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Spatial, Temporal and Demographical Analysis of Gulf of Mexico Research Priorities, the Effect of the Deepwater Horizon Oil Spill

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The University of Southern Mississippi

SPATIAL, TEMPORAL, AND DEMOGRAPHICAL ANALYSIS OF GULF OF MEXICO RESEARCH PRIORITIES, THE EFFECT OF THE DEEPWATER HORIZON OIL SPILL

by

Stephen Hiller Sempier

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
of the Degree of Doctor of Philosophy

May 2015

ABSTRACT

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A set of twenty equally-weighted national ocean research priorities were define in 2007, but it was not clear if these priorities applied for the Gulf of Mexico. A series of three longitudinal surveys of people who conduct research, sponsor research or use research for professional or recreational purposes was released that focused on the twenty research priorities and asked people how they rated each. A convenience sampling method was employed, which suggests that the results are constrained to the survey respondents and should not be extrapolated to a larger population. More than 1,500 people completed the 2013 GMRP survey and 1,124 of them rated all twenty national research priorities and four ecosystem service valuation priorities. Survey respondents rated the majority of research priorities as “high” or “very high” priorities but indicated that the research priorities are not equally important in the Gulf of Mexico. In addition, several indicators influenced how they rated the research priorities in 2013. The survey respondent’s area of expertise or discipline had the greatest influence on how they rated the priorities. Research priorities were also rated differently based on respondent’s relationship to research, affiliation, and sub-region within the

U.S. Gulf of Mexico. The categories that had the greatest differences compared to others include those that use research for recreational purposes and the business sector. Research sponsors had no difference in rating of research priorities between those that conduct research or use research for their profession. While comparing the same survey respondent's ratings in 2007, 2010 and 2013 seven out of 60 (11.7%) combinations of the research priorities across the three survey years were significantly different. However, only two of the twenty research priorities were rated significantly different between 2007 and 2013. The regional events that occurred between 2007 and 2013 such as the Deepwater Horizon oil spill may have changed the importance of research priorities for survey respondents over a short time period, however it may not have significantly changed the importance of many of the research priorities at the end of the six-year time period. A follow-on survey in 2016 could compliment this longitudinal work.

The University of Southern Mississippi

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Approved:

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Committee Chair

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May 2015

DEDICATION

The completion of my doctoral degree was only possible because of the unwavering support and encouragement by my wife, Tracie Tingle Sempier and the understanding of my children Savannah Autumn Sempier, Samuel Hiller Sempier, and James Carrig Sempier who missed many nights and some weekends with their dad so he could complete this degree. Finally, my parents, Leonard Romig Sempier and Hillane Adele Sempier, have supported my educational pursuit over five decades in innumerable ways. I appreciate my family's patience and support that have allowed me to reach this milestone.

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LIST OF ABBREVIATIONS

DWH	Deepwater Horizon
ESV	Ecosystem Service Valuation
GMRP	Gulf of Mexico Research Plan
JSOST	Joint Subcommittee on Ocean Science and Technology
NOAA	National Oceanic and Atmospheric Administration
NSGO	National Sea Grant Office
ORPP	Ocean Research Priorities Plan
RP	Research Priority
SPSS	Statistical Package for the Social Sciences

CHAPTER I

BACKGROUND AND CONTEXT

International and National Approaches to Setting Coastal and Environmental Research Priorities

There are many more research questions than resources available to adequately answer those questions. Research investments must be carefully considered due to the limited resources and competing demands for research dollars. Research questions and needs must be prioritized so that the most pressing and important issues are addressed. Numerous approaches have been used to prioritize research needs, but the approaches vary based on the discipline, groups initiating the research prioritization process and drivers to develop the prioritized lists (Cooke, Danylchuk, Kaiser, & Rudd, 2010; Fleishman et al., 2011; Rudd, 2011; Rudd & Lawton, 2013; Sutherland et al., 2009).

People throughout the world have participated in exercises that identify research needs at various scales. Recently, there have been efforts to identify and describe global coastal research questions (Rudd & Lawton, 2013). Other groups have identified and prioritized global-scale research topics on biological diversity and conservation science (Braunisch, Home, Pellet, & Arlettaz, 2012; Sutherland et al., 2009). Two other efforts identified the top forty priorities to inform conservation and management in the U.S. and a similar activity was undertaken for conservation science topics for Canada (Fleishman et al., 2011). In the above efforts the range of topics being considered and scale of geographic

area varied but the focus of each of these efforts was to identify research needs based on input from a representative group of experts.

A fundamental question is how to determine if a certain portfolio of research priorities would have a greater impact on society than a different portfolio of priorities (Sarewitz & Pielke Jr., 2007). Scientific research and the new knowledge and products that result from research investments can be viewed as a commodity. The investment can be examined from an economics perspective of supply and demand (McNie, 2007; Sarewitz & Pielke Jr., 2007). The people providing the “supply” are scientists that make discoveries and contribute to the scientific knowledge base. The people that generate the “demand” are policy makers and other people who utilize the science results to make decisions for their profession and in a broader sense used by society. The use of scientific knowledge has “acquired a very prominent position” because it is used in policymakers decisions and to identify if governance objectives are met (Kazancigil, 1998).

Federal US investments in the science disciplines and sub-disciplines that most closely aligned with coastal and ocean issues increased between 1978 and 2009 (Figure 1.1), however the investments in these disciplines have decreased relative to total federal research investments. The percent of total U.S. federal research investment in categories of “other life science” (non-NIH life science), “environmental science” and “social science” have all declined from 1970-2011 (Figure 1.2) (AAAS, 2014; National Science Foundation, 2014). This indicates that people allocating resources for the federal budget have prioritized other

research disciplines more than those that are closely aligned with ocean and coastal sciences. As resources to study the ocean and coastal regions become relatively scarce the need to carefully weigh and prioritize investments becomes greater.

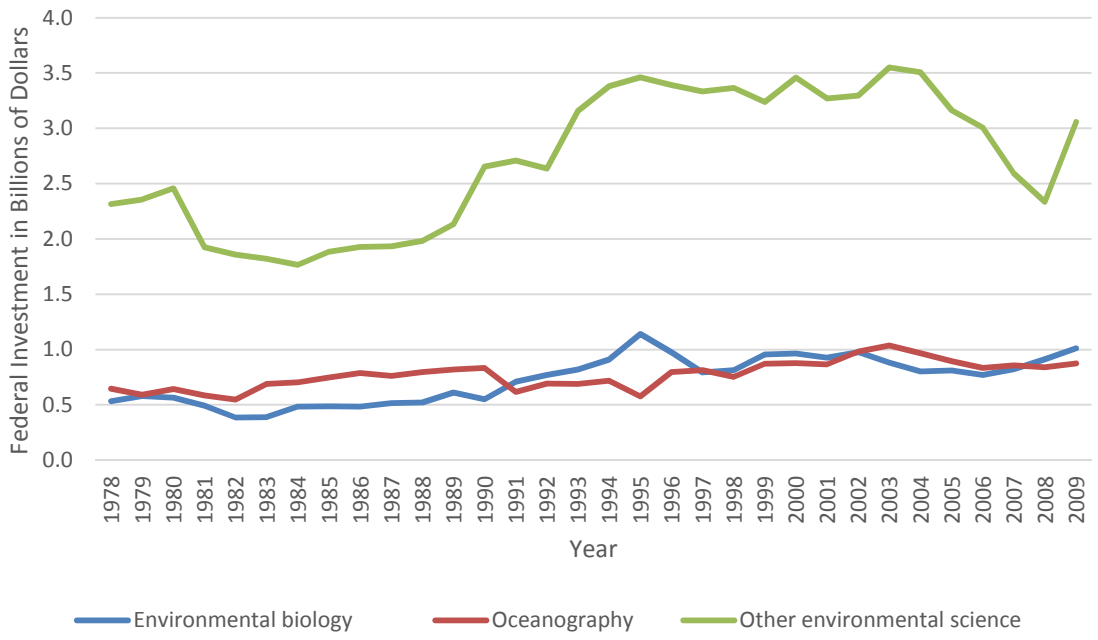


Figure 1.1. Total U.S. federal investment in select disciplines that are related to coastal and ocean research, in constant 2012 dollars. Data from AAAS (2014) and National Science Foundation (2014) was used to generate this figure.

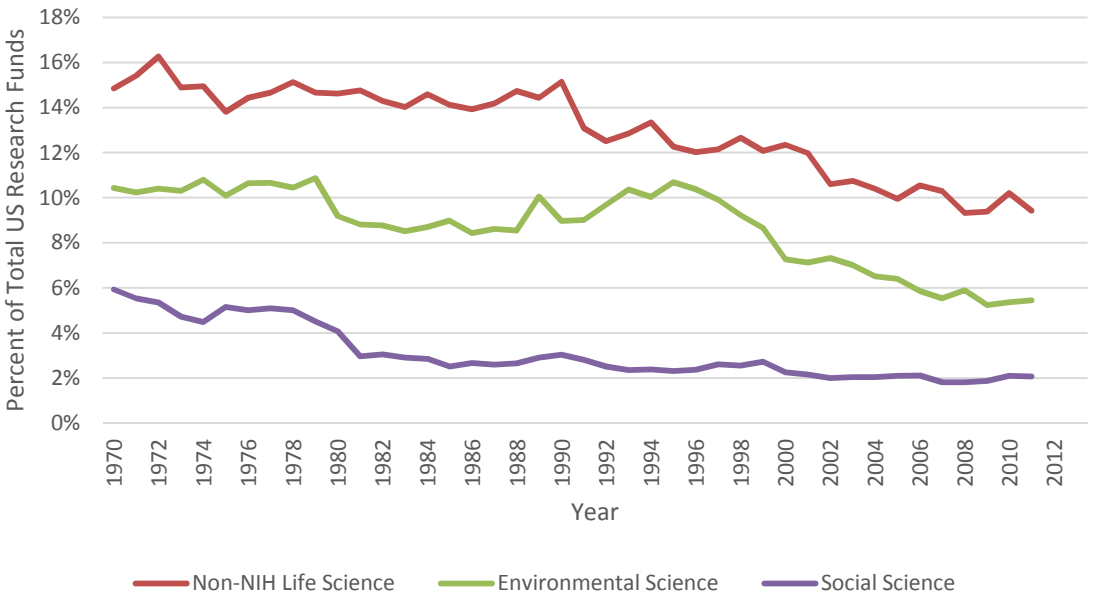


Figure 1.2. Percent of total U.S. federal research funding spent in select disciplines that are related to coastal and ocean research. Data from AAAS (2014) and National Science Foundation (2014) was used to generate this figure.

Regional Context

Due to the relative decrease of federal funding in disciplines closely aligned with coastal and ocean sciences there is a necessity to prioritize needs. The "Ocean Research Priorities Plan and Implementation Strategy" (ORPP) stated that on the national level all twenty research priorities were equally important (National Science and Technology Council, Joint Subcommittee on Ocean Science and Technology, 2007). One of the key questions is if this is true at a regional level. Are all twenty ORPP research priorities equally important for the Gulf of Mexico? The purpose of this dissertation is to understand if people prioritize a pre-set list of highly-vetted national ocean research priorities differently for the Gulf of Mexico and if there are differences in the prioritization

based on a person's background or if people changed the rating of research needs over time. Specifically, the following questions are answered.

Are the twenty national ocean research priorities and a set of four ecosystem service research priorities important in the Gulf of Mexico?—A fundamental question is if the previously established national research priorities resonate with the people who completed a region-wide survey. Do respondents agree that the national priorities apply to the Gulf of Mexico?

Is there a relative ranking of importance of the research priorities when they are applied to the Gulf of Mexico?—Although the national ocean research priorities were stated to be equally important, do the survey respondents agree that they are equally important in the Gulf of Mexico or are some priorities relatively more important than others in the region? Others have expressed that ecosystem service valuation is increasingly important (National Research Council, 2013). For the Gulf of Mexico, where do ecosystem service valuation (ESV) research priorities fit in terms of their relative importance compared to the other twenty research priorities?

Are there differences in how each of the research priorities are rated based on people's background and location?—People's perspective on the research priorities may vary depending on what type of organization they work for or where they are located in the Gulf of Mexico. Other factors may also weigh into their rating of research priorities including if they conduct research, use research for their profession or fund research projects. Finally, depending on the

person's discipline or area of expertise they may preferentially rate research priorities higher that match their interests.

Have the importance of the research priorities applied to the Gulf of Mexico changed between 2007, 2010 and 2013?—Between 2007 and 2013 the research priorities may have shifted for survey respondents. Multiple surveys were administered over that time period, and therefore we were able to evaluate if there were changes in the rating of priorities over time or if they were stable throughout the six year period.

It was predicted that the national research priorities described in the "Ocean Research Priorities Plan and Implementation Strategy" are not equally important in the Gulf of Mexico. It is also predicted that people from different sub-regions within the Gulf may rate the priorities differently and that those who have a background in a certain discipline will rate the priorities related to their discipline higher. Finally, research priorities that could be closely related to oil spill science were expected to rate higher post-Deepwater Horizon oil spill compared to the ratings in 2007. In order to have more context related to these research questions the sections below outline regional research planning efforts and how the original set of research priorities were derived for this survey-based research effort.

History of Regional Marine Research Planning in the U.S.

Coastal and marine regions are some of the most complex, vulnerable and valuable environments in the word (National Research Council, 2000). Investment in regional level marine and coastal research prioritization efforts is

not new. On an informal basis information was collected about research needs or the need for regional collaboration through conferences decades ago (Cofer-Shabica, Cofer-Shabica, & Cake, 1983; Mattox, 1975). The purpose of many regional research planning efforts is to bridge local and global scale approaches to research. The need for regional research does not suggest that smaller systems are completely understood, but it allows for larger-scale understanding of processes that may not be captured in localized research (National Research Council, 2000; Nixon, 1996).

In the early 2000's two landmark reports were released that focused on coastal and marine issues facing the United States. The Pew Oceans Commission released a report in 2003 that included an emphasis on establishing regional ocean ecosystem councils. The following year the U.S. Commission on Ocean Policy released a final report entitled, "An Ocean Blueprint for the 21st Century." This report echoed many of the same points identified in the Pews Ocean Commission report and devoted an entire chapter to "Advancing a Regional Approach." Within this chapter, the U.S. Commission on Ocean Policy indicated that research focused on regional concerns was "severely limited" and needed to be addressed (U.S. Commission on Ocean Policy, 2004). A comparison of the content of the Pews Ocean Commission report and the U.S. Commission on Ocean Policy was conducted and identified several commonalities between the two reports as they relate to regional research planning and funding. They include:

- double funding for basic and applied ocean science and research,
- develop a national ocean research and monitoring strategy,
- broaden programs to monitor and understand ecosystems, and
- encourage or establish regional ocean ecosystem councils or ocean councils (Granek, Brumbaugh, Heppell, Heppell, & Secord, 2005).

The Bush Administration provided a response to the report released by the U.S. Commission on Ocean Policy. This report was entitled, "U.S. Ocean Action Plan." The two most noteworthy items in the U.S. Ocean Action Plan as it relates to the focus of this dissertation is 1) developing an ocean research priorities plan and implementation strategy that was to be completed by the end of 2006 and 2) supporting a regional partnership in the Gulf of Mexico, which eventually evolved into the Gulf of Mexico Alliance (United States, 2006). The National Science and Technology Council's Joint Subcommittee on Ocean Science and Technology (JSOST) was charged with developing the national ocean research priorities plan and implementation strategy, which is the first document of its kind. On January 26, 2007, JSOST released "Charting the Course for Ocean Science in the United States for the Next Decade: An Ocean Research Priorities Plan and Implementation Strategy," also referred to as Ocean Research Priorities Plan or ORPP, in response to the U.S. Ocean Action Plan (National Science and Technology Council, Joint Subcommittee on Ocean Science and Technology, 2007).

Twenty-five federal agencies collected and analyzed input through a multi-phase process. The draft plan was developed based on input from a large national workshop held in Colorado, which had 231 participants. Input was also collected through several comment periods advertised in the Federal register, a series of regional meetings and sessions held at scientific society conferences (National Research Council Committee to Review the Joint Subcommittee on Ocean Science and Technology's Research Priorities Plan, 2007; R. Spinrad and S. Walker, personal communication, February 17, 2015). The completed ORPP became a guiding document for addressing national ocean research needs. It contained six societal themes and twenty equally-weighted research priorities. Each research priority began with the words “understand” or “apply understanding,” reflecting both basic research and applied research priorities.

In 2006, the National Sea Grant Office (NSGO) allocated resources to identify regional research and information needs. The NSGO defined nine regions throughout the U.S. to develop regional research and information need reports or plans. The regions were:

- Alaska,
- Caribbean,
- Great Lakes,
- Gulf of Maine,
- Gulf of Mexico,
- Insular Pacific,
- Mid-Atlantic,

- South Atlantic, and
- West Coast.

From 2007 through about 2011 the regional research planning efforts were initiated throughout the country. Seven regional reports or plans and two websites that served as final reports emerged from these efforts (Cicin-Sain, Balgos, Appiott, Hicks, & Van Hoeven, 2012; Gulf of Maine Regional Ocean Science Council, 2009; Laporte et al., 2010; Reutter, 2014; Risien, 2009; Seda-Miró, 2013; Sempier, Havens, Stickney, Wilson, & Swann, 2009; Wadsworth & Criddle, 2013).

The 2007 Gulf of Mexico Research Plan

The Sea Grant-coordinated effort for the Gulf of Mexico region included participation and support from the National Sea Grant Office, Texas Sea Grant College Program, Louisiana Sea Grant College Program, Mississippi-Alabama Sea Grant Consortium and Florida Sea Grant College Program. The ORPP was released in January 2007, which contributed to the Sea Grant-coordinated regional planning efforts. In the Gulf of Mexico the ORPP priorities were examined as they applied at the regional level. In the Fall of 2007, a web-based regional research planning survey was sent to at least 7,571 listserv and e-mail contacts, 68 media outlets, 7 websites, and people announced the survey at five or more conferences and workshops. By the conclusion of the Gulf of Mexico regional research planning process described above the following had happened:

- More than 260 universities, government agencies, businesses, NGOs, and other organizations were represented in this process,

- Approximately 300 people participated in five regional workshops,
- More than 1,500 people completed at least a portion of the survey,
- More than 20,000 years of professional experience was represented in the survey results,
- 571 survey comments were provided and 20 ORPP research priorities were rated, and
- 261 research topics were identified (Sempier et al., 2009).

At the conclusion of the data gathering process the results were analyzed and synthesized both within the context of the ORPP as it related to the Gulf of Mexico and independent of the ORPP. The Gulf of Mexico Research Plan (GMRP) was released in 2009 and identified five broad Gulf of Mexico topic areas:

- Connectivity of habitats and habitats to resources
- Ecosystem health indicators
- Freshwater input and hydrology
- Sea level change, subsidence, and storm surge
- Water quality and nutrients

A Regional Stressor Changes the Landscape in the Gulf of Mexico

On April 20, 2010 the *Deepwater Horizon* drilling rig exploded while drilling the Macondo deepwater well, and this explosion resulted in the death of eleven people and seriously injured others (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011). The Deepwater Horizon (DWH) oil spill also resulted in as much as 4.9 million barrels, which is more than 200

million gallons of crude oil entering the Gulf of Mexico over an 85-day period (Peterson et al., 2011; United States, 2011). The Deepwater Horizon oil spill drew international attention to the Gulf of Mexico and to the people and environment that were directly being impacted by the oil spill.

An oil spill of this magnitude had never occurred before, and there were many science-based questions that emerged while millions of gallons of oil began flowing into the region. The oil spill suddenly became a large-scale, unintentional experiment, and there were many research questions that were needing to be answered (R. Highsmith, personal communication, March 23, 2011). The GMRP was released just seven months prior to the DWH event, yet was in need of an immediate updated in light of the significant stressor on the region. The team that developed the Gulf of Mexico Research Plan rapidly developed a small, targeted survey to leaders in the research community (researchers, research administrators, and research users) to identify economic, environmental, and social research needs. This survey was released 2.5 weeks after the oil spill occurred and closed on May 24, 2010. The survey results were shared broadly at conferences, workshops and with NOAA, state agencies and others. The results of this rapidly implemented survey was used to inform a large-scale survey that was administered after the well was capped and the oil stopped flowing from the DWH oil spill. The survey was developed using a similar process as the original 2007 GMRP survey. The 2010 GMRP survey received 1,000 responses, was open from August 26, 2010 through October 12, 2010 and included many identical questions as the 2007 GMRP survey. The 2010 survey

included additional oil-spill specific questions. There was an indication that research priorities and their relative ratings may have changed between 2007 and 2010. The results of the large-scale survey conducted in 2010 was shared with leaders and decision-makers working in the Gulf of Mexico through presentations, emails and other forms of communication.

With billions of dollars being invested in the Gulf of Mexico as a direct result of the DWH oil spill it is imperative that there is a clear understanding of the regional research priorities so that plans can be formulated to successfully address those priorities. The research and restoration landscape in the Gulf of Mexico has changed substantially due to the DWH oil spill. There are limited options to simplify the complex relationships and streamline coordination between the groups that have different charges related to oil spill science and restoring the Gulf of Mexico and the communities impacted by the oil spill. Some organizations such as the National Academy of Science's Gulf Research Program have specific goals, which are:

> GOAL 1 Foster innovative improvements to safety technologies, safety culture, and environmental protection systems associated with offshore oil and gas development.
>
> GOAL 2 Improve understanding of the connections between human health and the environment to support the development of healthy and resilient Gulf communities.
>
> GOAL 3 Advance understanding of the Gulf of Mexico region as a dynamic system with complex, interconnecting human and

> environmental systems, functions, and processes to inform the protection and restoration of ecosystem services. (Advisory Group, National Academy of Science Gulf Research Program, 2014)

Other organizations such as NOAA's Restore Science Program purpose is to, "achieve an integrative, holistic understanding of the Gulf of Mexico ecosystem, as well as to support (to the maximum extent practicable) restoration efforts and the long-term sustainability of the ecosystem, including fisheries, wildlife, habitats, fishing industries, coastal communities and their economies." (NOAA, 2014) Another example is the National Wildlife and Fisheries Foundation's Gulf Environmental Benefit Fund's purpose, which is to, "support projects that remedy harm to natural resources (habitats, species) where there has been injury to, or destruction of, loss of, or loss of use of those resources resulting from the Deepwater Horizon oil spill." (National Fish and Wildlife Foundation, 2014)

The aforementioned groups are a small sample of the groups that are trying to identify Gulf-wide research priorities or would like to incorporate the best available science into their programing. However, learning the answers to the questions outlined in this dissertation provides additional insight for different groups to consider as they move ahead with strategic planning and implementation of their programs. The results from this dissertation have already been and will be broadly shared with those who are responsible for developing, implementing, and proposing work to be funded by the various programs that are investing in Gulf of Mexico research and restoration.

CHAPTER II

METHODS

Survey Design

The 2013 Gulf of Mexico Research Plan survey was largely based on the surveys that were administered by the four Sea Grant College Programs bordering the Gulf of Mexico in 2010 and 2007. All three of these surveys had 26 identical questions and one very similar question (Appendixes A through C). There are several advantages to using similar surveys with the longitudinal study. First, responses can be more easily compared among years. Second, because the original survey was designed and thoroughly tested for validity then it provided a foundation from which to refine and administer the follow-on surveys. When possible, it is best to use an already tested set of questions in a survey (Fink, 2003). The survey design for all three surveys followed many of the suggestions outlined in Fink (2003), which included the bulleted headings below:

- Ask purposeful questions—The survey questions pertained to rating research priorities or related topics to directly inform this research.
- Use time periods that are related to the importance of the question—The time periods were stated within the survey and respondents were asked to answer questions within these timeframes. People were asked to rate the level of importance of the twenty-four research priorities over the next fifteen years.
- Have questions reviewed by experts—Social scientists from NOAA and people that were coordinating the overall GMRP project reviewed the

survey instrument and provided feedback, which was incorporated into the survey design.

- Have the questions reviewed by potential respondents—Scientists and managers in the Gulf of Mexico reviewed and beta tested the survey. These reviewers were members of the GMRP Planning and Review Council, which was assisting with the overall development of the regional research plan and understood the context from which the survey was being used.
- Adopt or adapt questions that have been used in other surveys—The 2010 and 2013 surveys used many of the same questions as the ones used in the 2007 survey.
- Avoid biasing words and phrases—The survey was designed to reduce bias. Many of the terms and phrases came from national reports or were other commonly used, neutral terms. For example, the research priorities that people were asked to rate were from the ORPP and there was a follow-up opportunity for people to identify their own research priorities via open-ended questions so that people were not locked into a pre-defined list of priorities.
- Keep questionnaires uncluttered and easy to complete—This was accomplished by using SurveyMonkey to administer the survey. The SurveyMonkey design is inherently uncluttered and the process to select answers is straightforward. Respondents were likely familiar with this format, which is commonly used.

Using a variety of response choice types is also critical component of a well-designed survey (Podsakoff, MacKenzie, Jeong-Yeon Lee, & Podsakoff, 2003). The GMRP surveys used a combination of categorical, ordinal and numerical response choices to ascertain different answers. The number of questions ranged from 41 to 65 depending on the survey. Based on results from pre-testing each survey took less than 15 minutes to complete. As with other surveys, there were additional questions that could have been asked and were initially proposed, however they were eliminated to reduce the amount of time a respondent would have to dedicate to complete the survey. In addition, skip logic questions were used to reduce respondent burden and only present relevant questions to them. Skip logic questions present follow-up questions that a respondent could be asked based on their answer to an initial question. This can reduce the number of questions a respondent is asked and also customize the survey instrument to only collect information relevant to the respondent. For example, the GMRP survey included a skip logic question about respondent's primary state of residence. If their response was Mississippi the survey would present only the list of Mississippi counties for them to identify as the county of their residence. The key questions were the ORPP research priority rating questions that used a balanced 5-point Likert scale, which is recommended option for soliciting this type of information (Fink, 2003). People were asked to rate the priority level of each research need using the scale of "very low," "low," "medium," "high" and "very high." In addition, the scale was ordered with the negative end of the scale first (very low), which is recommended, although not

critical since the direction may not matter if the respondent believes the topic is important (Fink, 2003). Finally, Burkey and Kuechler (2003) outlined several web-based survey suggestions to improve the survey design and take advantage of this platform. The points they made and were used in the surveys related to this project are listed below.

- Provide a brief rationale for the survey on the first page—This was provided.
- First question should be easy to answer—The first question asked which state the respondent primarily resided.
- The survey should take less than 20 minutes to complete—The survey took less than 15 minutes to complete.
- A progress bar should be provided—This was provided.
- Have the ability to accept multiple responses simultaneously—SurveyMonkey provided this capability.
- Pilot test the survey—This was completed prior to survey release.

All of the above strategies improved the overall survey design.

Survey Question Development

People were asked to rate the level of importance of the twenty research priorities that were outlined in the *Ocean Research Priorities Plan and Implementation Strategy* (Table 2.1) (National Science and Technology Council, Joint Subcommittee on Ocean Science and Technology, 2007). These same set of questions were asked in the 2007 and 2010 GMRP surveys. People were

asked to rate the importance as it applies to the Gulf of Mexico over the next fifteen years.

The ORPP was released in 2007. An update called “Science for an Ocean Nation: Update of the Ocean Research Priorities Plan” was released in 2013 (National Science and Technology Council, Subcommittee on Ocean Science and Technology, 2013). This document primarily added cross-cutting topics and made other edits to the original document. The twenty core research priorities were largely unchanged. Because the original ORPP priorities were included in the 2007 and 2010 GMRP surveys the decision was made to keep the same priorities described in the previous surveys in the 2013 GMRP survey so that the longitudinal analysis could be conducted.

Four ecosystem service valuation (ESV) questions were developed through consultation with several ESV experts in the Gulf of Mexico. The ESV research priorities were asked in the same format as the 20 ORPP questions immediately following the ORPP research priorities.

The GMRP surveys focused on rating pre-defined research priorities using a Likert scale and included multiple choice questions that could provide context to determine if ratings of research priorities differed based on survey respondents discipline, location, relationship to research or affiliation. The format of the questions were designed to be quickly answered, reduce survey respondent burden and simplify the quantitative portion of the survey analysis.

Table 2.1

The twenty research priorities described in the Ocean Research Priorities Plan and Implementation Strategy arranged by theme area and priority code

Ocean Research Priorities Plan theme area*	Ocean Research Priorities Plan research priority*	Priority code
Stewardship of Natural and Cultural Ocean Resources	Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments	RP1
	Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability	RP2
	Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability	RP3
	Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts	RP4
Increasing Resilience to Natural Hazards	Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events	RP5
	Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards	RP6
	Apply understanding to develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation	RP7

Table 2.1 (continued).

Ocean Research Priorities Plan theme area*	Ocean Research Priorities Plan research priority*	Priority code
Enabling Marine Operations	Understand the interactions between marine operations and the environment	RP8
	Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain	RP9
	Apply understanding of environmental impacts and marine operations to enhance the marine transportation system	RP10
The Ocean's Role in Climate	Understand ocean-climate interactions within and across regions	RP11
	Understand the impact of climate variability and change on the biogeochemistry of the ocean and implications for its ecosystems	RP12
	Apply understanding of the ocean to help project future climate changes and their impacts	RP13
Improving Ecosystem Health	Understand and predict the impact of natural and anthropogenic processes on ecosystems	RP14
	Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems	RP15
	Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management	RP16

Table 2.1 (continued).

Ocean Research Priorities Plan theme area*	Ocean Research Priorities Plan research priority*	Priority code
Enhancing Human Health	Understand sources and processes contributing to ocean-related risks to human health	RP17
	Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health	RP18
	Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats	RP19
	Apply understanding of ocean ecosystems and biodiversity to develop products and biological models to enhance human well-being	RP20

*Names of Ocean Research Priorities Plan theme areas and research priority were derived from National Science and Technology Council, Joint Subcommittee on Ocean Science and Technology (2007)

Validity

Validity of a survey instrument indicates how well the survey measures what it is designed to measure. Two forms of validity were used to validate the core questions in the 2007 survey, which were then used again in 2010 and 2013. The two forms were (1) *face validity*, which includes a cursory review by people not in the field of study, and (2) *content validity* that involves experts in the field that can understand the content and ensure that there are not superfluous or poorly worded questions (Litwin, 1995). Face validity was tested by sharing a draft version of the survey instrument with people not in a marine or coastal science related field to identify if the survey appeared reasonable. The

test for content validity included a thorough review by the Sea Grant directors of the four Sea Grant college programs that border the Gulf of Mexico who oversaw the coordination of the project, two National Oceanic and Atmospheric Administration (NOAA) social scientists and the GMRP Planning and Review Council. These groups represented experts in the diverse fields that were covered in the survey and in survey design methodology. In the content validity phase participants not only reviewed the questions but pilot tested the instrument in SurveyMonkey to ensure that the skip logic and other functions of an online survey worked properly. They reviewed the core research priority rating and other related questions that were included in the 2007, 2010, and 2013 surveys. Input that was collected from these groups was used to update and improve the instrument before it was finalized and sent to potential respondents. Finally, although there was not a “gold standard” for this survey to be compared the foundation of the survey was based on the previously developed ORPP research priorities, which were highly vetted throughout the nation and were the basis for the first national ocean research priorities plan.

Soliciting Input to the 2013 Gulf of Mexico Research Plan Survey

Sampling

The population for the survey included people who conduct research, use research as part of their profession, use research for recreational purposes or sponsor research. In some cases the same person could fall into multiple categories (e.g. someone with resource management and research responsibilities or a person who conducts research and also manages a program

that sponsors research). In addition, the goal was to sample people from across different science-related disciplines and from a variety of affiliations including people from universities, government agencies, non-governmental organizations and from the business/industry sector.

A broad sampling frame was identified because there were several different groups that were being targeted for the survey. In order to solicit input from the broad sampling frame a convenience sampling approach was used. Convenience sampling is a form of non-random sampling that is commonly used and is comprised of individuals that are easy to recruit (Kelley et al., 2003). Convenience sampling typically provides less accurate information than a random sampling method. However, there are “very limited” options for conducting probability sampling when implementing a survey through web and email contacts (Kelley et al., 2003). This is partially due to a requirement for probability sampling that every person in the population has a known, non-zero chance of being sampled in the survey (Kelley et al., 2003). One challenge with conducting a random sample for this work was to identify the entire population and contact information for the population from which to draw a random sample. It was assumed that people who were engaged in regional activities, completed a previous GMPR survey or were part of the distribution lists that were sent the survey represented a representative sample of the population. Although a convenience sampling approach was used the survey was sent to a broad cross section of people that represented the target population and substantial effort

was taken to reach a large number of the population and provide them an opportunity to complete the survey.

A multi-phased, stepwise approach was used to distribute the survey and solicit responses from target audience. Several sampling methods were employed and each phase is described in greater detail below. Three of the four forms of nonprobability sampling methods outlined by Fricker (2008) were used to administer the 2013 GMRP survey. These methods include volunteer (opt-in) panels, which includes people who are pre-recruited. Phase I outlines how people who previously participated in a GMRP survey were specifically targeted. Phase II involved contacting people who were interested in regional research activities and included in email lists that were generated by other organizations. Finally, self-selected survey method was used when the survey was distributed broadly in Phase III and allowed anyone who was contacted or learned about the survey in Phase III to participate in the survey. In the 2007 GMRP a similar approach as Phase III was used and the 2010 GMRP survey used approaches that were similar to Phases I, II and III. Like other web-based, nonprobability sampling methods, this work should be considered exploratory and the results are a reflection of the individuals who completed the survey and should not be assumed to reflect the results of a larger population. However, comparing survey results between different groups of respondents is appropriate and valid.

Phase I—Contacting people who previously completed a GMRP Survey

People were asked to complete the 2013 Gulf of Mexico Research Plan (GMRP) survey in several phases. People who had completed the 2007 and/or

2010 GMRP surveys were contacted in this phase. People who previously completed a GMRP survey in the past were sent a unique web link to the 2013 survey, which enable the responses from 2013 to be linked to their previous responses.

The list of contacts for Phase I distribution of the 2013 GMRP survey had three contact lists, which were people who:

1. completed both the 2007 and 2010 surveys and provided their name in the previous surveys,
2. only provided their name in their 2007 survey response, and it was not known if they completed the 2010 survey, and
3. only provided their name in their 2010 survey response, and it was not known if they completed the 2007 survey.

When the email addresses were uploaded to SurveyMonkey several of the email addresses were not permitted into the SurveyMonkey collector because the person had previously "opted out" of receiving emails from SurveyMonkey. SurveyMonkey maintains a spamming policy that prevents the use of their software to contact people who previously let SurveyMonkey know they did not want an email from SurveyMonkey. Since SurveyMonkey is used by many groups and organizations someone may have received a survey in the past from SurveyMonkey, and if they responded that they did not want to get future surveys they would be put on SurveyMonkey's "opt out" list. This could present bias if people who were on the "opt out" SurveyMonkey list were different than those that were not on the list. Therefore, people who were on the "opt out"

SurveyMonkey list were contacted via other means. Because we know that the people we were contacting in Phase I completed a previous GMRP survey we assumed that they would be willing to be notified about a future GMRP survey. Also, we know they had not “opted out” of the previous GMRP survey because they completed it. We assumed they must have “opted out” of a different survey that SurveyMonkey administered.

SurveyMonkey does not reveal which email addresses are on their “opt out” list when you upload email addresses but that was determined by downloading the list of people SurveyMonkey contacted and comparing to the original list that was uploaded to SurveyMonkey. Three new SurveyMonkey collectors were created to share custom web links to the survey for to those who “opted out” of SurveyMonkey in each of the three original 2013 GMRP survey collectors. A unique web link to the 2013 survey was manually created for people who had not been contacted by SurveyMonkey directly because they had previously “opted out.”

The first email request to complete the survey was sent on October 22, 2013. Emails were released automatically by SurveyMonkey and manually via Microsoft Outlook (Outlook). After the release on October 22, 2013 several email addresses bounced and were recorded. For each email address that bounced a web search was conducted to see if that individual had changed email addresses. If an alternate email address was found then the email address was recorded. On October 28, 2013 people who had alternate email addresses from

the bounced emails were individually emailed a unique web link to the survey using Microsoft Outlook.

Web-based survey response rates have been demonstrated to increase when reminder emails are used (Sid Nair, 2013). The first set of reminder email requests to complete the 2013 survey was sent on October 30, 2013. The reminder was automatically sent by SurveyMonkey to people who completed the 2007 and/or 2010 GMRP survey.

On October 30, 2013 the list of people who completed the 2013 survey was downloaded from SurveyMonkey and compared with the list of people in the Excel worksheet who had “opted out” of receiving SurveyMonkey emails. People who had “opted out” and not completed the 2013 GMRP survey were manually sent an email reminder via Microsoft Outlook.

A final reminder email was sent on November 11, 2013 to those who had not yet completed the 2013 survey. The final reminder email was automatically released by SurveyMonkey or manually released via Microsoft Outlook in the same manner as the first set of reminder email requests.

Phase II—Contacting people who previously expressed interest or participated in other regional research planning activities

The Phase II release of the 2013 GMRP survey targeted people who previously expressed interest or participated in Gulf-wide research planning activities but may not have completed the 2007 or 2010 GMRP survey. People who had participated in GMRP organized workshops and science meetings between 2007 and 2013 or participated in regional workshops and meetings

organized by others after the DWH oil spill were directly contacted and asked to complete the 2013 GMRP survey. A list of participants was created based on contacts from the following workshops, science meetings, and the 2010 GMRP survey:

- 2007 Gulf of Mexico Research Plan workshop, Mobile, AL
- 2007 Gulf of Mexico Research Plan workshop, Biloxi, MS
- 2007 Gulf of Mexico Research Plan workshop, Tampa, FL
- 2007 Gulf of Mexico Research Plan workshop, Baton Rouge, LA
- 2007 Gulf of Mexico Research Plan workshop, Galveston, TX
- Other people identified as being potentially interested in GMRP results as identified by 2010 GMRP survey respondents
- 2010 Deepwater Horizon Oil Spill Principal Investigator Conference, St. Petersburg, FL
- 2012 Bays and Bayous Symposium, Biloxi, MS
- 2013 Gulf of Mexico Oil Spill and Ecosystem Science Conference, New Orleans, LA
- 2013 Gulf Restoration Science Workshop, Long Beach, MS

Additional contacts were found through two web-based lists of Principal Investigators who were conducting oil spill research that was related to the DWH oil spill. The lists were:

- National Science Foundation Oil Spill RAPID award Principal Investigators (http://nsf.gov/awardsearch/advancedSearchResult?BooleanElement=ALL&ProgRefCode=5987&BooleanRef=ALL&ActiveAwards=true&#results)

- Principal Investigators listed in the Gulf of Mexico Sea Grant oil spill database (http://gulfseagrant.tamu.edu/oilspill/database.htm)

The contacts from the above twelve lists were combined into a single list of 2,360 contacts in Excel. In many cases the same person was listed several times after the twelve lists were combined because they were involved in multiple activities. Duplicates were removed and the email address from the most recent event that they attended was kept in the list. In addition, the list was compared to the list of people and email addresses contacted in Phase I of the survey release. If the person was already contacted in Phase I they were removed from the Excel list. This resulted in a list with no duplicates or people contacted from Phase I and was called “Phase II contacts.”

On November 4, 2013 an email request with a unique web-link to the survey was released automatically by SurveyMonkey to all of the Phase II contacts that had not “opted out” of SurveyMonkey. The Phase II contacts who had “opted out” were manually sent a link to the survey via Microsoft Outlook. On November 11, 2013 a final reminder was sent to the “Phase II contacts” who had not yet complete the survey and had not “opted out” of receiving SurveyMonkey emails. This email was sent automatically by SurveyMonkey.

Phase III—Broad release of the 2013 GMRP survey

Phase III involved the broad distribution of the survey through a network of regional groups working in the Gulf of Mexico. The rationale for this approach was to be as inclusive as possible because this survey was part of a larger project supported by NOAA and Sea Grant that intended to collect input from

groups interested in regional research priorities. This approach was also consistent to the approaches used for the 2007 and 2010 GMRP surveys. A SurveyMonkey collector was created with a generic web link. The SurveyMonkey web link allowed only one response per computer to reduce the chance that someone would complete the survey more than once. The following groups were asked to share the announcement and web link to the 2013 GMRP survey:

- Florida Sea Grant College Program
- Gulf of Mexico Alliance Administrative Office
- Gulf of Mexico Alliance Environmental Education Network
- Gulf of Mexico Coastal Ocean Observing System
- Gulf of Mexico National Estuarine Research Reserve
- Gulf of Mexico National Estuary Programs
- Gulf of Mexico Restoration Council
- Gulf of Mexico Universities Research Consortium
- Louisiana Sea Grant College Program
- Mississippi-Alabama Sea Grant Consortium
- National Academies of Science Gulf of Mexico Program
- NOAA Gulf of Mexico Regional Coordination Team
- NOAA Gulf of Mexico Science Plan Group
- Northern Gulf Institute
- Texas Sea Grant College Program
- Water Resource Research Institutes in states with watersheds connected to the Gulf of Mexico

Contacts for each of the above organizations were sent sample language to include in emails or listservs and press releases. In addition, people from Mexico listed in Gulfbase.org were directly contacted and asked to complete the survey. Contacts in Phase III were sent the information between November 11, 2013 and November 19, 2013 and asked to share the survey with their networks. Because the people contacted through Phase III were not directly contacted by the researchers of this project it was not known if a person who had previously been contacted in Phase I or Phase II was again contacted in Phase III another or multiple times. It is assumed that this was likely the case because people who were interested in regional activities were likely also on listservs listed in Phase III and because there was antidotal evidence from people that they were asked to complete the survey from more than one source.

Sources of Error

There are several sources of error associated with any survey. There are four primary sources of survey error: errors of coverage, sampling error, nonresponse error, and measurement error (Burkey & Kuechler, 2003; Fricker, 2008; Spitz, Niles, & Adler, 2007). Each form of error is summarized along with a description of how it was address in the 2013 GMRP survey.

Errors of coverage occur when a portion of the population is not included in the sample or cannot access the survey and reflects the difference between the population of interest and those sampled (Burkey & Kuechler, 2003; Fricker, 2008; Spitz et al., 2007). This may occur if people are unable to access the internet. The target audiences for this survey do have access to the internet and

web-based surveys through their profession, and this was not a limitation in this survey. The 2013 GMRP survey used a convenience sample method, which makes determining coverage error difficult. However, substantial effort was taken to reach members of the population of interest so that people interested in Gulf of Mexico research would have an opportunity to provide their input.

The second form of error is sampling error, which occurs from the sample not completely reflecting the target population and indicates that different samples from the same population would result in unlike results (Fricker, 2008; Hoets, 2014). Sampling error is greater when a convenience sample is taken compared to simple random sampling (Kelley et al., 2003). The people who were asked to complete the survey were not disinterested individuals but were people who were generally well-aware of coastal issues and funding and policies associated with coastal research. This survey did not target the general public and the results are not a reflection of the general public. This form of error can be partially resolved through a large sample size. Although the size of the target population could not be enumerated one of the goals of the survey was to have a large number of responses to reduce this potential form of error. Based on the 2007 and 2010 GMRP survey there was expectation that there would be a large sample size and therefore lower sampling error in the 2013 survey. In 2013 there was an effort to develop a long list of contacts and email addresses of people who were familiar with Gulf of Mexico research and conducted research, sponsored or administered research funding, or used research for their profession or other uses. Listservs, newsletters and other means were included

in a strategy to identify and distribute the survey broadly. The survey was open for several weeks, which allowed people to receive notice and have time to complete it. This also allowed the survey to be advertised through different media that may take days or weeks to be released. For example, if the editor of a newsletter learned about the survey it may have taken a few weeks before the information would reach the recipients of the newsletter. In addition, draft press releases and listserv language were sent to people who could use them to help distribute the survey, and therefore increased the likelihood that they would distribute the survey because the editor of the newsletter did not need to take time to write content about the survey. The emails and sample press release, newsletter and listserv language that were used to advertise the survey are in Appendix D.

Non-response error can also cause bias, which is described later in this dissertation. This third form of error occurs at two levels. It could be caused by a person not completing the survey at all (unit nonresponse) or could occur if a respondent only completes a portion of the survey and leaves some questions unanswered (item nonresponse) (Fricker, 2008; Spitz et al., 2007). As with sampling error both unit nonresponse and item non response error can be overcome through obtaining a large sample size.

Unit nonresponse error can influence the survey results if some subpopulations are underrepresented because they chose to not complete the survey. Web-based surveys are a preferred method to overcome nonresponse error compared to telephone surveys because if a call is from an unknown caller

a potential survey respondent may not answer the phone, whereas if a potential survey respondent receives an email about a survey with a subject line that is of interest they are more likely to open the email and possibly complete the survey (Spitz et al., 2007). However, this does not work if a potential respondent receives many emails and chooses to not read the emailed survey invitation or if the email is filtered by a spam filter (Spitz et al., 2007). Survey administration programs such as SurveyMonkey have methods to reduce the chances that the survey will be treated as spam, which includes providing an opt out option in each survey. Also, reminder emails were sent to many potential respondents so that they had multiple opportunities to complete the survey if the first invitation was not read in their email inbox.

Item nonresponse occurs when an individual does not answer all questions in the survey (Burkey & Kuechler, 2003; Spitz et al., 2007). SurveyMonkey has a function that requires answers to all questions. Although this approach would reduce or eliminate this form of error it would also “force” respondents to answer all questions, and therefore this approach was not used for the survey. One suggestion is to remind participants that they have not yet completed the survey in order to encourage them to continue answering questions (Spitz et al., 2007). This strategy was used by including a progress bar at the top of the survey page that identified the percent of the survey that was already complete. In addition, skip logic was employed to only ask respondents questions most relevant to them and reduce the risk that they leave the survey before completion. Finally, unit or item nonresponse error can be caused by

complexities in completing the survey (Burkey & Kuechler, 2003). SurveyMonkey was used, which presents the survey in a format that is widely used because SurveyMonkey has hosted 43 million surveys with 479 million unique visitors (SurveyMonkey, 2014). The method to submit responses was clearly described.

The final form of survey error is measurement error, which occurs when a respondent answers a question differently than how they should. This can occur if the respondent does not want to reveal their true answer due to a sensitive question or if they do not understand the question correctly, which could be due to incorrectly displaying the response scale and the design of the scale (Fricker, 2008). Web-based surveys can display scales that are outside of the web browser window or change position as the window changes (Burkey & Kuechler, 2003). SurveyMonkey takes this into consideration and the survey was tested in various size web browser windows prior to release to ensure that the scale was displayed properly. Additional strategies to reduce measurement error were employed for the GMRP survey and are outlined in Podsakoff et al. (2003). The first strategy was that different response formats were used throughout the survey. Another strategy was to space the variables used in this analysis throughout the survey and not immediately after each other. Also, page breaks distributed the questions further and reduced the risk of making edits to previous questions due to the influence of new questions later in the survey. This reduces bias in the retrieval phase of answering questions; reduces the risk that respondent's previous answers influenced their answers; and makes previous answers less accessible (Podsakoff et al., 2003). A final strategy to reduce

measurement error was to allow responses to be anonymous, which reduces the chance that respondents would answer based on external influences or how they think the researcher thinks they should answer (Podsakoff et al., 2003).

Although the survey was anonymous in some cases people were told that their input would be linked to their responses in previous years. However, the email told respondents that their identifiers would not be shared, which would maintain their anonymity beyond the research team. Finally, the 2013 GMRP survey did not include any sensitive questions, and the questions were tested and reviewed by a group external to the researchers for this project prior to finalization. This suggests measurement error was minimized.

Bias

Bias can impact all facets of conducting survey-based research. Bias can be introduced in the survey design phase, survey distribution phase, data interpretation phase and reporting phase. Bias can be introduced by both the respondents to the survey and the researchers who design the survey instrument and interpret the results from the survey. Qualitative research relies on human input and therefore the context from which input is provided is through that person's values, perspectives, and worldview (Merriam, 1998). In addition, the researcher interpreting the data also brings their construct of reality to the research design and analysis (Merriam, 1998). Bias can negatively impact data interpretation when the researcher must determine notable patterns in the data and how to report them. Merriam (1998) provided the following quote from (Diener & Crandall, 1978), which is:

> There is simply no ethical alternative to being as nonbiased, accurate, honest as is humanly possible in all phases of research. In planning, conducting, analyzing, and reporting his work the scientist should strive for accuracy, and whenever possible, methodological controls should be built in to help….Biases that cannot be controlled should be discussed in the written report. Where the data only partly support the predictions, the report should contain enough data to let readers draw their own conclusions. (p. 216)

This guidance was followed and details and rationale will be provided throughout this dissertation on why certain decisions were made and how results were interpreted in order to address bias.

Bias occurs when the sample does not represent the population, which cannot be overcome by increasing the sample size because the sample is inherently biased (Fricker, 2008). Fricker (2008) identifies four forms of bias in survey development, which are: frame coverage bias, selection bias, size bias and nonresponse bias.

Frame coverage bias is a result of sampling the population but missing one or more key components of that population in the sampling (Fricker, 2008). The GMRP surveys specifically targeted those who conduct, use, or sponsor Gulf of Mexico research. The survey distribution methodology specifically targeted these groups in order to reduce frame coverage bias.

Selection bias occurs in the process to identify people to participate in the survey (Fricker, 2008). The GMRP used a combination of an open solicitation

process and targeted emails to people who had previously participated in GMRP surveys, were known to have interest in the research regional planning efforts or were funded to conduct research in the Gulf. This may have presented selection bias because people who were not actively engaged in these activities (Phase II) or were not on the listservs or other forms of contact used by organizations that shared the survey (Phase III) had a lower chance of receiving the survey.

Size bias is encountered when some individuals have a greater likelihood of being asked to complete the survey than others (Fricker, 2008). As stated above, this may have occurred when individual emails with unique web links were sent to people and then later these same people may have received the survey announcement via one or more listservs or newsletters, whereas other people may have only learned of the survey through notice on a listserv.

Finally, nonresponse bias occurs when people who chose to not complete the survey are significantly different than those that do complete the survey (Fricker, 2008). It is not possible to ascertain the extent that this occurred, but based on the overall response rate to the survey it appeared more people completed the survey than what would have been expected. Kelley (2003) also suggested that a larger response rate does not reduce all forms of bias but can reduce nonresponse bias.

Testing Reliability

Testing the reliability of survey data is one of the first steps after the data has been reviewed and coded. Reliability measures if the data from the survey instrument are reproducible. If possible, it is recommended to calculate both

internal consistency reliability and test-retest reliability (Litwin, 1995). Internal consistency measures different aspects of a similar concept within the survey so a single person's answer to multiple questions within the survey are evaluated while test-retest examines how consistent a person's response is to the same question at two different times (Litwin, 1995).

Testing Reliability: Internal Consistency

Internal consistency is measured using Cronbach's coefficient alpha (Litwin, 1995). This statistical test was used to determine the internal consistency of the ratings of the questions related to the twenty Ocean Research Priority Plan (ORPP) research priorities and the four ESV priorities in the 2013 survey. Cronbach's coefficient alpha was also calculated for the 2010 and 2007 surveys because the longitudinal analyses would compare the results across multiple surveys. For the 2007 and 2010 surveys only the ORPP research priorities were included because the ESV questions were not in either of these surveys.

Testing Reliability: Test-Retest

Test-retest reliability was tested when there were cases where the same individual completed the survey twice within the same survey year. An Excel spreadsheet that only had the duplicate responses from the same survey year was created and the first set of columns had the person's first answers to the survey and the second set of columns had the person's answers when they completed the survey the second time for the same survey year. The Excel file was opened in SPSS 22 and a Wilcoxon signed ranks test was run for each of the Likert scale ORPP questions. The hypothesis being tested is that there is no

difference in ratings for the same respondent who completed the survey twice in the same years. The level of significance for the Wilcoxon signed ranks test was set at: $\alpha = 0.05$

Differences in Rating of Research Priorities in 2013

Friedman Test to Compare Ratings of Research Priorities by the Same Respondent

The Friedman test is a nonparametric test that will elucidate significant differences between the same respondents' answers to different variables as long as the same measurement scale is used (Lund and Lund, 2014). In this case, the twenty ORPP and the four ESV research priorities were the variables and each were measured on the 5-point Likert scale that was previously discussed. An analysis of variance (ANOVA) is the parametric equivalent to the Friedman test, which was used to determine if there were significant differences between the ratings of the twenty-four research priorities (Corder & Foreman, 2009). The Friedman test will only indicate if there is a significant difference in rating between research priorities but not indicate where the significant differences exist. If a significant difference was found using the Friedman test then a pairwise comparison was used to identify if and where significant differences exist between research priorities.

The hypothesis was that all twenty-four research priorities were equally important in the Gulf of Mexico. This is consistent with the national-level belief that all twenty ORPP research priorities are equally important at a national level,

and we were assuming the ESV priorities were similar importance as the ORPP priorities. The level of significance for the Friedman test was set at: $\alpha = 0.05$

IBM's Statistical Package for Social Sciences 22 (SPSS 22) automatically included a pairwise comparison (post hoc test) when there was a significant difference found through the Friedman test. In addition, SPSS 22 automatically adjusted the significance levels for the pairwise comparison using a Bonferroni correction that is built into this version of SPSS and accounts for Type I errors (Lund & Lund, 2014). Therefore, the risk of a Type I error was taken into account and the adjusted alpha level was reported in the SPSS 22 results. If the adjusted level of significance in a pairwise comparison was less than .05 then it was determined to be significantly different. Because there are twenty-four research priorities there were 276 pairwise comparisons to be made: (23+22+21+20+19+18+17+16+15+14+13+12+11+10+9+8+7+6+5+4+3+2+1=276).

Comparison of 2013 Research Ratings Between Groups

Overview of approach

The 2013 GMRP survey included questions to identify respondent's affiliation, location, relationship to research and discipline or area of expertise. This information was used to categorize respondents into different groups and identify if there were significant differences in how different groups rated the twenty ORPP research priorities and four ecosystem service research priorities. A multivariate approach could have been used to analyze the data, however in this analysis there were 24 dependent variables, representing each research

priority. This approach would have required 24 separate analyzes because multivariate analyzes such as discriminant analysis and multiple regression require only one dependent variable (Hair, Black, Babin, Anderson, & Tatham, 2006). In addition, each question was treated as independent of the other. For the approaches described below univariate analysis was run for each dependent variable and then the differences were examined because there was interest in if each research priorities was rated differently within the categories of each group and then results shared across all research priorities. Item non-response bias would be elevated if the analysis included all independent variable simultaneously because anyone who did not answer every question would not be included in the analysis.

In order to identify if two or more unrelated groups rated Likert scale rating questions differently a Kruskal-Wallis H-test was required (Corder & Foreman, 2009). A one-way analysis of variance (ANOVA) is the parametric equivalent to the Kruskal-Wallis H-test (Corder & Foreman, 2009). The Kruskal-Wallis H-test was set at $\alpha = 0.05$ but would only indicate if there was a significant difference between three or more groups. It would not indicate which groups have the significant differences. The Kruskal-Wallis H-test was run independently for each research priority. If a significant difference was found using the Kruskal-Wallis H-test then a post hoc test (Mann-Whitney U test) was used to examine combinations of groups for each research priority that was found to have a significant difference. The Mann-Whitney U test is a nonparametric test that allows for a comparison between two unrelated samples and is analogous to the

t-test for independent samples (Corder & Foreman, 2009). Because Type I errors can be higher when there are multiple comparisons when using tests such as the Kruskal-Wallis H test (Corder & Foreman, 2009) the Bonferroni procedure was employed to account for the increase in Type I errors in the Mann-Whitney U post hoc test. Therefore, the following Bonferroni procedure was employed where:

$\alpha_B = \alpha/k$

and α_B is the adjusted level of risk, α is the original level of risk (0.05) and k is the number of groups, which varied depending on which category was being evaluated. Each research priority was tested by group independent of the other research priorities, therefore the k value ranged between three and five because that is the number of categories within each group.

Four separate statistical analyses were run for the four categories. The analysis was run for research priority 1 and then repeated for all of the remaining research priorities so that a total of 24 analyses were run for each for the four categories. Kruskal-Wallis H-test and Mann-Whitney U post hoc tests examined differences in ratings for people based on their 1) affiliation, 2) location, 3) relationship to research and 4) discipline or area of expertise. Each of these analyses are presented in the sections below.

Affiliation

The respondents to the 2013 GMRP survey could select one of eight affiliation groups or provide an answer as “other.” Because some affiliations were similar and in order to have larger numbers in the groups to be compared,

several of the eight affiliation groups were combined. This could present some bias but the rationale is described below and groups were combined based on if they were from government, university, business/industry or non-governmental organizations. Table 2.2. identifies which categories people were placed based on their response.

Table 2.2

Broad category that each respondent was placed based on their reported affiliation in the 2013 GMRP survey

Reported affiliation in 2013 GMRP survey	Broad category name
Federal, state, county/parish or city government	Government
University/college	University
Business/industry	Business
Non-governmental organization	NGO

The twenty-four research priorities (twenty ORPP plus four ESV) did not focus specifically on the priorities for one affiliation, and therefore, it was predicted that the four affiliation categories would not rate any of the research priorities differently. The threshold to identify significant differences in the Mann-Whitney U post hoc test was:

$\alpha_B = 0.05/4 = 0.0125$ because there were four groups being examined.

Region

Survey responses were placed into one of three categories. The categories were “western,” which included respondents from Texas, “northern,” which included respondents from Louisiana, Mississippi, Alabama and Florida west of the Suwannee River and “eastern,” which included respondents from the remaining portion of Florida. Figure 2.1 displays the different regions that were used for this analysis.

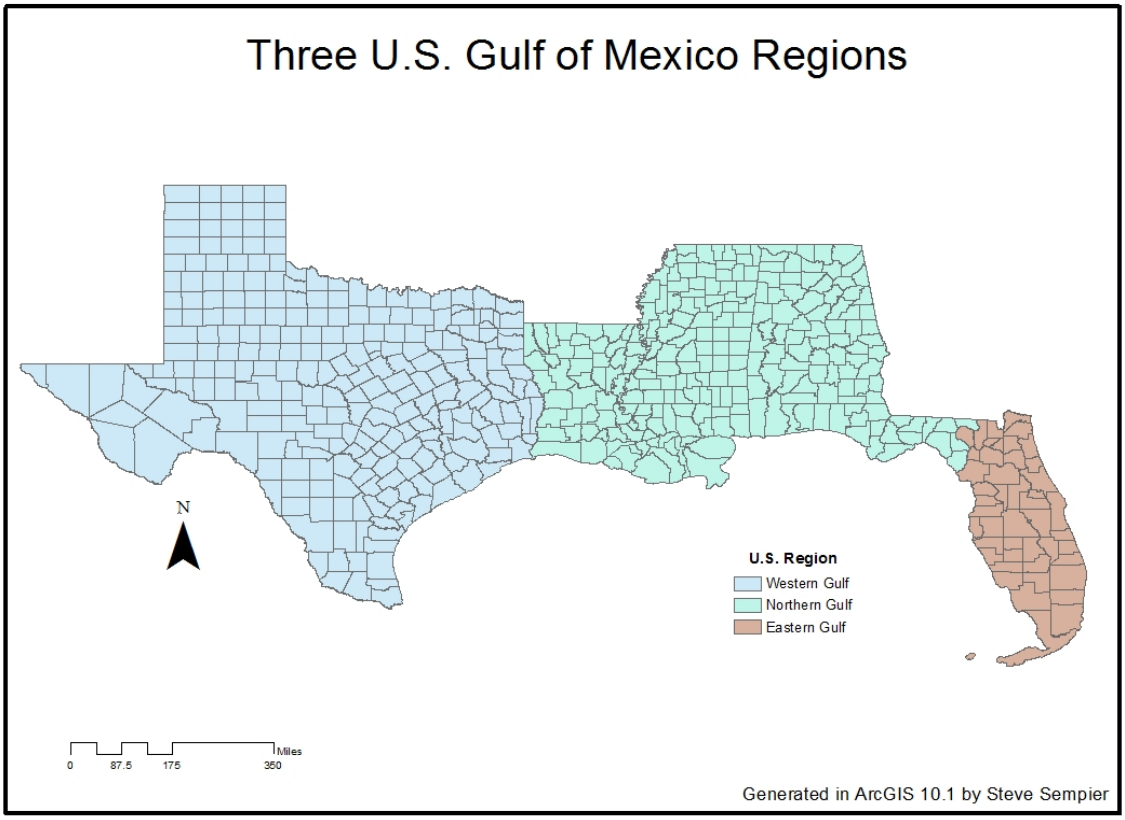


Figure 2.1. Three U.S. Gulf of Mexico regions defined for comparison and identification of differences in the 2013 GMRP survey.

FIPS values for each county was created for each of the survey responses (Federal information processing standard, 2014.). Each of the Excel files (2007, 2010 and 2013 survey responses) were opened with SPSS 22. A syntax code was manually created by using the numerical responses that people provided for their state and county and a list of FIPS codes provided through a U.S. Environmental Protection Agency website (U.S. Environmental Protection Agency, 2014).

Because the survey asked people to rate research priorities within the context of the Gulf of Mexico and not at a local or state level we predicted that there would be no differences in the rating of research priorities by the three regions. The threshold to identify significant differences in the Mann-Whitney U post hoc test was: $\alpha_B = 0.05/3 = 0.0167$ because there were three groups being examined.

Relationship to research

The respondents to the 2013 GMRP survey were asked to categorize their relationship to Gulf of Mexico research. People who completed the survey could indicate one of five options for the survey question and responses were categorized as described in Table 2.3. The research priorities included in the survey did not target different people based on their relationship to research. For example, it did not appear that a research priority would primarily benefit research sponsors compared to researchers or those that use research for their profession. Because of this it was expected that there would be no significant

differences in the rating of research priorities based on people's relationship to research.

Table 2.3

Category names for options respondents were provided when asked, "Which best describes your primary relationship with Gulf of Mexico research?" in the 2013 GMRP survey

Survey response	Category name
Conduct research in the Gulf of Mexico	Conduct
Sponsor/Administer Gulf of Mexico research programs	Sponsor
Used research findings as part of your profession in the Gulf of Mexico (but not as a researcher or research sponsor/administrator)	Professional
Use Gulf of Mexico research findings for recreational purposes	Recreational
Do not use Gulf of Mexico research findings	Non-user

The threshold to identify significant differences in the Mann-Whitney U post hoc test was: $\alpha_B = 0.05/5 = 0.01$ because there were five groups being examined.

Area of expertise

The respondents to the 2013 GMRP survey were asked to share their discipline or area of expertise. People who completed the survey could indicate one of fourteen options plus they could describe an "other" category. Similar discipline areas were aggregated into broad categories: "social sciences,"

"biological sciences," and "other natural sciences." Table 2.4 outlines the disciplines that were placed into each of the categories.

The expectation was that the research priorities that most closely aligned with the person's broad discipline category would be rated higher by the respondent. Table 2.5 highlights the research priorities that may align most closely with different disciplines. However, we will assume that each discipline will rate them equally important in order to be consistent with the previous tests and because we asked respondents to rate the priorities for the Gulf of Mexico and not rate the priority level based exclusively on their discipline. The threshold to identify significant differences in the Mann-Whitney U post hoc test was: $\alpha_B = 0.05/3 = 0.0167$ because there were three groups being examined.

Table 2.4

Disciplines or areas of expertise identified by survey respondents that were later associated with broad categories based on responses in the 2013 GMRP survey

Broad category	Discipline or area of expertise of respondents
Social science	Anthropology
	Communications
	Economics
	Education
	Health science (mental health and social work)
	History
	Journalism
	Librarian
	Marine archaeology
	Media
	Philosophy
	Policy science
	Psychology
	Sociology

Table 2.4 (continued).

Broad category	Discipline or area of expertise of respondents
Biological science	Agriculture
	Biological sciences
	Health sciences (such as public health or toxicology)
	Marine toxicology
Other Natural Science	Atmospheric science
	Chemical science
	Computer science
	Engineering
	Environmental science
	Geochemistry and biogeochemistry
	Geodesy
	Geography
	Geology
	Math
	Oceanography
	Physical science

Table 2.5

The twenty-four research priorities rated in the 2013 GMRP survey as they relate to three broad discipline areas

Research priority	Priority code	Relationship between research priority and broad discipline?		
		Biological science	Other natural science	Social science
Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments	RP1	yes		
Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability	RP2	yes		
Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability	RP3			yes
Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts	RP4	yes		
Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events	RP5		yes	
Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards	RP6		yes	
Apply understanding to develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation	RP7		yes	yes

Table 2.5 (continued).

Research priority	Priority code	Relationship between research priority and broad discipline?		
		Biological science	Other natural science	Social science
Understand the interactions between marine operations and the environment	RP8	yes		
Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain	RP9		yes	
Apply understanding of environmental impacts and marine operations to enhance the marine transportation system	RP10	yes	yes	
Understand ocean-climate interactions within and across regions	RP11		yes	
Understand the impact of climate variability and change on the biogeochemistry of the ocean and implications for its ecosystems	RP12	yes	yes	
Apply understanding of the ocean to help project future climate changes and their impacts	RP13		yes	
Understand and predict the impact of natural and anthropogenic processes on ecosystems	RP14	yes		
Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems	RP15	yes		yes

Table 2.5 (continued).

Research priority	Priority code	Relationship between research priority and broad discipline?		
		Biological science	Other natural science	Social science
Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management	RP16	yes		
Understand sources and processes contributing to ocean-related risks to human health	RP17	yes		
Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health	RP18	yes		
Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats	RP19			yes
Apply understanding of ocean ecosystems and biodiversity to develop products and biological models to enhance human well-being	RP20	yes		

Table 2.5 (continued).

Research priority	Priority code	Relationship between research priority and broad discipline?		
		Biological science	Other natural science	Social science
Understand how people perceive the services provided by coastal and offshore ecosystems of the Gulf of Mexico	ESV1			yes
Quantify services provided by coastal and offshore ecosystems of the Gulf of Mexico	ESV2	yes		yes
Estimate the value of the services provided by coastal and offshore ecosystems of the Gulf of Mexico	ESV3			yes
Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service	ESV4			yes

Longitudinal Analysis of Rating of Research Priorities

The results from the three GMRP surveys can elucidate is if there has been a significant change over the last six years in the ratings of the twenty Ocean Research Priority Plan research priorities as they related to the Gulf of Mexico. Every research priority could be compared over time because the same questions were asked in each survey and people's answers to the different surveys were linked.

The twenty ORPP research priorities that were rated over the three periods were pre-defined in 2007. Some of the research priorities could be closely aligned to oil spill-related issues, while others could not. It was assumed that those closely aligned with oil spill-related research may have increased in their rating in 2010 and 2013 compared to the 2007 baseline due to the influence of the DWH oil spill while those research priorities that did not closely align may have decreased in relative importance or not changed. Therefore, the hypothesis is that there would be a significant difference in the rating of each of the research priorities between the three periods in time. The twelve ORPP research priorities that may be most closely aligned or influenced by the DWH oil spill, and therefore may have significantly increased in rating in 2010 and 2013 compared to the 2007 rating were:

- Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments (RP01)
- Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability (RP02)

- Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability (RP03)
- Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts (RP04)
- Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events (RP05)
- Understand the interactions between marine operations and the environment (RP08)
- Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain (RP09)
- Understand and predict the impact of natural and anthropogenic processes on ecosystems (RP14)
- Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems (RP15)
- Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management (RP16)
- Understand sources and processes contributing to ocean-related risks to human health (RP17)
- Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health (RP18)

The results from the 2007, 2010 and 2013 GMRP surveys were separately downloaded from SurveyMonkey as Excel spreadsheets. The next step was to merge the survey results from all three surveys into a single Excel file and match responses provided by the same person in multiple years to each other. The final Excel file had a single row per person so if the person completed two or three of the surveys then all of their responses would be on that row. Conditional formatting was used to identify if people in the same row had the same last name and same email address between the three survey responses. If there were cases where last names had changed possibly due to change in marital status or emails had changed possibly due to change in employment. The individual responses were further examined to confirm that the same person completed the survey where the linkages were made. If a previously linked response was from two different people then they were unlinked and placed at the end of the comprehensive Excel file and treated as an individual response for a single survey.

Additional linkages were also sought in the survey that may not have been revealed through the SurveyMonkey collectors. This was also performed using conditional formatting to see where other last names and/or email addresses matched for previously unlinked survey responses. The analysis was completed across all three surveys. When additional linkages were identified they were made in the comprehensive Excel file.

If responses from the same person in the same year were found then if the person only partially completed the survey it was discarded and the

completed survey was retained. If both responses were equally completed the first response was retained.

Approach I. Compare changes in rating of research priorities for those who completed all three surveys

In order to analyze Likert scale rating questions for more than two survey years the Friedman test was required (Corder & Foreman, 2009). The Friedman test is a nonparametric test that is appropriate when more than two samples are related. In this case three samples were related when the same individual completed survey responses to identical questions in 2013, 2010 and 2007. The Friedman test will only indicate if there is a significant difference between the survey years but not indicate where the significant differences are between the three years. If a significant difference was found using the Friedman test at a $\alpha = 0.05$ then a post hoc test (Wilcoxon signed ranks test) was used to examine each combination. Because the analysis required a respondent to provide a rating for each of the three years a subset of the comprehensive dataset was used.

A Wilcoxon signed ranks test was applied as the post hoc test to the priorities that were found to have a significant difference. The Wilcoxon signed ranks test is a nonparametric test that allows for a comparison between two samples that are paired and is analogous to several parametric tests such as t-tests (Corder & Foreman, 2009). As a post hoc test we compared a survey respondent's paired answers to the same research priority over two different survey years as follows:

- Compare rating of RP_N in 2007 to the rating of RP_N in 2010,
- Compare rating of RP_N in 2007 to the rating of RP_N in 2013, and
- Compare rating of RP_N in 2010 to the rating of RP_N in 2013

where RP_N equals one of the research priorities of interest.

Because Type I errors can be higher when there are multiple comparisons when using tests such as the Friedman test (Corder & Foreman, 2009) the Bonferroni procedure was employed to account for the increase in Type I errors in the post hoc test. A separate analysis was run for only research priorities that had a significant difference according to the Friedman test. This was done to compare changes across the three survey years. So, the new threshold to identify significant differences in the Wilcoxon sign ranks test results was: $\alpha_B = 0.05/3 = 0.0167$. The analysis was run first for research priority 1 and then repeated for each research priority so that a total of 20 analyses were run.

Approach II. Compare changes in the rating of research priorities for those who completed at least two surveys

As an alternate test to Approach I each survey pairing by year was examined independently from the other year pairings. The Friedman test could not be run because it requires more than two samples from the same person. In this case a Wilcoxon signed ranks test was used to compare all of the responses that could be associated with each pairing of survey years. This included combining the responses from people who completed all three surveys with those who only completed two of the three surveys.

The Wilcoxon signed ranks test for this approach examined every research priority for the pairing of survey years with $\alpha = 0.05$. Therefore, there were a total of 60 runs (three survey pairings multiplied by twenty research priorities). The same approach was used as in the post hoc test in Approach I, however all pairings were compared rather than just those found significantly different in a Friedman test in Approach I.

CHAPTER III

RESULTS

Contacts and Response Rate for the 2013 Survey

A total of 2,371 people were directly emailed the 2013 GMRP survey in Phase I and Phase II (Table 3.1). The total number of people contacted through Phase III cannot be calculated because not every person who sent the survey to their lists shared the number of contacts but the distribution is summarized in Table 3.2. It is likely that many of the people contacted in Phase III were also contacted within Phase I or Phase II or may have been contacted multiple times through different listservs or other means within Phase III. It would be conservative to say that thousands of new contacts received the survey announcement through Phase III.

Table 3.1

Number of people that were successfully sent a request to complete the 2013 GMRP survey from Phases I and II

Category	Number successfully emailed from SurveyMonkey	Number successfully emailed from Microsoft Outlook	Total number sent survey
Phase I: 2007 and 2010 respondent	260	4	264
Phase I: 2010 only respondent	262	10	272
Phase I: 2007 only respondent	276	18	294
Phase II: Other contacts	1,504	37	1,541
Total number of people contacted in Phases I and II			2,371

Table 3.2

Number of people sent the 2013 GMRP survey as part of Phase III

Organizations that shared survey with their networks	Methods used	Number potentially reached using the method*
Texas Sea Grant College Program	Sea Grant staff list Researcher listserv Texas A&M University email	30 262 69,529
Louisiana Sea Grant College Program	Three listservs Facebook Twitter	240 349 fans 1,494
Mississippi-Alabama Sea Grant Consortium	Listserv Website Management team	1,665 unknown 14
Florida Sea Grant College Program	Agents shared with advisory council members	150 (estimated)
National Academy of Science Gulf Program	Listserv	50
Gulf of Mexico University Research Collaborative	Listserv	140
NOAA Gulf of Mexico Regional Research Coordination Team	Listserv	80
Atlantic Oceanographic and Meteorological Laboratory	Emails	50
Gulf of Mexico Alliance	Listserv Website posting	2,400 unknown

Table 3.2 (continued).

Organizations that shared survey with their networks	Methods used	Number potentially reached using the method*
Gulf of Mexico Alliance Environmental Education Network	Listserv	223
	LinkedIn	354
	Facebook	189
	Twitter	421
Northern Gulf Institute	Listserv	350
	Facebook	91
NOAA Gulf of Mexico Science Plan	Listserv	208
Gulf of Mexico Coastal Ocean Observing System	Listserv	382
	Newsletter	25
	Banner on website	unknown
Gulf of Caribbean Fisheries Institute Network	Listserv	996
Gulf of Mexico National Estuary Program	Directors asked to share with their networks	unknown
Gulf of Mexico National Estuary Research Reserves	Managers asked to share with their networks	unknown
Water Resource Research Institutes that are part of Gulf of Mexico watersheds	Directors asked to share with their networks	unknown
Mexican contacts found on Gulfbase.org	Direct email to each contact	145

*The total number of people contacted cannot be calculated because the same person could have been contacted multiple times by the different organizations listed above.

The survey was opened on October 22, 2013 and closed on December 15, 2013. Figure 3.1. illustrates the daily response rate and cumulative number of responses. A total of 1,668 people completed at least a portion of the 2013 GMRP survey. Table 3.3 enumerates the percentage of respondents by category that completed the survey based on what phase they were contacted, total responses across all phases and those that rated every ORPP and ESV research priority. There was also a comparison between those who completed the 2013 GMRP survey and those that participated in the 2006 ORPP workshop according to affiliation (Table 3.4). A summary of the number of respondents and their linkages to previous surveys is outlined in Table 3.5. Of the 1,668 people who completed the 2013 survey 164 people or approximately 10% are known to have completed the 2007, 2010, and 2013 GMRP surveys.

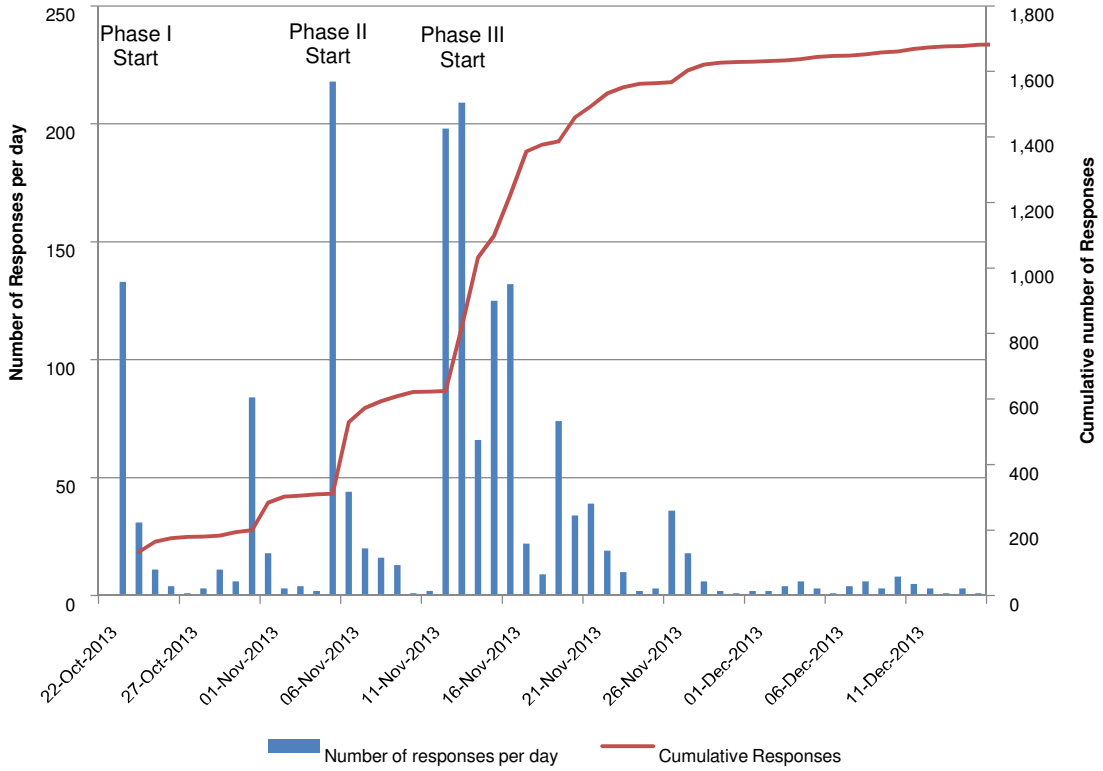


Figure 3.1. Responses to the 2013 GMRP survey by date and cumulative responses with the start dates of the three phases.

Table 3.3

Percent of respondents to the 2013 GMRP survey by different groupings and percent of participants in the national Ocean Research Priorities Plan (ORPP) workshop by affiliation

Grouping	Phase I	Phase II	Phase III	2013 GMRP total all phases	Rated all 24 research priorities
Region					
Western Gulf	17%	12%	47%	29%	28%
Northern Gulf	68%	64%	39%	55%	55%
Eastern Gulf	15%	23%	13%	17%	17%
N for Region	334	322	487	1143	925
Affiliation					
University	46%	58%	53%	53%	52%
Government	28%	25%	22%	25%	26%
NGO	7%	6%	11%	8%	8%
Business	10%	7%	7%	8%	8%
Other	8%	4%	7%	6%	6%
N for Affiliation	351	389	385	1125	963
Relationship to Research					
Conduct	41%	60%	35%	46%	44%
Sponsor	10%	11%	5%	9%	10%
Professional User	36%	23%	27%	28%	29%
Recreational User	8%	3%	15%	9%	9%
Non-user	5%	3%	17%	9%	9%
N for Relationship to Research	345	382	366	1093	935
Discipline					
Biological science	46%	41%	44%	44%	46%
Other natural science	30%	41%	26%	32%	31%
Social science	24%	18%	30%	24%	23%
N for Discipline	327	377	361	1065	911

Table 3.4

Percent of respondents to the 2013 GMRP survey by affiliation and phase and percent of participants in the national Ocean Research Priorities Plan (ORPP) workshop by affiliation

Affiliation	2013 GMRP survey total	2006 ORPP national workshop*
University	53%	36%
Government	25%	47%
NGO	8%	8%
Business	8%	9%
Other	6%	0%
N	1125	231

*Data from National Research Council Committee to Review the Joint Subcommittee on Ocean Science and Technology's Research Priorities Plan (2007).

Table 3.5

Number of respondents that completed the 2007, 2010, and/or 2013 GMRP surveys arranged by the number of surveys completed by a respondent and the survey year

	Survey year completed			Number of people in category
Number of surveys completed	2013	2010	2007	
Three surveys	X	X	X	164
Two surveys	X	X		143
	X		X	103
		X	X	118
One survey*	X			1,258
		X		569
			X	1,190
Total number of respondents per survey year	1,668	994	1,575	

*Respondent may have completed more than one survey but there was no identifier available to link their survey to surveys completed in other years.

There was a high response rate from those who completed the 2010 survey. More than 60% of those who completed both the 2010 and 2007 survey and 50% of the people who previously completed just the 2010 survey completed in the 2013 survey (Table 3.6). The response rate to the 2013 GMRP survey ranged from 33.8% to 62.1% and averaged 39.0% for Phases I and II.

Table 3.6

Number of responses and response rate based on which phase people were contacted to complete the 2013 GMRP survey

Category	Total sent 2013 survey	Number responded to 2013 survey	Response rate
Phase I: 2007 and 2010 respondent	264	164	62.1%
Phase I: 2010 only respondent	272	143	52.6%
Phase I: 2007 only respondent	294	103	35.0%
Phase II: Other contacts	1,541	521	33.8%
Phase III: Broadly advertised	unknown	737	
Total	unknown	1,668	

Reliability

Testing Reliability: Cronbach's coefficient alpha

The results of the Cronbach's coefficient alpha are outlined in Table 3.7 and Cronbach's alpha levels were at 0.890 or above in the three cases.

Table 3.7

Cronbach's coefficient alpha results for ORPP and ESV research priorities by survey year

Survey year	N	Cronbach's alpha	Number of items
2013 (ORPP and ESV questions)	1,124	.925	24
2010 (ORPP questions)	617	.890	20
2007 (ORPP questions	1,038	.926	20

Testing Reliability: Test-Retest

Fifteen duplicates were found for the 2013 survey, 8 duplicates were found for the 2010 survey and 6 duplicates were found for the 2007 survey. This totaled 29 duplicates across the three surveys. The average time that passed between the person's first response and second response was 20.8 days. The results in Table 3.8 indicate that at $P<.05$ there was no significant difference between the person's first response and their second response to the same survey for 23 of the 24 of the Likert scale questions (95.8% of questions).

Table 3.8

Results of a Wilcoxon Signed Ranks test that compared the same person's response when they rated the same research priority twice in the same survey year

ORPP research priority code	N	P
RP01	25	.020*
RP02	25	.083
RP03	23	.593
RP04	24	.248
RP05	24	.134
RP06	24	.152
RP07	24	.397
RP08	25	.182
RP09	25	.092
RP10	25	.225
RP11	25	.808
RP12	25	.822
RP13	25	.449
RP14	25	.763
RP15	25	.617
RP16	25	1.000
RP17	25	.175
RP18	25	.788
RP19	25	.808
RP20	25	.229
ESV1	14	.236
ESV2	14	.429
ESV3	12	.197
ESV4	13	.084

* $p < .05$

Summary Statistics for the 2013 Survey

Survey respondents were distributed across the five U.S. Gulf of Mexico states and beyond (Figure 3.2). The most responses came from Texas (26%) followed by Florida (19%), other states (19%), Louisiana (18%), Alabama (10%) and Mississippi (8%).

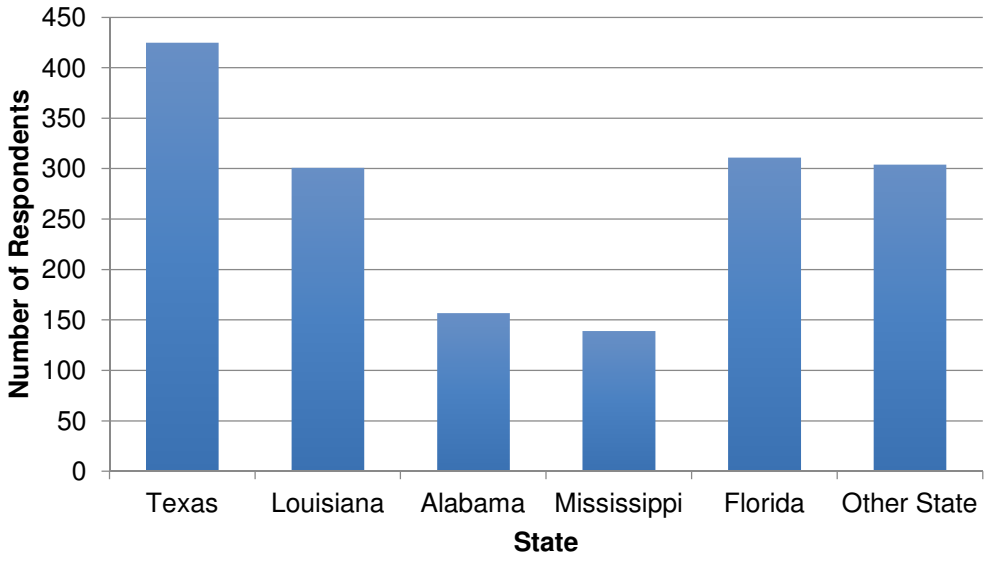


Figure 3.2. Number of respondents to the 2013 GMRP survey by state (N=1,637).

In addition, the distribution of Gulf of Mexico respondents by county shows the Gulf-wide distribution with a relatively high number of responses in several counties (Figure 3.3).

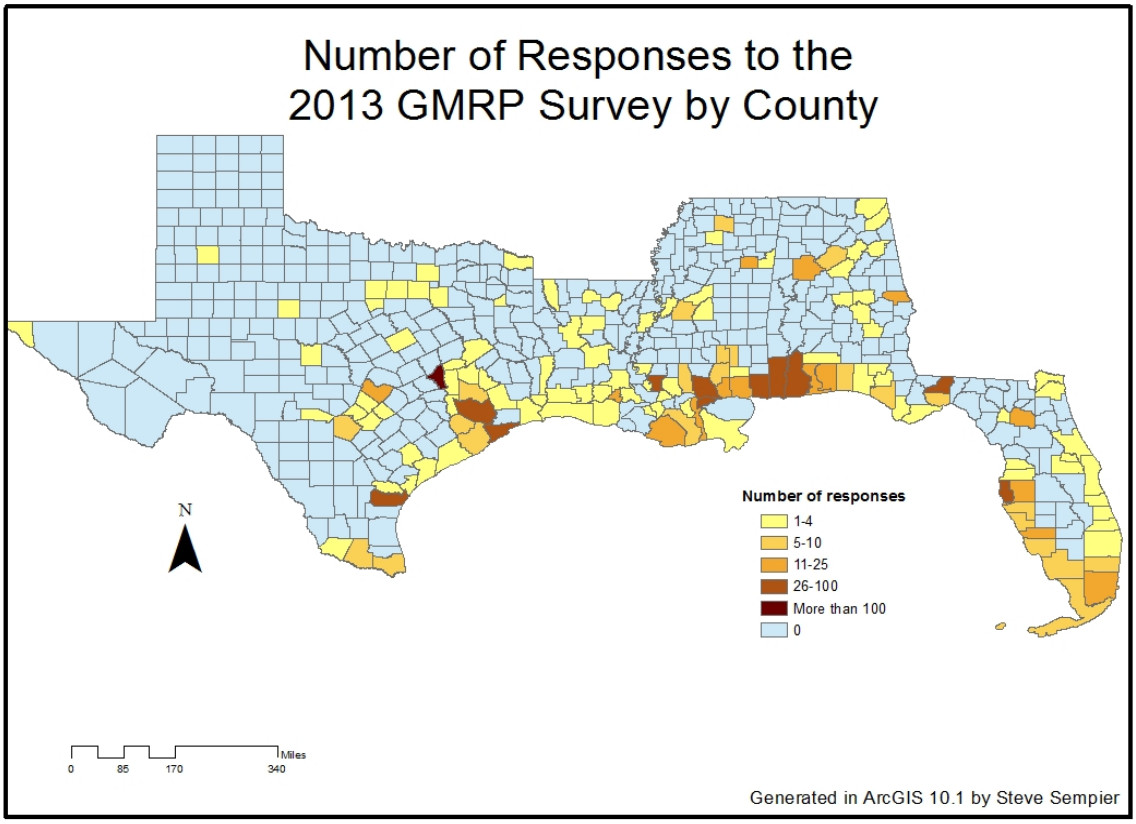


Figure 3.3. Number of responses to the 2013 GMRP survey by county for U.S. Gulf of Mexico states (N=1,315).

More than one thousand survey respondents identified themselves by affiliation (Figure 3.4). The largest percentage of respondents were from universities or colleges (53%). People from government agencies were the next largest group with federal (14%) and state (9%) agencies represented. Business/industry and non-governmental organizations each represented 8% of responses. The remaining 85 people that responded to the question were classified in the “other” category.

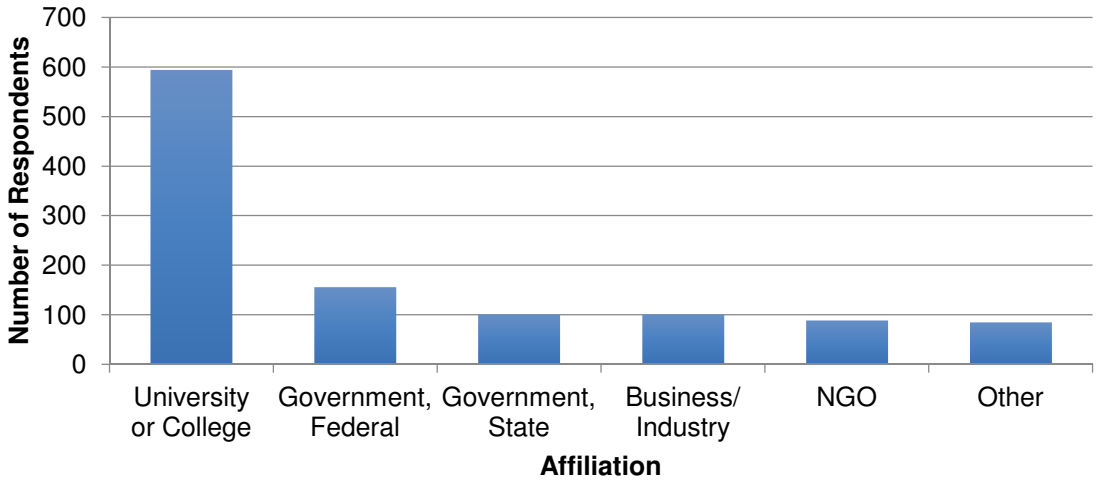


Figure 3.4. Number of 2013 GMRP survey respondents by affiliation (N=1,126).

In general terms, the most respondents were from biological sciences followed by engineering, physical sciences, education and chemical sciences (Table 3.9). When organized by broad category, the most responses were still from biological sciences followed by other natural sciences and social sciences (Figure 3.5).

Table 3.9

Number and percentage of respondents who indicated their discipline or area of expertise (N=1,117)

Discipline	Number of respondents	Percentage of respondents
Biological sciences	467	41.8%
Engineering	74	6.6%
Physical sciences	70	6.3%
Education	61	5.5%
Chemical sciences	55	4.9%
Anthropology	48	4.3%
Geological sciences	47	4.2%
Political science/Law/Policy	43	3.8%
General sciences	42	3.8%
Economics	30	2.7%
Geography/GIS	28	2.5%
Health sciences	28	2.5%
Computer and Information sciences	19	1.7%
Sociology	19	1.7%
Other social sciences	15	1.3%
Atmospheric sciences	11	1.0%
Psychology	10	0.9%
Other	50	4.5%
Total	1,117	

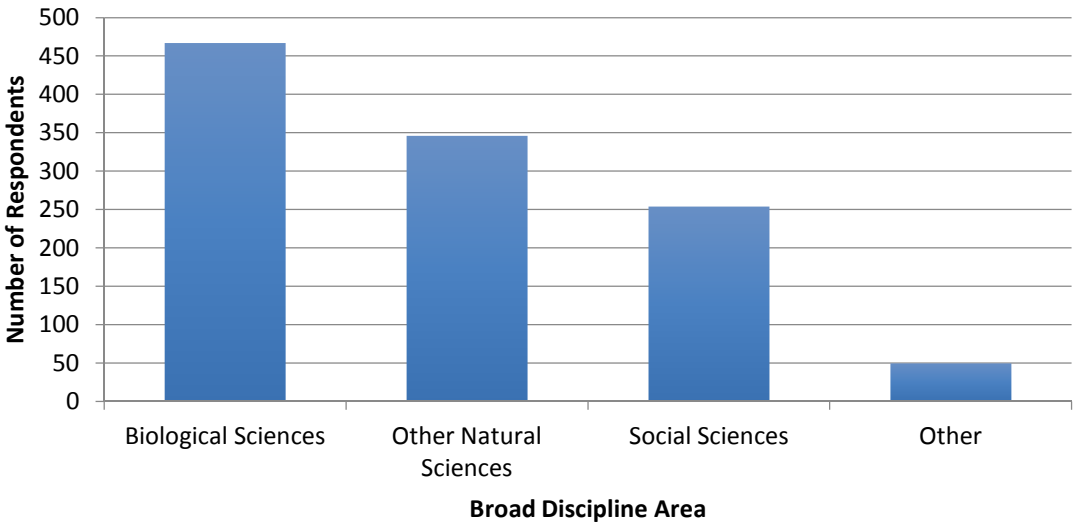


Figure 3.5. Number of 2013 GMRP survey respondents who indicated their discipline or area of expertise aggregated into biological sciences, other natural sciences, social sciences and "other" (N=1,117).

Most respondents indicated that they "conduct research in the Gulf of Mexico" (500) followed by "use Gulf of Mexico research findings as part of your profession" (311), "sponsor/administer research in the Gulf of Mexico" (96), "do not use Gulf of Mexico research findings" (95) and "use Gulf of Mexico research findings for recreational purposes" (93) (Figure 3.6).

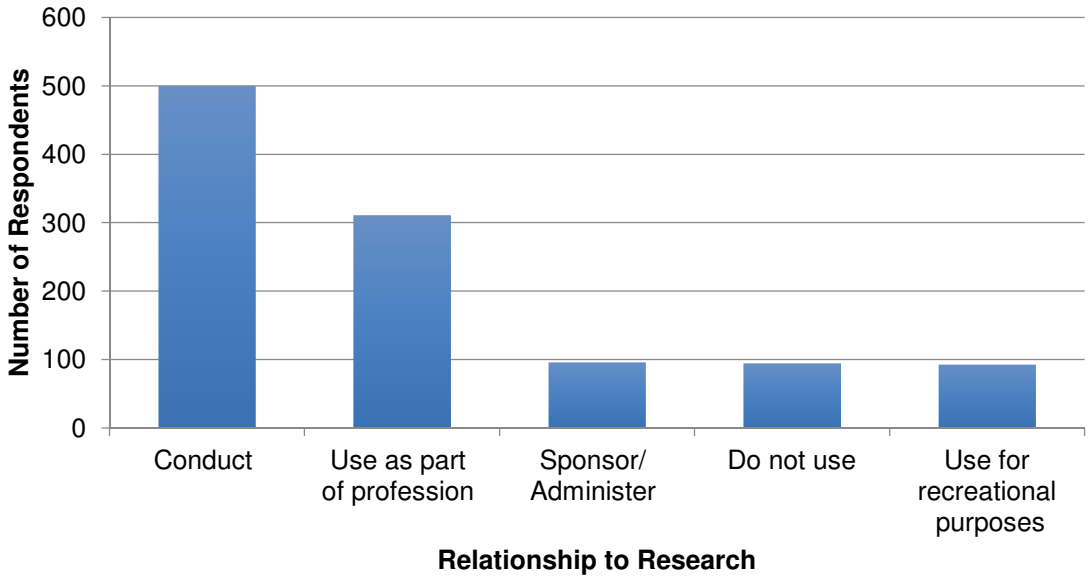


Figure 3.6. Number of 2013 GMRP survey respondents who indicated their primary relationship to Gulf of Mexico research (N=1,095).

Approximately 1,300 people rated the twenty ORPP priorities in the 2013 GMRP survey. Figure 3.7 displays the responses in an ordered list based on the research priorities with the highest percentage of responses in the "very high," "high," and "medium" categories and the number of responses for each research priority using a published method of presenting this data (Robbins & Heiberger, 2011). The three research priorities that had the highest overall ratings were:

1. Understand and predict the impact of natural and anthropogenic processes on ecosystems,
2. Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability, and

3. Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards.

The four ESV related priorities and number of people that provided a rating are in Table 3.10 and the rating results are in Figure 3.8. The highest rated ESV research priority was “Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service.”

Table 3.10

Four ecosystem service valuation priorities, priority code and number of people who rated the priorities in the 2013 GMRP survey

Research priority	Priority code	N
Understand how people perceive the services provided by coastal and offshore ecosystems of the Gulf of Mexico	ESV1	1,317
Quantify services provided by coastal and offshore ecosystems of the Gulf of Mexico	ESV2	1,312
Estimate the value of the services provided by coastal and offshore ecosystems of the Gulf of Mexico	ESV3	1,310
Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service	ESV4	1,310

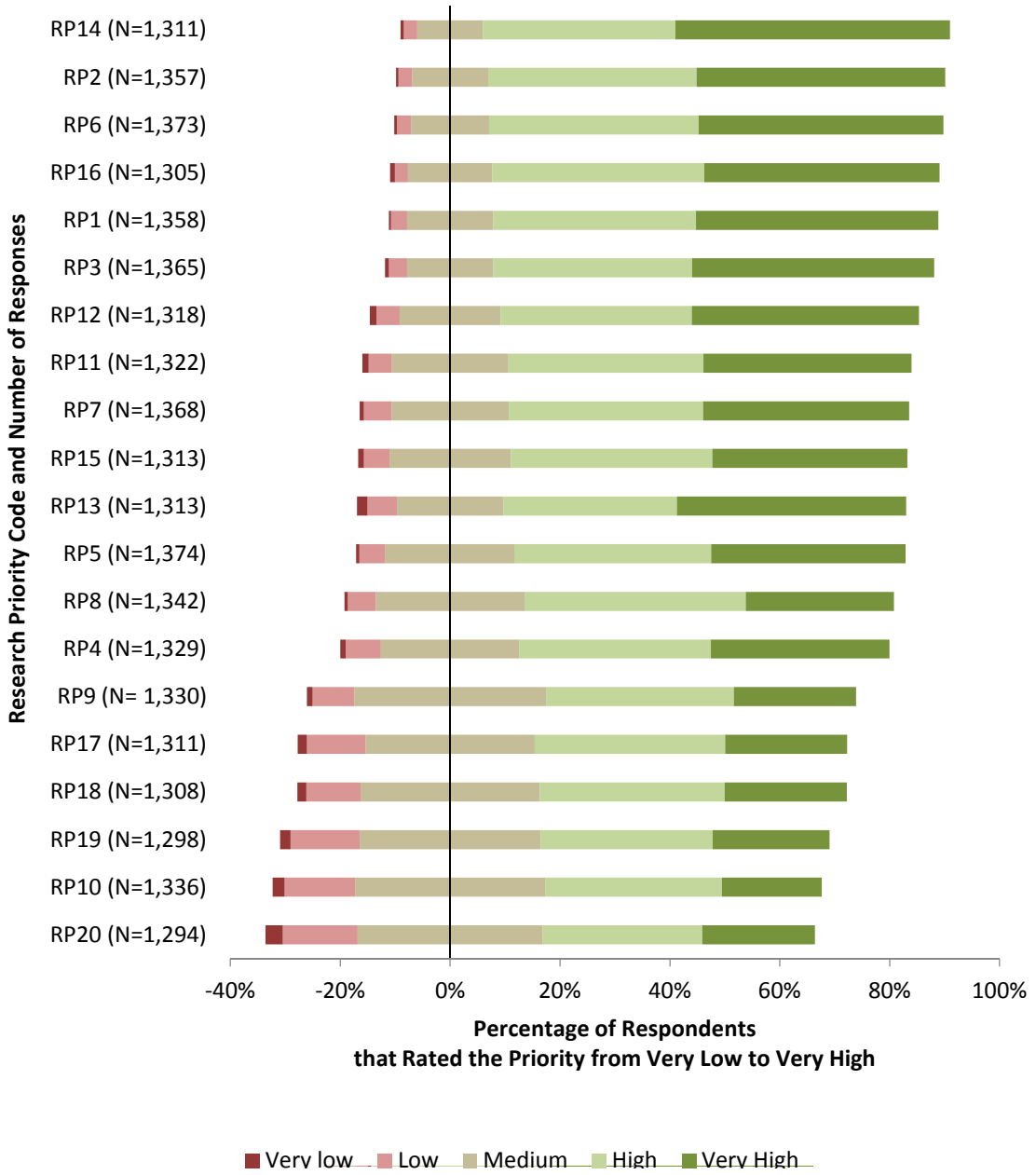


Figure 3.7. Percentage of respondents that answered the different priority levels from "very low" to "very high" for the twenty ORPP research priorities (RP) in the 2013 GMRP survey adjusted so that the percentage of respondents that answered "medium" priority level is centered at 0% for each RP.

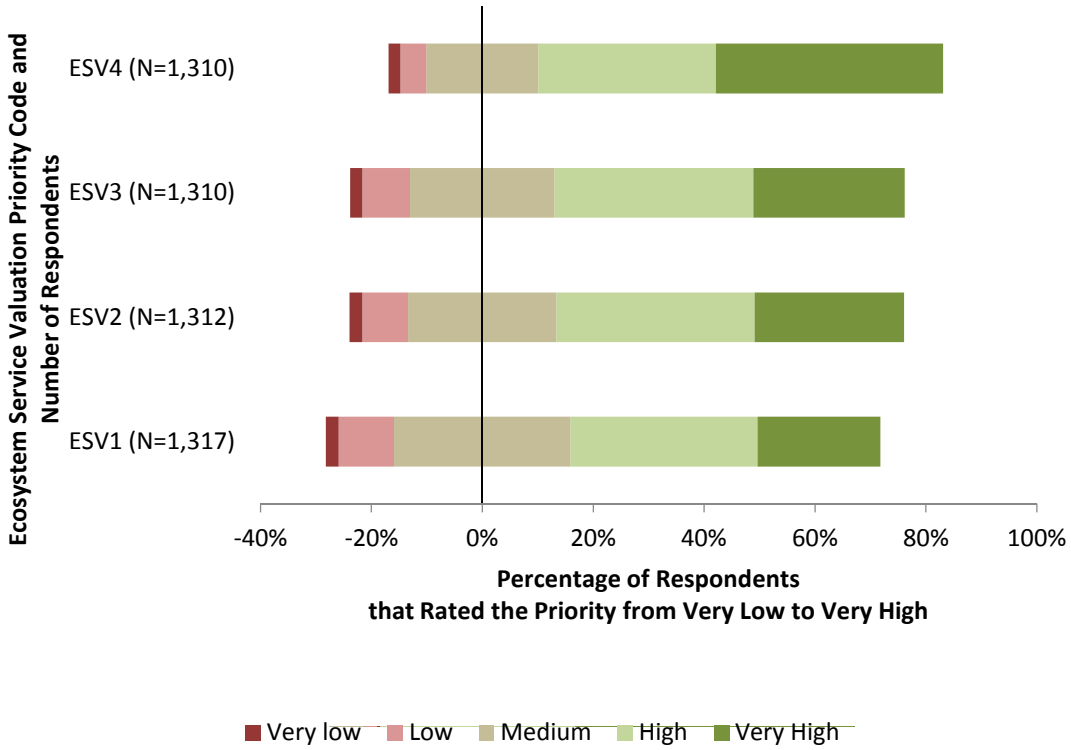


Figure 3.8. Percentage of respondents that answered the different priority levels for the four ecosystem service valuation priorities in the 2013 GMRP survey adjusted so that the percentage of respondents that answered "medium" priority level is centered at 0% for each ESV research priority.

Rating of Priorities in 2013

The results of the Friedman test suggest that a significant difference does exist in the rating of the twenty-four research priorities amongst the 1,124 people who rated all twenty-four research priorities in the 2013 GMRP survey $X^2(23)=2{,}592.75$, $p < .001$ (Table 3.11). Because a significant difference was found using the Friedman test further analysis was used to determine where differences exist between the ratings of the research priorities.

Table 3.11

Results of the Friedman test to identify if differences exist between the ratings of the twenty-four research priorities based on people who completed all twenty-four rating questions in the 2013 GMRP survey

N	Test statistic	Degrees of freedom	P
1,124	2,592.74	23	<.001

Appendix G includes the test statistic, standard error, standard test value, significance and adjusted level of significance organized by each research priority for the post hoc test. Of the 276 pairwise comparisons there were 194 with significant differences (70.3%) between one research priority and another. Figure 3.9 illustrates the results and indicates how many significant differences there were between one research priority and the others and the number of research priorities that were rated significantly lower or significantly higher among 276 pairwise comparisons.

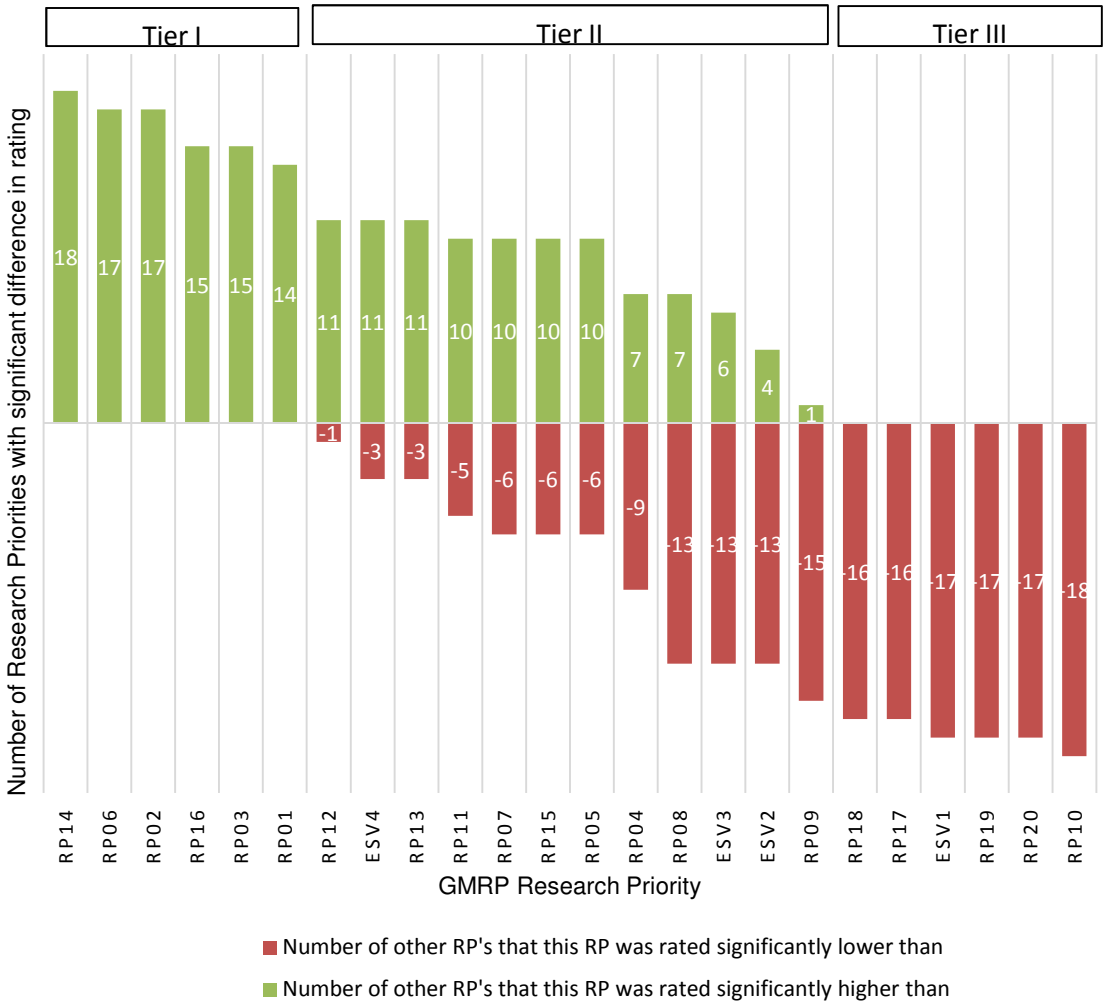


Figure 3.9. Number of research priorities that each research priority was rated significantly higher (positive value) and rated significantly lower (negative value) based on a pairwise comparison of the ratings of research priorities in the 2013 GMRP survey.

The research priorities were placed into three tiers based on their relative importance in the Gulf of Mexico. The first tier are those that are rated significantly higher than one or more other research priority and was not rated significantly lower than any other research priority. The second tier are those research priorities that are rated significantly higher that one or more research

priority and significantly lower than one or more research priority. The third tier are those research priorities that are rated significantly lower than one or more research priority and are not rated significantly higher than any research priority. Table 3.12 includes all three tiers of research priorities, the names of the research priorities and which societal theme the research priority is associated with. Six societal theme areas were defined in the ORPP and the seventh theme was added in the 2013 GMRP survey (Ecosystem Service Valuation). The ORPP societal theme areas are as follows:

- Stewardship of Natural and Cultural Ocean Resources (Stewardship)
- Increasing Resilience to Natural Hazards (Resilience)
- Enabling Marine Operations (Operations)
- The Ocean's Role in Climate (Climate)
- Improving Ecosystem Health (Ecosystem)
- Enhancing Human Health (Health)

There were six tier I research priorities that are in three societal theme areas; twelve tier II research priorities that are in all seven societal theme areas; and six tier III research priorities that are in three societal theme areas.

Table 3.12

Research priorities arranged by tiers based on their relative rating from the 2013 GMRP survey

Research priority code	ORPP societal theme	Research priority
Tier I		Tier I had significantly higher ratings than several other priorities in this list and no priorities were rated significantly greater than any tier I priority
RP14	Ecosystem	Understand and predict the impact of natural and anthropogenic processes on ecosystems
RP06	Resilience	Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards
RP02	Stewardship	Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability
RP16	Ecosystem	Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management
RP03	Stewardship	Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability
RP01	Stewardship	Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments

Table 3.12 (continued).

Research priority code	ORPP societal theme	Research priority
Tier II		Tier II priorities had both significantly higher and significantly lower ratings compared to other priorities
RP12	Climate	Understand the impact of climate variability and change on the biogeochemistry of the ocean and implications for its ecosystems
ESV4	ESV	Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service
RP13	Climate	Apply understanding of the ocean to help project future climate changes and their impacts
RP11	Climate	Understand ocean-climate interactions within and across regions
RP07	Resilience	Apply understanding to develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation
RP15	Ecosystem	Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems
RP05	Resilience	Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events
RP04	Stewardship	Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts
RP08	Operations	Understand the interactions between marine operations and the environment

Table 3.12 (continued).

Research priority code	ORPP societal theme	Research priority
ESV3	ESV	Estimate the value of the services provided by coastal and offshore ecosystems of the Gulf of Mexico
ESV2	ESV	Quantify services provided by coastal and offshore ecosystems of the Gulf of Mexico
RP09	Operations	Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain
Tier III		Tier III priorities were rated significantly lower than other priorities and none of these priorities were rated significantly higher than any tier I or tier II priority
RP18	Health	Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health
RP17	Health	Understand sources and processes contributing to ocean-related risks to human health
ESV1	ESV	Understand how people perceive the services provided by coastal and offshore ecosystems of the Gulf of Mexico
RP19	Health	Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats
RP20	Health	Apply understanding of ocean ecosystems and biodiversity to develop products and biological models to enhance human well-being
RP10	Operations	Apply understanding of environmental impacts and marine operations to enhance the marine transportation system

Comparison of 2013 Ratings between Groups

Affiliation

More than one thousand people (1,046) from the four affiliation categories completed the questions that rated ORPP and/or ESV questions. The results of the Kruskal-Wallis H-test are included in Table 3.13. Seven of the twenty-four (29%) research priorities had significant differences in their rating between at least two categories. The research priorities with significant differences in their ratings were:

- Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments (RP01)
- Understand ocean-climate interactions within and across regions (RP11)
- Understand the impact of climate variability and change on the biogeochemistry of the ocean and implications for its ecosystems (RP12)
- Apply understanding of the ocean to help project future climate changes and their impacts (RP13)
- Understand and predict the impact of natural and anthropogenic processes on ecosystems (RP14)
- Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management (RP16)
- Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service (ESV4)

Table 3.13

Results of the Kruskal-Wallis H-test applied to the ratings of the twenty-four research priorities identified in the 2013 GMRP survey when responses were grouped into four categories by affiliation

Research priority	N business	N government	N NGO	N university	df	P
RP01	90	276	89	580	3	.001*
RP02	89	274	90	579	3	.598
RP03	89	278	90	583	3	.152
RP04	86	274	86	569	3	.328
RP05	90	275	89	589	3	.051
RP06	90	277	90	588	3	.150
RP07	89	275	87	587	3	.223
RP08	87	275	89	565	3	.540
RP09	88	267	87	561	3	.381
RP10	87	269	90	564	3	.865
RP11	90	276	90	589	3	.016*
RP12	90	276	90	585	3	<.001*
RP13	90	275	90	581	3	<.001*
RP14	89	276	88	585	3	<.001*
RP15	88	275	91	586	3	.251
RP16	90	275	91	578	3	.019*
RP17	89	277	90	585	3	.365
RP18	89	277	89	583	3	.336
RP19	89	274	89	581	3	.204
RP20	89	274	89	578	3	.194
ESV1	89	278	91	586	3	.242
ESV2	89	278	90	584	3	.269
ESV3	89	278	91	581	3	.422
ESV4	89	276	91	586	3	.011*

*$p < 0.05$

There were a total of thirteen significant differences found amongst the comparisons in the post hoc Mann-Whitney U test. Tables 1 through 6 in Appendix F summarize the results of pairings of the four categories for the seven

research priorities that were found significantly different in the Kruskal-Wallis H test. Table 3.14 summarizes the results from Appendix F. The people from the business category rated two priorities significantly lower than people from all of the other categories (RP12 and RP14). In addition, the people in the business category rated RP11 significantly lower than people from the university category and rated RP 16 significantly lower than people from the government category. People from the NGO category rated ESV4 significantly higher than people from the university and government categories. Finally, RP01 was rated significantly higher by people in the government category versus people in the university category.

Table 3.14

Categories organized by affiliation that rated a research priority significantly higher than another affiliation based on a Kruskal-Wallis H-test and Mann-Whitney U post hoc test of the 2013 GMRP survey

Research priority	Business vs government	Business vs NGO	Business vs university	Government vs NGO	Government vs university	NGO vs university
RP01					government higher	
RP11			university higher			
RP12	government higher	NGO higher	university higher			
RP13		NGO higher	university higher			
RP14	government higher	NGO higher	university higher			
RP16	government higher					
ESV4				NGO higher		NGO higher

Region

Four of the twenty-four (16.7%) research priorities had significant differences in their rating between at least two groups based on the Kruskal-Wallis H-test results (Table 3.15). The research priorities with significant differences by region were:

- Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability (RP03)
- Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain (RP09)
- Apply understanding of environmental impacts and marine operations to enhance the marine transportation system (RP10)
- Apply understanding of the ocean to help project future climate changes and their impacts (RP13)

There were a total of three significant differences found amongst the comparisons in the post hoc Mann-Whitney U test (Appendix F). There were two significant difference between the “western” and “northern” regions. The first was for research priority 3 (Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability) with a p=.010 (Appendix F). Based on the mean rank of 498.94 for “western” and 454.25 for “northern” the “western” region rated this research priority higher. The second significant difference between “western” and “northern” regions was for research priority 13 (Apply understanding of the ocean to help project future climate changes and their impacts) with a mean rank in the “western” region being greater than the “northern” region with values of 483.65 and 433.68, respectively. The final significant difference was between “western” and “eastern” regions (Appendix F) for research priority 10 (Apply understanding

of environmental impacts and marine operations to enhance the marine transportation system).

Table 3.15

Results of the Kruskal-Wallis H-test applied to the ratings of the twenty-four research priorities identified in the 2013 GMRP survey when responses were categorized into three groups by region in the U.S. Gulf of Mexico

Research priority	N western	N northern	N eastern	df	P
RP01	316	614	189	2	.144
RP02	317	612	189	2	.683
RP03	320	618	188	2	.034*
RP04	314	598	185	2	.518
RP05	324	618	189	2	.492
RP06	322	619	189	2	.872
RP07	321	618	187	2	.821
RP08	323	598	184	2	.115
RP09	322	591	182	2	.034*
RP10	323	595	184	2	.023*
RP11	306	601	180	2	.380
RP12	302	601	181	2	.107
RP13	303	597	179	2	.014*
RP14	303	594	180	2	.113
RP15	303	598	179	2	.355
RP16	301	591	180	2	.442
RP17	303	597	180	2	.615
RP18	303	595	179	2	.706
RP19	295	595	179	2	.312
RP20	294	593	176	2	.565
ESV1	303	599	180	2	.353
ESV2	300	599	180	2	.053
ESV3	302	596	181	2	.169
ESV4	302	595	179	2	.332

*$p < .05$

The “western” region rated this research priority higher than the “eastern” region with mean ranks of 265.54 and 233.74, respectively. The above results are summarized in Table 3.16. The only significant differences were found between the western and another region and this occurred only three times out of a total of 72 possible combinations (three region combinations multiplied by twenty-four research priorities) or 4% of the total combinations.

Table 3.16

U.S. Gulf of Mexico regions that rated a research priority significantly higher than another region based on a Kruskal-Wallis H-test and Mann-Whitney U post hoc test of the 2013 GMRP survey

Research priority	Research priority number	Significant difference in rating
Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability	RP03	western higher than northern
Apply understanding of the ocean to help project future climate changes and their impacts	RP13	western higher than northern
Apply understanding of environmental impacts and marine operations to enhance the marine transportation system	RP10	western higher than eastern

Relationship to research

Seventeen of the twenty-four (70.8%) research priorities had significant differences in their rating between at least two categories based on the Kruskal-Wallis H-test (Table 3.17). The research priorities where there were significant differences between groups were:

- Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments (RP01)
- Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability (RP03)
- Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards (RP06)
- Understand the interactions between marine operations and the environment (RP08)
- Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain (RP09)
- Apply understanding of environmental impacts and marine operations to enhance the marine transportation system (RP10)
- Understand ocean-climate interactions within and across regions (RP11)
- Understand and predict the impact of natural and anthropogenic processes on ecosystems (RP14)

- Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems (RP15)
- Understand sources and processes contributing to ocean-related risks to human health (RP17)
- Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health (RP18)
- Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats (RP19)
- Apply understanding of ocean ecosystems and biodiversity to develop products and biological models to enhance human well-being (RP20)
- Understand how people perceive the services provided by coastal and offshore ecosystems of the Gulf of Mexico (ESV1)
- Quantify services provided by coastal and offshore ecosystems of the Gulf of Mexico (ESV2)
- Estimate the value of the services provided by coastal and offshore ecosystems of the Gulf of Mexico (ESV3)
- Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service (ESV4)

Forty-six of the 85 (54.1%) tests identified significant differences in the rating of research priorities between categories based on the Mann-Whitney

U post hoc tests (Appendix F). If a pairing had a significant difference the mean rank values were also provided in order to determine which of the categories rated the priority significantly higher.

Table 3.17

Results of the Kruskal-Wallis H-test applied to the ratings of the twenty-four research priorities identified in the 2013 GMRP survey when responses were categorized into five groups based on the respondent's relationship to research

Research priority	N conduct	N sponsor	N profession	N recreation	N non-user	df	P
RP01	489	96	310	93	89	4	.014*
RP02	490	96	307	92	89	4	.059
RP03	491	96	309	93	92	4	.001*
RP04	476	96	302	92	90	4	.172
RP05	495	96	310	92	91	4	.875
RP06	495	96	309	93	92	4	.026*
RP07	492	96	309	92	89	4	.407
RP08	475	95	305	89	91	4	<.001*
RP09	470	94	303	90	88	4	<.001*
RP10	472	95	303	89	91	4	<.001*
RP11	493	96	310	92	94	4	.006*
RP12	492	96	308	92	94	4	.079
RP13	488	96	309	91	93	4	.271
RP14	494	96	307	91	90	4	.024*
RP15	494	96	307	91	92	4	.007*
RP16	486	96	309	92	91	4	.279
RP17	491	96	309	92	92	4	.016*
RP18	491	96	307	91	92	4	.013*
RP19	486	96	307	91	92	4	.001*
RP20	482	96	308	89	92	4	.002*
ESV1	494	96	310	93	92	4	.002*
ESV2	492	96	310	91	92	4	<.001*
ESV3	491	95	309	91	92	4	<.001*
ESV4	492	96	309	93	91	4	<.001*

*$p < .05$

The number of significant differences based on pairings is provided in Table 3.18. Only two of the ten pairwise comparisons did not have significant differences in any of the twenty-four research priorities. The pairings without significant differences in rating any of the research priorities were between:

- those that sponsor research versus those that conduct research, and
- those that sponsor research versus those that use research for their profession.

The remaining pairings had at least one significant difference in their rating of research priorities. A summary table that outlines where significant difference were found is in Table 3.19.

Table 3.18

Number of significant differences from the Mann-Whitney U tests in the rating of the twenty-four research priorities based on people's relationship to Gulf of Mexico research

	Grouping based on relationship to Gulf of Mexico research					
Grouping	Conduct	Sponsor	Profession	Recreation	Non-User	Total
Conduct		0	6	11	4	21
Sponsor	0		0	5	1	6
Profession	6	0		6	6	18
Recreation	11	5	6		7	29
Non-user	4	1	6	7		18
Total	21	6	18	29	18	

Table 3.19

Significantly higher rating of research priorities based on people's relationship to research based on a Kruskal-Wallis H-test and Mann Whitney U post hoc test of the 2013 GMRP survey results

Research priority	Conduct vs profession	Conduct vs recreation	Profession vs recreation	Sponsor vs recreation	Conduct vs non-user	Profession vs non-user	Sponsor vs non-user	Recreation vs non-user
RP01						profess. higher	sponsor higher	
RP03	profess. higher	rec. higher						
RP06					conduct higher	profess. higher		rec. higher
RP08		rec. higher	rec. higher	rec. higher				rec. higher
RP09		rec. higher	rec. higher	rec. higher				rec. higher
RP10	profess. higher	rec. higher	rec. higher	rec. higher	non-user higher			
RP11					conduct higher			rec. higher

Table 3.19 (continued).

Research priority	Conduct vs profession	Conduct vs recreation	Profession vs recreation	Sponsor vs recreation	Conduct vs non-user	Profession vs non-user	Sponsor vs non-user	Recreation vs non-user
RP14					conduct higher			
RP15	profess. higher	rec. higher						
RP17		rec. higher	rec. higher					
RP18		rec. higher						
RP19		rec. higher	rec. higher	rec. higher				
RP20		rec. higher	rec. higher	rec. higher				
ESV1						profess. higher		rec. higher
ESV2	profess. higher					profess. higher		rec. higher
ESV3	profess. higher	rec. higher				profess. higher		rec. higher

Table 3.19 (continued).

Research priority	Conduct vs profession	Conduct vs recreation	Profession vs recreation	Sponsor vs recreation	Conduct vs non-user	Profession vs non-user	Sponsor vs non-user	Recreation vs non-user
ESV4	profess. higher	rec. higher				profess. higher		
Total differences	6	11	6	5	4	6	1	7

Area of expertise

Based on the respondents' areas of expertise, nineteen of the twenty-four (79.2%) research priorities had significant differences in the rating between at least two categories based on the Kruskal-Wallis H-test results (Table 3.20). The research priorities with differences in ratings between at least two categories were:

- Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments (RP01)
- Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability (RP02)
- Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability (RP03)
- Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts (RP04)
- Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events (RP05)
- Apply understanding to develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation (RP07)
- Apply understanding of environmental impacts and marine operations to enhance the marine transportation system (RP10)
- Understand ocean-climate interactions within and across regions (RP11)

- Understand and predict the impact of natural and anthropogenic processes on ecosystems (RP14)
- Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems (RP15)
- Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management (RP16)
- Understand sources and processes contributing to ocean-related risks to human health (RP17)
- Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health (RP18)
- Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats (RP19)
- Apply understanding of ocean ecosystems and biodiversity to develop products and biological models to enhance human well-being (RP20)
- Understand how people perceive the services provided by coastal and offshore ecosystems of the Gulf of Mexico (ESV1)
- Quantify services provided by coastal and offshore ecosystems of the Gulf of Mexico (ESV2)

- Estimate the value of the services provided by coastal and offshore ecosystems of the Gulf of Mexico (ESV3)
- Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service (ESV4)

Appendix F includes the results of the Mann-Whitney U post hoc test for each of the research priorities that were found significantly different in the Kruskal-Wallis H test. If a pairing had a significant difference the mean rank values were also provided in order to determine which of the categories rated the priority significantly higher. A total of thirty-five significant differences in rating of research priorities were found between the three groups and represents 61.4% of all possible combinations from the Mann-Whitney U test. The results are summarized in Table 3.21.

Table 3.20

Results of the Kruskal-Wallis H-test applied to the ratings of the twenty-four research priorities identified in the 2013 GMRP survey when responses were categorized into three groups based on respondents' discipline or area of expertise

Research priority	N biological science	N other natural science	N social science	df	P
RP01	466	336	247	2	<.001*
RP02	464	333	249	2	<.001*
RP03	464	338	251	2	<.001*
RP04	454	330	243	2	.001*
RP05	466	342	248	2	<.001*
RP06	465	343	250	2	.295
RP07	463	341	246	2	<.001*
RP08	455	331	241	2	.164
RP09	453	327	236	2	.134
RP10	454	329	240	2	.004*
RP11	465	343	250	2	.019*
RP12	466	341	248	2	.128
RP13	463	338	249	2	.564
RP14	464	341	246	2	<.001*
RP15	465	339	249	2	<.001*
RP16	463	335	249	2	.001*
RP17	464	336	252	2	<.001*
RP18	464	336	252	2	<.001*
RP19	462	331	251	2	<.001*
RP20	459	333	247	2	.002*
ESV1	465	340	252	2	.001*
ESV2	463	340	251	2	<.001*
ESV3	463	336	251	2	<.001*
ESV4	466	336	251	2	<.001*

*$p < .05$

Table 3.21

Research priorities that were rated significantly higher based on comparisons between respondent's discipline in the 2013 GMRP survey and notation on which discipline the research priority most likely aligns

Research priority	Priority code	Primary discipline	Rated significantly higher by stated discipline		
			Biological vs other natural	Biological vs social	Other natural vs social
Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments	RP01	biology	biological higher	biological higher	
Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability	RP02	biology	biological higher	biological higher	
Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability	RP03	social science		social higher	social higher
Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts	RP04	other natural science	other natural higher		
Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events	RP05	other natural science	other natural higher	social higher	
Apply understanding to develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation	RP07	other natural science	other natural higher	social higher	

Table 3.21 (continued).

Research priority	Priority code	Primary discipline	Rated significantly higher by stated discipline		
			Biological vs other natural	Biological vs Social	Other natural vs Social
Apply understanding of environmental impacts and marine operations to enhance the marine transportation system	RP10	other natural science		social higher	
Understand ocean-climate interactions within and across regions	RP11	other natural science			other natural higher
Understand and predict the impact of natural and anthropogenic processes on ecosystems	RP14	biology	biological higher	biological higher	
Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems	RP15	social science		social higher	social higher
Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management	RP16	biology	biological higher	biological higher	
Understand sources and processes contributing to ocean-related risks to human health	RP17	biology		social higher	social higher
Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health	RP18	biology		social higher	social higher

Table 3.21 (continued).

Research priority	Priority code	Primary discipline	Rated significantly higher by stated discipline		
			Biological vs other natural	Biological vs Social	Other natural vs Social
Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats	RP19	social science		social higher	social higher
Apply understanding of ocean ecosystems and biodiversity to develop products and biological models to enhance human well-being	RP20	biology		social higher	social higher
Understand how people perceive the services provided by coastal and offshore ecosystems of the Gulf of Mexico	ESV1	social science	biological higher		social higher
Quantify services provided by coastal and offshore ecosystems of the Gulf of Mexico	ESV2	social science	biological higher		social higher
Estimate the value of the services provided by coastal and offshore ecosystems of the Gulf of Mexico	ESV3	social science	biological higher		social higher
Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service	ESV4	social science	biological higher		social higher
Total number of differences			11	13	11

Longitudinal Analysis of Rating of Research Priorities

Sampling frame for longitudinal analyses

The demographics of people who completed two or more GMRP-related surveys varied across the years but the differences had a narrow range with 8% being the greatest difference between survey pairings within any one category (Table 3.22).

Table 3.22

Demographics of survey respondents that completed the GMRP survey in two or more years

Grouping	Year(s) respondent completed survey			
	2013 and 2010	2013 and 2007	2010 and 2007	2013, 2010 and 2007
Region				
Western Gulf	15%	20%	22%	19%
Northern Gulf	72%	64%	65%	69%
Eastern Gulf	13%	16%	13%	12%
N for Region	245	221	237	132
Affiliation				
University	46%	42%	41%	39%
Government	28%	29%	28%	30%
NGO	7%	7%	7%	6%
Business	11%	12%	13%	16%
Other	8%	9%	12%	10%
N for Affiliation	253	239	256	141
Relationship to Research				
Conduct	42%	36%	35%	35%
Sponsor	11%	8%	7%	9%
Professional User	36%	41%	47%	43%
Recreational User	7%	10%	7%	9%
Non-user	4%	5%	5%	4%
N for Relationship to Research	247	239	255	141
Discipline				
Biological science	46%	45%	49%	44%
Other natural science	30%	30%	29%	29%
Social science	25%	25%	21%	27%
N for Discipline	235	227	197	133

Approach I—those who completed all three survey

The dataset used for the Friedman test included the 164 people that were known to have completed all three surveys. The results from the Friedman test indicate that five of the twenty research priorities (25%) were found to have a significant difference, however it was not known between which years the difference existed (Table 3.23). The research priorities with significant differences between the three survey years were:

- Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability (RP3)
- Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events (RP5)
- Understand and predict the impact of natural and anthropogenic processes on ecosystems (RP14)
- Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems (RP15)
- Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management (RP16)

Table 3.23

Friedman test results based on the rating of the twenty ORPP research priorities over the three GMRP survey years (2007, 2010, and 2013)

Research priority	N	df	Asymp. sig.
RP1	141	2	.067
RP2	145	2	.458
RP3	145	2	.005*
RP4	136	2	.084
RP5	146	2	.005*
RP6	146	2	.210
RP7	147	2	.600
RP8	146	2	.602
RP9	140	2	.660
RP10	141	2	.199
RP11	148	2	.392
RP12	146	2	.663
RP13	144	2	.200
RP14	147	2	.008*
RP15	145	2	<.001*
RP16	149	2	.001*
RP17	146	2	.185
RP18	144	2	.065
RP19	143	2	.304
RP20	141	2	.703

* $p < .05$

Tables 3.24 and 3.25 provides the results of the post hoc Wilcoxon signed ranks tests for each of the research priorities. In each of the five cases the 2007

rating of the research priority was significantly higher than the 2010 rating. Research priorities 3, 5 and 16 significantly decreased in their rating between 2007 and 2010 but there was no difference between 2007 rating and 2013. Research priorities 15 and 16 had significantly higher rating in 2007 than in 2010 or 2013.

Table 3.24

Summary table of Wilcoxon sign ranks post hoc test results for comparing the ratings of research priorities by the same respondents over time based on Approach I

Research priority	Survey years compared	N	P	Year rated higher
RP03	2010 vs 2013	147	.076	
	2007 vs 2010	149	.001*	2007
	2007 vs 2013	155	.157	
RP05	2010 vs 2013	147	.060	
	2007 vs 2010	150	.001*	2007
	2007 vs 2013	157	.067	
RP14	2010 vs 2013	147	.834	
	2007 vs 2010	152	.002*	2007
	2007 vs 2013	156	.005*	2007
RP15	2010 vs 2013	146	.021	
	2007 vs 2010	151	<.001*	2007
	2007 vs 2013	153	.005*	2007
RP16	2010 vs 2013	149	.276	
	2007 vs 2010	154	.003*	2007
	2007 vs 2013	156	.022	

* $p < .0167$

Table 3.25

Research priorities with significant differences in ratings between GMRP survey years and identification of which year the rating was greater

Research priority	2013 vs 2010	2010 vs 2007	2013 vs 2007
Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability (RP3)		2007 higher	
Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events (RP5)		2007 higher	
Understand and predict the impact of natural and anthropogenic processes on ecosystems (RP14)		2007 higher	2007 higher
Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems (RP15)		2007 higher	2007 higher
Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management (RP16)		2007 higher	

Approach II—those who completed at least two surveys

There were 164 people that were known to have completed all three surveys and 366 people completed two of the three surveys. The breakdown by survey pairing was as follows:

- 143 people completed only the 2013 survey and 2010 survey;
- 103 people completed only the 2013 survey and 2007 survey; and

- 120 people completed only the 2010 survey and 2007 survey.

The test of each pairing of survey years was run independently and the results are outlined in Table 3.26, which summarizes the total number of responses that were used for each comparison. Each comparison had an N that ranged from 267 to 307.. Six research priorities (30% of the priorities) had ratings that were significantly higher in 2013 versus 2010. Fourteen research priorities (70% of the priorities) had ratings that were significantly lower in 2010 versus 2007. The final set of pairwise comparisons was completed for those who completed the 2007 and 2013 surveys. Six research priorities ratings (30% of the priorities) were significantly lower in 2013 versus 2007.

Table 3.26

Wilcoxon signed ranks test results of all research priorities when comparing the survey ratings by the same individual across surveys using Approach II

Research priority	Survey years compared	N	P	Year rated higher
RP01	2010 vs 2013	273	.028*	2013
	2007 vs 2010	242	.001*	2007
	2007 vs 2013	253	.868	
RP02	2010 vs 2013	275	.409	
	2007 vs 2010	249	.004*	2007
	2007 vs 2013	253	.239	
RP03	2010 vs 2013	274	.024*	2013
	2007 vs 2010	247	<.001*	2007
	2007 vs 2013	253	0.225	

Table 3.26 (continued).

Research priority	Survey years compared	N	P	Year rated higher
RP04	2010 vs 2013	261	<.001*	2013
	2007 vs 2010	234	<.001*	2007
	2007 vs 2013	249	.735	
RP05	2010 vs 2013	277	.017*	2013
	2007 vs 2010	251	.001*	2007
	2007 vs 2013	254	.173	
RP06	2010 vs 2013	274	.325	
	2007 vs 2010	250	.069	
	2007 vs 2013	254	.476	
RP07	2010 vs 2013	275	.901	
	2007 vs 2010	249	.039	
	2007 vs 2013	253	.331	
RP08	2010 vs 2013	270	.737	
	2007 vs 2010	250	.386	
	2007 vs 2013	252	.86	
RP09	2010 vs 2013	263	.183	
	2007 vs 2010	242	.286	
	2007 vs 2013	242	.976	
RP10	2010 vs 2013	265	.010*	2013
	2007 vs 2010	243	.005*	2007
	2007 vs 2013	243	.348	
RP11	2010 vs 2013	274	.026	
	2007 vs 2010	255	.016*	2007
	2007 vs 2013	253	.072	
RP12	2010 vs 2013	274	.346	
	2007 vs 2010	250	.077	
	2007 vs 2013	247	.243	
RP13	2010 vs 2013	270	.12	
	2007 vs 2010	247	.015*	2007
	2007 vs 2013	248	.668	

Table 3.26 (continued).

Research priority	Survey years compared	N	P	Year rated higher
RP14	2010 vs 2013	274	.233	
	2007 vs 2010	251	<.001*	2007
	2007 vs 2013	252	<.001*	2007
RP15	2010 vs 2013	273	.002*	2013
	2007 vs 2010	250	<.001*	2007
	2007 vs 2013	248	.040*	2007
RP16	2010 vs 2013	271	.11	
	2007 vs 2010	254	<.001*	2007
	2007 vs 2013	250	.001*	2007
RP17	2010 vs 2013	274	.943	
	2007 vs 2010	252	.084	
	2007 vs 2013	248	.040*	2007
RP18	2010 vs 2013	271	.816	
	2007 vs 2010	252	.013*	2007
	2007 vs 2013	244	.041*	2007
RP19	2010 vs 2013	269	.786	
	2007 vs 2010	247	.002*	2007
	2007 vs 2013	245	.004*	2007
RP20	2010 vs 2013	264	.688	
	2007 vs 2010	247	.002*	2007
	2007 vs 2013	242	.052	

* $p < .05$

Comparison between Approach I and Approach II

If a significant difference was found in Approach I the same significant difference was found in Approach II (Table 3.27). Zero research priorities had a significant difference in rating between 2010 and 2013 using Approach I and six research priorities had significant differences for these years using Approach II. Five research priorities had a significant difference in rating between 2007 and

2010 in Approach I compared to fourteen significant differences found in Approach II. In all cases where a significant difference was found the rating significantly decreased between 2007 and 2010. Two research priorities had a significant difference in rating between 2007 and 2013 using Approach I and six research priorities had significant differences for these years using Approach II. In all cases the rating of those priorities significantly decreased between 2007 and 2013. Regardless of which approach was used, the greatest number of significant differences occurred between 2007 and 2010 compared to the other year pairings (2007 vs 2013 or 2010 vs 2013) (Table 3.27).

Table 3.27

Comparison of significant differences found in the rating of research priorities when analyzing only those who completed all three surveys (Approach I) versus everyone who completed at least two surveys (Approach II) and the survey year that had a rating significantly higher than another year

Research priority	Survey years compared	Approach I year rated higher	Approach II year rated higher
RP01	2010 vs 2013		2013
	2007 vs 2010		2007
	2007 vs 2013		
RP02	2010 vs 2013		
	2007 vs 2010		2007
	2007 vs 2013		

Table 3.27 (continued).

Research priority	Survey years compared	Approach I year rated higher	Approach II year rated higher
RP03	2010 vs 2013		2013
	2007 vs 2010	2007	2007
	2007 vs 2013		
RP04	2010 vs 2013		2013
	2007 vs 2010		2007
	2007 vs 2013		
RP05	2010 vs 2013		2013
	2007 vs 2010	2007	2007
	2007 vs 2013		
RP10	2010 vs 2013		2013
	2007 vs 2010		2007
	2007 vs 2013		
RP11	2010 vs 2013		
	2007 vs 2010		2007
	2007 vs 2013		
RP13	2010 vs 2013		
	2007 vs 2010		2007
	2007 vs 2013		
RP14	2010 vs 2013		
	2007 vs 2010	2007	2007
	2007 vs 2013	2007	2007
RP15	2010 vs 2013		2013
	2007 vs 2010	2007	2007
	2007 vs 2013	2007	2007
RP16	2010 vs 2013		
	2007 vs 2010	2007	2007
	2007 vs 2013		2007
RP17	2010 vs 2013		
	2007 vs 2010		
	2007 vs 2013		2007

Table 3.27 (continued).

Research priority	Survey years compared	Approach I year rated higher	Approach II year rated higher
RP18	2010 vs 2013		
	2007 vs 2010		2007
	2007 vs 2013		2007
RP19	2010 vs 2013		
	2007 vs 2010		2007
	2007 vs 2013		2007
RP20	2010 vs 2013		
	2007 vs 2010		2007
	2007 vs 2013		

Summarized Results by Research Priority

The three surveys contained input from more than 3,000 people over a six-year period. A total of fifteen separate statistical tests, including post hoc tests were conducted on at least one or more of the GMRP surveys. The results of these tests indicate that the importance of twenty research priorities are different over time and in 2013 the twenty-four research priorities are different relative to each other. In addition, in 2013 respondent's rating of some of the priorities are different based on their area of expertise, relationship to research and affiliation. However, not all of these factors are equally important in determining the rating of the research priorities. Table 3.28 highlights the different types of categories that were tested and the percent of research priorities or pairings that had statistically significant differences by category. Appendix F includes the aggregated results of all analyses by research priority.

Table 3.28

Summary table of statistical tests, categories analyzed, number of pairwise comparisons and number and percent of the pairings that had statistical differences in ratings of research priorities

Comparison	Categories used	Number of research priorities tested	Number of comparisons	Number of differences	Percent differences
Research priorities compared to each other	Twenty-four research priorities	24	276	194	70.3%
Grouping					
Affiliation	Business Government University NGO	24	144	13	9.0%
Sub-region	Western Northern Eastern	24	72	3	4.2%
Relationship to research	Conduct Sponsor Professional user Recreational user Non-user	24	240	46	19.2%
Discipline	Biology Other natural science Social science	24	72	35	48.6%

Table 3.28. (continued).

Comparison	Categories used	Number of research priorities tested	Number of comparisons	Number of differences	Percent differences
Time					
Approach I	2013 survey 2010 survey 2007 survey	20	60	7	11.7%
Approach II	2013 survey 2010 survey 2007 survey	20	60	26	43.3%

CHAPTER IV

DISCUSSION

Response Rate

Web-based surveys response rates tend to range from 20-47% in an academic setting (Nulty, 2008). However, there may be a recent trend towards decreased response rates due to survey fatigue and may be due to numerous people contacting the same individuals to complete different surveys (Olson, 2014). In fact, Olson (2014) suggests that there is a tragedy of the commons where researchers are sharing the same survey population and if this population is repeatedly being contacted then the community of researchers will be adversely impacted due to a decreased response rate. Fortunately, the high response rate for the GMRP survey may partially be due to the infrequency that people are asked to complete this survey (once every three years). The highest response rates came from those who previously completed a GMRP survey. It may have been elevated because the customized email that was sent to each potential respondent thanked them for completing a previous survey and asked for assistance again in 2013. Because they had previously completed the survey and were interested in the topic area they may have been more inclined to complete the 2013 survey. In addition, governmental and academic-based surveys have been proven to increase response rate and may be perceived as being more legitimate (Tourangeau, Rips, & Rasinski, 2000). The survey was administered by Sea Grant through a university email address and the survey introduction also stated that the results would be shared with several government

and academic groups. The 2013 survey had a consistently high number of responses similar to the 2007 and 2010 surveys, which indicates continued interest in this subject.

Sampling Frame

The multi-phased approach to soliciting input for the 2013 survey was able to reach more members of the target audience compared to implementing just one of the phases. There were some differences between the types and locations of people that responded based on the different phases. Phase II respondents had relatively higher representation in the university category and tended to conduct research more than the others. The broad release (Phase III) had the highest number of responses compared to the other phases and captured relatively more responses from the Western Gulf and people who use research for recreational purposes or stated that they did not use research. There was no way to differentiate in greater detail the demographics of respondents (e.g. student versus professional, gender) because these questions were not included in the survey. The shifts in the types of people who responded across the different phases allowed for a more complete representation of the target audiences and added value to the process compared to only using one of the phases for this work. In addition, it was consistent with the previous sampling methodologies of open and targeted requests that were used in 2007 and 2010, where possible. However, there are potential drawbacks with this approach that must be considered including that the sampling frame shifted with each phase and for the longitudinal analysis the sampling frame could not be replicated

between the three survey years because people were invited to complete the survey through a convenience sampling method. In addition, the large number of responses from the open solicitation process (Phase III) meant that that phase has a greater influence on the final results for the rating of research priorities and analyses by group when compared to the other two phases. However, the analyses were conducted with all responses across phases being aggregated to be a single dataset to analyze.

Reliability

Cronbach's coefficient alpha values above 0.7 are considered "acceptable," above 0.8 are considered "good," and greater than 0.9 are "excellent" (Gliem & Gliem, 2003). Therefore, because all values were at or greater than 0.89 for the three surveys the data for the repeated questions can be considered internally consistent.

The test-retest for reliability had a relatively small sample size compared to other analyses described in this dissertation. However, all but one of the research priorities did not significantly change over an average of 20.8 days between the two responses by the same person. Therefore, it appears that the ratings of the ORPP research priorities are reliable based on the test-retest results. These tests confirm that the data could be considered reliable and therefore useable in the next phases of analysis.

Rating of Research Priorities in 2013

The following discussion can only be applied to those who completed the survey. However, based on the input of 1,124 people who completed all of the

2013 survey the twenty ORPP and four ecosystem service valuation research priorities they rated all priorities highly but not equally important. In fact, there were a large number of differences between research priorities with more than 70% of the comparisons having a significant difference in their importance. This conflicts with the national level (ORPP) perspective that each of these research priorities are equally important. When the 2013 GMRP survey sampling frame is compared to the sampling frame from the 2006 ORPP workshop the most notable difference is that the GMRP survey had the largest percentage of respondents from academia while the ORPP was most represented by government. This could partially explain why differences were found between the national ratings and Gulf of Mexico ratings.

In the 2013 GMRP survey tier I research priorities primarily focused on ecosystem health and natural resources. Some of the tier I research priorities were quite broad, and therefore may have been rated relatively high because many different issues could be included in that priority. For example the top rated research priority, “Understand and predict the impact of natural and anthropogenic processes on ecosystems” covers an array of disciplines and major issues facing the Gulf. There was also an emphasis on ecosystem indicators, understanding species and habitat relationships and how humans influence resource use and sustainability. These high priorities for the Gulf of Mexico may be driven by the situation in the Gulf post-DWH oil spill and also due to the composition of the 1,124 people who completed all of the survey rating questions.

The mid-tier (tier II) research priorities contained the most priorities and included at least one priority from all but one theme area. These were still priorities that were rated high or very high by respondents and covered an array of topics. The tier III priorities mainly related to ocean and human health, and in fact all research priorities in this societal theme were clustered in tier III. This may be due to a relatively low number of people working in this societal theme area that completed the survey or because some of the research priorities in this theme area were very specific compared to the other research priorities that were rated.

The ESV related research priorities were rated in the lower half of the twenty-four research priorities and again may have been due to the same reasons as those in the oceans and human health societal theme. In the comparisons between groups we discover that there are many significant differences between the rating of the ESV priorities depending on which group was rating them. Therefore, if more of the types of people who highly rated the ESV priorities completed the survey they would have been elevated in their overall ranking or alternatively if more people from groups that rated ESV priorities significantly lower completed the survey the relative ratings would have been lower.

Comparison of 2013 Ratings between Groups

Each of the group comparisons were conducted independently of the others. The map of responses by county revealed that not all counties had equal representation and that some of the highest response rates may have come from

counties with large university or government representation. There may be co-linearity of the independent variables that were examined in each separate analysis (e.g. region and affiliation). However, region was aggregated to an area much larger than at the county level, which could reduce the impacts of co-linearity for that variable. Each analysis by group was examined independently of the others with the assumption that each group had a similar composition of members in terms of the other groupings. This increases N because if multiple groups were compared simultaneously then only the respondents that completed every grouping-related question could be included in the analysis and this would increase item non-response bias. Finally, because the comparison were being conducted between groups of respondents to identify differences the results can be extended to the larger population and not constrained to just those that completed the survey.

Affiliation

The low percentage of differences (9.0%) in the ratings of research priorities by affiliation is noteworthy. The business affiliation drove the majority of differences and rated two climate research priorities and the impacts of natural and anthropogenic process on ecosystem priorities significantly lower than almost every other type of affiliation. Further investigation is needed to determine why people in the business sector rated two of the priorities significantly lower than all other sectors. The only other priority that had more than one difference was one of the ESV priorities that the NGO community rated higher than some of

the others. Overall, it appears that people's affiliation does not drive how they rate Gulf of Mexico research priorities.

Region

Where people lived within the Gulf of Mexico also had relatively few differences between the ratings of research priorities. With only 4.2% of all possible pairings having a significant difference it appears that people were considering the entire Gulf of Mexico when answering the rating questions rather than being influenced by their locale or all locales within the Gulf have the same set of research priorities. Interestingly, in the three cases where significant differences were found the western region rated the research priority relatively higher than people in other regions. Phase III of the survey included more people from the western region and more recreational users of research, which may have driven these differences because recreational users of research had many more differences than any other group. This could be a case where co-linearity had an impact on the results. Another possible explanation of the differences is that the western region contains seven of the top 50 largest ports in the U.S. and four of these are in the top ten based on tonnage in 2009, whereas the eastern Gulf of Mexico only contains one port in the top ten, which may have influenced why a marine operations related priority was rated higher in the western region (NOAA National Ocean Service, 2011).

Relationship to research

It appears that people who sponsor research rate the research priorities similarly as those that conduct research and those that use research for their

profession because these are the only two cases where there were no significant differences found in the ratings between sponsors and either of these groups. That result suggests that research sponsors are properly assessing the research needs and consider the needs of people on the supply side (researchers) and at least part of the demand side (professional users of research). Sponsors appear to bridge this gap. The research sponsors and researchers were broadly-defined categories, which could have impacted how their ratings of individual research priorities compared to other groups rating of individual research priorities and resulted in less differences between other groups. There were likely cases where an individual served in similar roles and potentially had some overlap between the groups. An example would be someone who sponsors research but still runs a research program. They could only select one category in the survey but may be considered part of more than one category.

There were six of the twenty-four priorities that the researchers and professional users did not rate similarly and interestingly they were all rated higher by the professional users of research. Four of these priorities were the ESV research priorities. This may suggest that those that conduct research should re-evaluate their efforts and priorities and consider focusing effort on addressing research priorities that were rated highly by the professional users.

The group that drove the most significant difference in ratings was recreational users and they always rated the research priority higher than the other group. This suggests that recreational users of Gulf research do value the research priorities even if they do not use them for their profession. In some

cases they rate the research priorities higher than those that conduct research or use professionally. The reason research priorities 8, 9, 17, 18, 19 and 20 were identified as having significantly different ratings based on relationship to research is only because recreational users of research rated these significantly higher compared to one or more groups. Recreational users also rated many priorities related to marine operations and human health significantly higher than any other group. These may resonate highly with them because it reflects priorities related to how they use the resource instead of how they study or manage the resource.

Area of expertise

As anticipated, the highest number of significant differences were between people with different areas of expertise. Generally, in the cases where there were significant differences people rated research priorities that related to their discipline significantly higher. Biologists and social scientists had the greatest number of differences, but found common ground for the ESV priorities with no significant differences in the rating of those priorities between these groups and by rating ESV priorities higher than people with expertise in other natural sciences. Social scientists rated the ocean and human health priorities higher than any other group. One priority that did not have significant differences in rating by area of expertise and appeared to be rated very high by all groups was the tier I research priority “Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards.” This priority crosses multiple disciplines

and suggests that people in the Gulf have a focus on resilience regardless of their area of study or interest.

Longitudinal Analysis of Research Priority Ratings

Similar to the overall rating of research priorities, the results for this section of the dissertation is constrained to only reflect those that completed the survey. Although only five of the twenty research priorities had a significant difference in their ratings over time these five were some of the ones that were predicted to change based on the DWH oil spill. However, according to the people who completed the three surveys all five of the research priorities decreased in ratings between 2007 and 2010. This is the opposite of what would be expected. Two of the priorities expected to be high remain relatively lower ratings in 2013 compared to 2007 rating (RP14 and RP15) while the other three have rebounded. Because many of these research priorities were rated “high” or “very high” by most of the respondents the differences observed reflect an increase in the number of people decreasing the rating of the priorities. This is different than people elevating other research priorities.

Approach II revealed many significant differences in ratings between 2007 and 2010 with 14 research priorities that had changed in importance, while the 2013 survey results had six research priorities with significant differences in rating compared to the 2010 survey and six compared to the 2007 survey. One possible contributor to these differences could be due to a shift in the sampling frame across the three time periods because each analysis was completed independent of the others for Approach II. However, the sampling frame from

Approach II does not appears to shift much between the three survey years, which suggests that significant differences found between years likely was not driven by different types of people completing the survey. An alternative explanation is that because this approach utilized three different, independent analyses the tests may have been sensitive enough and N large enough to identify more significant differences.

A change in ratings of the research priorities over a six year period could be expected due to the shift in research needs caused by various stressors (e.g. DWH oil spill). It may be possible that the DWH oil spill, which was capped just months before the 2010 survey, influenced how people rated the research priorities in 2010. Survey respondents may have been focused on very specific oil-spill-related research priorities and the broad research priorities described in the ORPP did not provide the amount of detail the respondent expected and they rated them lower in 2010. However, many of the research priorities that were rated lower in 2010 compared to 2007 would address general oil spill related issues and focused on topics such as ecosystem health, ecological indicators, identifying anthropogenic impacts, and similar topics. Another possible explanation is that after the DWH oil spill there were many new priorities which made some existing priorities relatively decreased in importance as new priorities were identified. There were numerous conferences and workshops that were held during the summer and fall of 2010 and many people shared an array of research needs and priorities at these meetings. Many of them specifically focused on oil spill research and monitoring. These discussions and results of the

workshops and meetings may have been considered when respondents were rating research priorities in the 2010 GMRP survey.

A possible second explanation relates to the 2010 survey design. The primary focus of that survey related to the oil spill. Although the twenty ORPP research priorities were included in this survey the respondents were provided lists of specific oil spill-related research priorities prior to being asked to rate the ORPP research priorities. After reading the list of oil spill specific research priorities they may have decreased their ratings of the ORPP research priorities. A third possibility is that there was input fatigue in 2010 because of the numerous workshops, listening sessions, surveys and other queries and people were not rating the importance of priorities as high as previously because they were being asked to do this numerous times over a short period of time by numerous organizations. However, it is still noteworthy that several of the ORPP research priorities that most closely aligned with oil spill topics also decreased in their rating.

There are a relatively low number of differences between 2007 and 2013 compared to the difference between 2010 and 2007. However, both approaches indicate that the ratings of the following research priorities have significantly decreased over time:

- Understand and predict the impact of natural and anthropogenic processes on ecosystems (RP14)

- Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems (RP15)

The two research priorities listed above align with the oil spill related-issues. Even in 2014 the oil spill and its impacts were forefront on many people's minds. It is difficult to explain why these two research priorities were rated significantly lower in 2013 than they were in 2007. Although RP14 has been rated significantly lower in importance over time it is still the highest rated research priority amongst the twenty-four that were rated, which suggests that some people rated the priority lower compared to 2007 but the majority of people still rate the priority highly. There are several potential explanations on why some of the research priorities are still significantly lower in 2013. First, one reason for the relative decrease in rating could be due to the perception that there was substantial interest, discussion and assumed resources being dedicated to DWH-related priorities so people decreased their rating of those priorities to increase attention on the other priorities. Another possible explanation is that the priorities are very broad and the people who completed the survey were thinking of other aspects (e.g. non-oil spill related priorities) of that research priority when they were completing the survey.

CHAPTER V

CONCLUSIONS

Drivers to complete this work

There were several reasons why this research was completed. Initially the ORPP was the foundation from which the 2007 GMRP survey was created in order to ascertain if national research priorities resonated when applied to the Gulf of Mexico. Upon reflection across 2007, 2010 and 2013 the short answer is "yes" survey respondents indicated that the ORPP research priorities were "high" or "very high" priorities for the Gulf. As time progressed and the DWH oil spill occurred there was an urgent need to reassess research priorities for the region and a difference was discovered between how people rated priorities in 2007 and after the DWH was capped in 2010. These results demanded further research three years later to determine if priorities were continuing to change or if they were returning to the previous baseline established in 2007. According to the survey respondents there is almost a complete return to 2007 levels and the remaining differences are primarily driven by people who more recently are rating just a few research priorities significantly lower than they had previously. This may indicate that people's focus and priorities are returning to pre-Deepwater Horizon levels, which could be due to them believing that adequate work is already being done on DWH oil spill-related issues.

Overall conclusions

At the conclusion of all of the tests the greatest percentage of differences were the rating of research priorities compared to each other. This would be

expected if the research priorities had various levels of importance. Because this is based on the same person's rating of one research priority compared to another research priority this indicates that survey respondents value some of the stated research priorities relatively higher than others. The lowest rated priorities were rated "high" or "very high" by 49.5% of the respondents or more. We were identifying differences within this spectrum of generally highly rated research priorities. The main constraint in this interpretation was that we can only base this information on the 1,124 people that completed the survey. One could extrapolate this to a broader population but that should be done with caution due to the original survey design and survey administration methods.

If someone wanted to predict how an individual survey respondent would rate the research priorities in 2013 they should ask their discipline and relationship to research, which appear to be the two greatest indicators influencing the rating of the research priorities. In this analysis people's affiliation and region impacted the rating of relatively few research priorities.

The foundation of the survey and the subsequent analysis was mainly based on the twenty ORPP research priorities. While, these priorities were widely vetted nationally they may not perfectly match the needs in the Gulf of Mexico. In 2013 the four ESV research priorities were added to capture some additional research priorities that had recently been discussed in regional research meetings and workshops. None of the ESV priorities entered the top 50% of the ranked research priorities. However, it is important to note that this does not

mean they are not high priorities but just that survey respondents identified other research priorities even higher.

The level of resolution described in each of the ORPP research priorities varied from being very broad to quite narrow. This may influence how the research priority was rated with broader research priorities capturing more topics that are of interest to respondents. In addition, since the priorities were pre-defined some respondents may have felt forced to rate priorities that were not of interest to them. However, they could rate these priorities from “very low” to “very high” and a separate section of the survey did provide an opportunity for them to provide their own research priorities. This qualitative data was not included in this document because of the additional potential bias that could be brought into the interpretation process as well as the lack of quantitative tests that could be applied to that data.

Another noteworthy limitation is that the ratings of the research priorities is based on the input of those that completed the survey. A great amount of effort was taken to broadly distribute the survey to people such as researchers, research sponsors and those that use research for professional and recreational purposes. However, because this is a sample of convenience we cannot extrapolate the results to say that these are the priorities of all Gulf of Mexico residents. Gulf residents were not specifically targeted. This was not a census of the population of these groups. This is because 1) it would be extremely difficult, if not impossible, to develop a complete list of members of this population and 2) if a list was created then different methodology would be needed to capture all of

their input. We maintained some consistency in our approach to solicit input for the 2013 survey as was done in 2010 and 2007 in order to not shift the sampling frame. The only difference in the 2013 approach was reaching out to more people from the harvested email lists. This enhanced the number of people asked to complete the survey and was an attempt to increase representation from the population of interest. It did not appear to substantially shift the sampling frame.

The Gulf of Mexico is a complex ecosystem that also supports diverse industries and uses. The national ORPP research priorities as they apply to the Gulf of Mexico rated highly but survey respondents did differentiate between them and indicated that, while they are all important, some rate higher than others. It appears that in the Gulf of Mexico the rating of ORPP research priorities tended to not be greatly influenced by where people primarily worked in the Gulf or by their affiliation. People who sponsor Gulf research appear to have a good grasp of the research priorities of both those that are funded to increase the scientific knowledge base (researchers) and those that would benefit from the increase in scientific knowledge base (professional users of research). Based on how research sponsors prioritize research needs they appear to bridge the gap between the people that supply and people that demand scientific knowledge. The next challenge is to develop or refine processes to allow sponsors to work together in a coordinated fashion to have greater impact on regional research. There could be increased efficiencies through collaboration and jointly funding research projects.

Application

Since the inception of the broader effort to develop the Gulf of Mexico Research Plan the GMRP survey and associated activities have been used by at least fifteen groups that have incorporated the priorities into their strategic plan and/or Requests for Proposal. In addition, it has been used to fund tens of millions of dollars in regional research. The current and anticipated investment in Gulf of Mexico research and restoration is unprecedented. The results shared in this document can assist in the coordination and setting of priorities. This analysis focused on the twenty ORPP research priorities and four ecosystem service valuation priorities, and therefore the results are constrained to those priorities. However, it is apparent that the importance of national and regional priorities are different and in some cases change over time. On-going input is needed to identify if research priorities that are being set are consistent with the priorities of the people who are sponsoring, conducting and using the research. The analysis by grouping suggest that if organizations that are setting research want to be inclusive and balance input across a broad cross section of the region they should consult with an array of groups and especially consider including research sponsors that serve as a bridge between researchers and those that use research for their profession. They should also include recreational users of research and the business sector because these groups tend to rate priorities significantly different than others. Finally, regardless of the composition of groups setting research priorities there should be a multidisciplinary mix of people because the survey results suggest that almost half of the ORPP priorities are

rated significantly different based on people's discipline. The next regional research survey should be administered in 2016 and could serve as another update to this work.

APPENDIX A

THE 2013 GULF OF MEXICO RESEARCH PLAN SURVEY

2013 Gulf of Mexico Regional Research Survey

Introduction

Survey to Prioritize Gulf of Mexico Research Needs

Your participation is essential in order to prioritize existing regional research and monitoring agendas and to identify emerging research needs. This survey should take less than 15 minutes to complete, but you may take as much time as necessary to complete and provide comments. Your participation is voluntary, and you may discontinue the survey at any time.

The results of this survey will be shared with leaders of:

- NOAA RESTORE Act Science Program
- BP-supported Gulf of Mexico Research Initiative (GoMRI),
- National Academy of Science's Gulf of Mexico Program,
- Gulf Coast Ecosystem Restoration Council,
- National Fish and Wildlife Foundation's Gulf Environmental Benefit Fund,
- Multiagency-developed Gulf of Mexico Research Plan (GMRP),
- University-based Centers of Excellence and Gulf of Mexico University Research Collaborative (GOMURC),
- Gulf of Mexico Alliance,
- NGO-coordinated efforts,
- Business community, and
- Others.

If you would like to receive email notices about the progress of the project, you may do so by adding your contact information at the end of the survey. We will only use this contact information to communicate GMRP-related work, and your contact information will not be shared with others. Individual responses that identify who submitted answers will not be shared.

Thank you for your participation in this survey.

For more information about this survey, contact Steve Sempier (228) 818-8830. This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820.

***If you agree to continue with the survey please check the box below. If you do not agree, please close this window.**

○ Yes, I agree.

Page 1

2013 Gulf of Mexico Regional Research Survey

Residence

To sort responses into sub regions we would like to collect some background information from you.

***In what state do you primarily reside?**

- Alabama
- Florida
- Louisiana
- Mississippi
- Texas
- Campeche
- Quintana Roo
- Tabasco
- Tamaulipas
- Veracruz
- Yucatan
- Other state or country (please specify) _____

2013 Gulf of Mexico Regional Research Survey

Alabama Counties

In what Alabama county do you primarily reside?

- Autauga
- Baldwin
- Barbour
- Bibb
- Blount
- Bullock
- Butler
- Calhoun
- Chambers
- Cherokee
- Chilton
- Choctaw
- Clarke
- Clay
- Cleburne
- Coffee
- Colbert
- Conecuh
- Coosa
- Covington
- Crenshaw
- Cullman
- Dale
- Dallas
- DeKalb
- Elmore
- Escambia
- Etowah
- Fayette
- Franklin
- Geneva
- Greene
- Hale
- Henry
- Houston
- Jackson
- Jefferson
- Lamar
- Lauderdale
- Lawrence
- Lee
- Limestone
- Lowndes
- Macon
- Madison
- Marengo
- Marion
- Marshall
- Mobile
- Monroe
- Montgomery
- Morgan
- Perry
- Pickens
- Pike
- Randolph
- Russell
- St. Clair
- Shelby
- Sumter
- Talladega
- Tallapoosa
- Tuscaloosa
- Walker
- Washington
- Wilcox
- Winston

2013 Gulf of Mexico Regional Research Survey

Florida Counties

In what Florida county do you primarily reside?

- Alachua
- Baker
- Bay
- Bradford
- Brevard
- Broward
- Calhoun
- Charlotte
- Citrus
- Clay
- Collier
- Columbia
- Dade
- De Soto
- Dixie
- Duval
- Escambia
- Flagler
- Franklin
- Gadsden
- Gilchrist
- Glades
- Gulf
- Hamilton
- Hardee
- Hendry
- Hernando
- Highlands
- Hillsborough
- Holmes
- Indian River
- Jackson
- Jefferson
- Lafayette
- Lake
- Lee
- Leon
- Levy
- Liberty
- Madison
- Manatee
- Marion
- Martin
- Monroe
- Nassau
- Okaloosa
- Okeechobee
- Orange
- Osceola
- Palm Beach
- Pasco
- Pinellas
- Polk
- Putnam
- St. Johns
- St. Lucie
- Santa Rosa
- Sarasota
- Seminole
- Sumter
- Suwannee
- Taylor
- Union
- Volusia
- Wakulla
- Walton
- Washington

2013 Gulf of Mexico Regional Research Survey

Louisiana Parishes

In what Louisiana parish do you primarily reside?

- Acadia
- Allen
- Ascension
- Assumption
- Avoyelles
- Beauregard
- Bienville
- Bossier
- Caddo
- Calcasieu
- Caldwell
- Cameron
- Catahoula
- Claiborne
- Concordia
- De Soto
- East Baton Rouge
- East Carroll
- East Feliciana
- Evangeline
- Franklin
- Grant
- Iberia
- Iberville
- Jackson
- Jefferson
- Jefferson Davis
- Lafayette
- Lafourche
- La Salle
- Lincoln
- Livingston
- Madison
- Morehouse
- Natchitoches
- Orleans
- Ouachita
- Plaquemines
- Pointe Coupee
- Rapides
- Red River
- Richland
- Sabine
- St. Bernard
- St. Charles
- St. Helena
- St. James
- St. John the Baptist
- St. Landry
- St. Martin
- St. Mary
- St. Tammany
- Tangipahoa
- Tensas
- Terrebonne
- Union
- Vermilion
- Vernon
- Washington
- Webster
- West Baton Rouge
- West Carroll
- West Feliciana
- Winn

2013 Gulf of Mexico Regional Research Survey

Mississippi Counties

In what Mississippi county do you primarily reside?

- Adams
- Alcorn
- Amite
- Attala
- Benton
- Bolivar
- Calhoun
- Carroll
- Chickasaw
- Choctaw
- Claiborne
- Clarke
- Clay
- Coahoma
- Copiah
- Covington
- DeSoto
- Forrest
- Franklin
- George
- Greene
- Grenada
- Hancock
- Harrison
- Hinds
- Holmes
- Humphreys
- Issaquena
- Itawamba
- Jackson
- Jasper
- Jefferson
- Jefferson Davis
- Jones
- Kemper
- Lafayette
- Lamar
- Lauderdale
- Lawrence
- Leake
- Lee
- Leflore
- Lincoln
- Lowndes
- Madison
- Marion
- Marshall
- Monroe
- Montgomery
- Neshoba
- Newton
- Noxubee
- Oktibbeha
- Panola
- Pearl River
- Perry
- Pike
- Pontotoc
- Prentiss
- Quitman
- Rankin
- Scott
- Sharkey
- Simpson
- Smith
- Stone
- Sunflower
- Tallahatchie
- Tate
- Tippah
- Tishomingo
- Tunica
- Union
- Walthall
- Warren
- Washington
- Wayne
- Webster
- Wilkinson
- Winston
- Yalobusha
- Yazoo

2013 Gulf of Mexico Regional Research Survey

Texas Counties

In what Texas county do you primarily reside?

- Anderson
- Andrews
- Angelina
- Aransas
- Archer
- Armstrong
- Atascosa
- Austin
- Bailey
- Bandera
- Bastrop
- Baylor
- Bee
- Bell
- Bexar
- Blanco
- Borden
- Bosque
- Bowie
- Brazoria
- Brazos
- Brewster
- Briscoe
- Brooks
- Brown
- Burleson
- Burnet
- Caldwell
- Gillespie
- Glasscock
- Goliad
- Gonzales
- Gray
- Grayson
- Gregg
- Grimes
- Guadalupe
- Hale
- Hall
- Hamilton
- Hansford
- Hardeman
- Hardin
- Harris
- Harrison
- Hartley
- Haskell
- Hays
- Hemphill
- Henderson
- Hidalgo
- Hill
- Hockley
- Hood
- Hopkins
- Houston
- Moore
- Morris
- Motley
- Nacogdoches
- Navarro
- Newton
- Nolan
- Nueces
- Ochiltree
- Oldham
- Orange
- Palo Pinto
- Panola
- Parker
- Parmer
- Pecos
- Polk
- Potter
- Presidio
- Rains
- Randall
- Reagan
- Real
- Red River
- Reeves
- Refugio
- Roberts
- Robertson

2013 Gulf of Mexico Regional Research Survey

- Calhoun
- Callahan
- Cameron
- Camp
- Carson
- Cass
- Castro
- Chambers
- Cherokee
- Childress
- Clay
- Cochran
- Coke
- Coleman
- Collin
- Collingsworth
- Colorado
- Comal
- Comanche
- Concho
- Cooke
- Coryell
- Cottle
- Crane
- Crockett
- Crosby
- Culberson
- Dallam
- Dallas
- Dawson
- Howard
- Hudspeth
- Hunt
- Hutchinson
- Irion
- Jack
- Jackson
- Jasper
- Jeff Davis
- Jefferson
- Jim Hogg
- Jim Wells
- Johnson
- Jones
- Karnes
- Kaufman
- Kendall
- Kenedy
- Kent
- Kerr
- Kimble
- King
- Kinney
- Kleberg
- Knox
- Lamar
- Lamb
- Lampasas
- La Salle
- Lavaca
- Rockwall
- Runnels
- Rusk
- Sabine
- San Augustine
- San Jacinto
- San Patricio
- San Saba
- Schleicher
- Scurry
- Shackelford
- Shelby
- Sherman
- Smith
- Somervell
- Starr
- Stephens
- Sterling
- Stonewall
- Sutton
- Swisher
- Tarrant
- Taylor
- Terrell
- Terry
- Throckmorton
- Titus
- Tom Green
- Travis
- Trinity

2013 Gulf of Mexico Regional Research Survey

- Deaf Smith
- Delta
- Denton
- De Witt
- Dickens
- Dimmit
- Donley
- Duval
- Eastland
- Ector
- Edwards
- Ellis
- El Paso
- Erath
- Falls
- Fannin
- Fayette
- Fisher
- Floyd
- Foard
- Fort Bend
- Franklin
- Freestone
- Frio
- Gaines
- Galveston
- Garza
- Lee
- Leon
- Liberty
- Limestone
- Lipscomb
- Live Oak
- Llano
- Loving
- Lubbock
- Lynn
- McCulloch
- McLennan
- McMullen
- Madison
- Marion
- Martin
- Mason
- Matagorda
- Maverick
- Medina
- Menard
- Midland
- Milam
- Mills
- Mitchell
- Montague
- Montgomery
- Tyler
- Upshur
- Upton
- Uvalde
- Val Verde
- Van Zandt
- Victoria
- Walker
- Waller
- Ward
- Washington
- Webb
- Wharton
- Wheeler
- Wichita
- Wilbarger
- Willacy
- Williamson
- Wilson
- Winkler
- Wise
- Wood
- Yoakum
- Young
- Zapata
- Zavala

2013 Gulf of Mexico Regional Research Survey

Prioritization of ORPP and Related Research Areas

In 2007 and 2010 we asked people to rate the priority level of research needs identified in the national *Ocean Research Priorities Plan and Implementation Strategy* (ORPP) considering its relevance to the Gulf of Mexico over the next fifteen years. Answering these same questions will allow us to learn if priorities have changed over time. A separate, additional set of research priorities that relates to ecosystem services was also added this year.

Rate the priority level of each research need considering its relevance to the Gulf of Mexico over the next fifteen years.

1) Stewardship of Natural and Cultural Ocean Resources

	Very Low	Low	Medium	High	Very High	No Opinion
Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments	○	○	○	○	○	○
Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability	○	○	○	○	○	○
Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability	○	○	○	○	○	○
Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts	○	○	○	○	○	○

2) Increasing Resilience to Natural Hazards

	Very Low	Low	Medium	High	Very High	No Opinion
Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events	○	○	○	○	○	○
Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards	○	○	○	○	○	○
Apply understanding to develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation	○	○	○	○	○	○

3) Enabling Marine Operations

	Very Low	Low	Medium	High	Very High	No Opinion
Understand the interactions between marine operations and the environment	○	○	○	○	○	○
Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain	○	○	○	○	○	○
Apply understanding of environmental impacts and marine operations to enhance the marine transportation system	○	○	○	○	○	○

This question continues onto the next page.

2013 Gulf of Mexico Regional Research Survey

Prioritization of ORPP and Related Research Areas, Part II

Rate the priority level of each research need considering its relevance to the Gulf of Mexico over the next fifteen years.

4) The Ocean's Role in Climate

	Very Low	Low	Medium	High	Very High	No Opinion
Understand ocean-climate interactions within and across regions	○	○	○	○	○	○
Understand the impact of climate variability and change on the biogeochemistry of the ocean and implications for its ecosystems	○	○	○	○	○	○
Apply understanding of the ocean to help project future climate changes and their impacts	○	○	○	○	○	○

5) Improving Ecosystem Health

	Very Low	Low	Medium	High	Very High	No Opinion
Understand and predict the impact of natural and anthropogenic processes on ecosystems	○	○	○	○	○	○
Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems	○	○	○	○	○	○
Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management	○	○	○	○	○	○

6) Enhancing Human Health

	Very Low	Low	Medium	High	Very High	No Opinion
Understand sources and processes contributing to ocean-related risks to human health	○	○	○	○	○	○
Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health	○	○	○	○	○	○
Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats	○	○	○	○	○	○
Apply understanding of ocean ecosystems and biodiversity to develop products and biological models to enhance human well-being	○	○	○	○	○	○

7) Identifying Ecosystem Services and their Values

	Very Low	Low	Medium	High	Very High	No Opinion
Understand how people perceive the services provided by coastal and offshore ecosystems of the Gulf of Mexico	○	○	○	○	○	○
Quantify services provided by coastal and offshore ecosystems of the Gulf of Mexico	○	○	○	○	○	○
Estimate the value of the services provided by coastal and offshore ecosystems of the Gulf of Mexico	○	○	○	○	○	○
Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service	○	○	○	○	○	○

2013 Gulf of Mexico Regional Research Survey

Open-ended Responses and Linkages to GMRP

If the highest priority research needs for the Gulf of Mexico in the next 15 years **were not included** in the previous lists please enter up to three (one per line with Research Priority 1 being the highest priority need). Consider any discipline (social science and natural science).

Your Research Priority 1

Your Research Priority 2

Your Research Priority 3

Identify the primary link between each of your research priorities listed above and the themes in the 2009 Gulf of Mexico Research Plan.

	Ecosystem health indicators	Freshwater input and hydrology	Habitats and living resources	Sea level change, subsidence, and storm surge	Water quality and nutrients	None of the themes
Your Research Priority 1	○	○	○	○	○	○
Your Research Priority 2	○	○	○	○	○	○
Your Research Priority 3	○	○	○	○	○	○

The 2009 Gulf of Mexico Research Plan (GMRP) had the five themes listed below. Please indicate the importance of these themes over the next 5-15 years.

	Very Low	Low	Medium	High	Very High	No Opinion
Ecosystem health indicators	○	○	○	○	○	○
Freshwater input and hydrology	○	○	○	○	○	○
Habitats and living resources	○	○	○	○	○	○
Sea level change, subsidence, and storm surge	○	○	○	○	○	○
Water quality and nutrients	○	○	○	○	○	○

2013 Gulf of Mexico Regional Research Survey

The 2009 GMRP had the five themes listed below. Select the themes that should remain in an updated version of the GMRP. (select all that apply)

- ☐ Ecosystem Health Indicators
- ☐ Freshwater Input and Hydrology
- ☐ Habitats and Living Resources
- ☐ Sea Level Change, Subsidence, and Storm Surge
- ☐ Water Quality and Nutrients
- ☐ None of the above themes should be in the top five. Here is one that should be: _____

Identify the single most important Gulf of Mexico baseline data need that you would use if it w in each of the following categories:

Bluewater environmental sciences _____

Coastal environmental sciences _____

Socioeconomic sciences _____

Identify the Gulf of Mexico stressor with the greatest negative impact in each of the following

Bluewater environment _____

Coastal environment _____

Socioeconomics _____

2013 Gulf of Mexico Regional Research Survey

Input for Other Regional Efforts

The following questions were requested for this survey and will assist specific research planning efforts.

The Gulf of Mexico Research Initiative (GoMRI) has five research themes listed below. Please indicate the importance of these themes over the next 5-15 years.

	Very Low	Low	Medium	High	Very High	No Opinion
Physical distribution, dispersion, and dilution of petroleum (oil and gas), its constituents, and associated contaminants (e.g., dispersants) under the action of physical oceanographic processes, air–sea interactions, and tropical storms.	○	○	○	○	○	○
Chemical evolution and biological degradation of the petroleum/dispersant systems and subsequent interaction with coastal, open-ocean, and deepwater ecosystems.	○	○	○	○	○	○
Environmental effects of the petroleum/dispersant system on the sea floor, water column, coastal waters, beach sediments, wetlands, marshes, and organisms; and the science of ecosystem recovery.	○	○	○	○	○	○
Technology developments for improved response, mitigation, detection, characterization, and remediation associated with oil spills and gas releases.	○	○	○	○	○	○
Impact of oil spills on public health.	○	○	○	○	○	○

During a recent regional workshop several short-term (1-5 years) actions were identified to incorporate "Best Available Science" into regional restoration and science planning activities. Please rate the priority level of the following actions:

	Very Low	Low	Medium	High	Very High	No Opinion
Establish a RESTORE Council science advisory body	○	○	○	○	○	○
Develop key components for science-based project proposals to be supported by oil spill funds	○	○	○	○	○	○
Utilize peer review for developing programs and assessing performance at project level to regional level	○	○	○	○	○	○
Establish and sustain funding for a Gulf-wide, long-term, coastal and ocean monitoring and observing system at appropriate scales (small restoration project to ecosystem-scale modeling)	○	○	○	○	○	○
Establish macro-coordination committee for all restoration science programs	○	○	○	○	○	○
Joint development of a suite of conceptual models for Gulf ecosystem restoration	○	○	○	○	○	○

Identify the greatest barrier to implementing a successful Gulf-wide research program.

2013 Gulf of Mexico Regional Research Survey

Background Information

Please select one of the following that best describes your affiliation.

- ○ Business/Industry
- ○ Education, K-12
- ○ Government, City
- ○ Government, County/Parish
- ○ Other (please specify)
- ○ Government, State
- ○ Government, Federal
- ○ Non-Governmental Organization
- ○ University/College

Indicate the number of years (in whole numbers) you have primarily:

Conducted research in the Gulf of Mexico	
Sponsored/Administered Gulf of Mexico research programs	
Used research findings as part of your profession in the Gulf of Mexico (but not as a researcher or research sponsor/administrator)	
Conducted research directly on oil-spill issues in the Gulf of Mexico or elsewhere	

Currently, which best describes your primary relationship with Gulf of Mexico research?

- ○ Conduct research in the Gulf of Mexico
- ○ Sponsor/Administer research in the Gulf of Mexico
- ○ Use Gulf of Mexico research findings as part of your profession (but not as a researcher or research sponsor/administrator)
- ○ Use Gulf of Mexico research findings for recreational purposes
- ○ Do not use Gulf of Mexico research findings

Please select one of the following that best describes your discipline or area of expertise.

- ○ Anthropology
- ○ Atmospheric sciences
- ○ Biological sciences
- ○ Chemical sciences
- ○ Computer and Information sciences
- ○ Economics
- ○ Education
- ○ Other (please specify)
- ○ Engineering
- ○ Geography/GIS
- ○ Geological sciences
- ○ Physical sciences
- ○ Political science/Law/Policy
- ○ Psychology
- ○ Sociology

2013 Gulf of Mexico Regional Research Survey

Contact Information and Submission

Do you have any comments regarding this survey?

Please provide your contact information if you wish to be included in future correspondences related to the Gulf of Mexico Research Plan.

First name	
Last name	
Organization or Affiliation	
Email address	

Upon clicking "Done" you will be sent to the Gulf of Mexico Research Plan (GMRP) webpage. Connection to the GMRP webpage will indicate that your survey response was received and recorded. Final results of this survey will also be posted here in early 2014.

Thank you for your time and input. Click "Done" to submit your response to this survey.

APPENDIX B

2010 GULF OF MEXICO RESEARCH PLAN OIL SPILL SURVEY

GMRP Oil Spill Survey

Introduction

Survey to Prioritize Deepwater Horizon Oil-Spill Research Needs for the Gulf of Mexico

The results of this survey will contribute to an addendum to the Gulf of Mexico Research Plan (GMRP) that focuses on oil-spill-related research needs. The GMRP has been used by at least 14 groups to fund regional initiatives and/or identify priorities in their planning documents.

Your participation is essential in order to develop an oil-spill-related research agenda. This survey should take less than 15 minutes to complete, but you may take as much time as necessary to complete and provide comments. Your participation is voluntary, and you may discontinue the survey at any time.

If you would like to receive email notices about the progress of the project you may do so by adding your contact information at the end of the survey. We will only use this contact information to communicate GMRP-related work, and your contact information will not be shared with others. Individual responses that identify who submitted answers will not be shared.

More information about the GMRP and oil-spill research projects are available at: http://gulfseagrant.tamu.edu/gmrp.htm.

Thank you for your help.

For more information about this survey, contact Steve Sempier (228) 818-8830.This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820.

Residence

To sort responses into subregions we would like to collect some background information from you.

GMRP Oil Spill Survey

***In what state do you primarily reside?**

- Alabama
- Florida
- Louisiana
- Mississippi
- Texas
- Campeche
- Quintana Roo
- Tabasco
- Tamaulipas
- Veracruz
- Yucatan
- Other state (please specify)

Alabama Counties

GMRP Oil Spill Survey

In what Alabama county do you primarily reside?

- Autauga
- Baldwin
- Barbour
- Bibb
- Blount
- Bullock
- Butler
- Calhoun
- Chambers
- Cherokee
- Chilton
- Choctaw
- Clarke
- Clay
- Cleburne
- Coffee
- Colbert
- Conecuh
- Coosa
- Covington
- Crenshaw
- Cullman
- Dale
- Dallas
- DeKalb
- Elmore
- Escambia
- Etowah
- Fayette
- Franklin
- Geneva
- Greene
- Hale
- Henry
- Houston
- Jackson
- Jefferson
- Lamar
- Lauderdale
- Lawrence
- Lee
- Limestone
- Lowndes
- Macon
- Madison
- Marengo
- Marion
- Marshall
- Mobile
- Monroe
- Montgomery
- Morgan
- Perry
- Pickens
- Pike
- Randolph
- Russell
- St. Clair
- Shelby
- Sumter
- Talladega
- Tallapoosa
- Tuscaloosa
- Walker
- Washington
- Wilcox
- Winston

Florida Counties

GMRP Oil Spill Survey

In what Florida county do you primarily reside?

- Alachua
- Baker
- Bay
- Bradford
- Brevard
- Broward
- Calhoun
- Charlotte
- Citrus
- Clay
- Collier
- Columbia
- Dade
- De Soto
- Dixie
- Duval
- Escambia
- Flagler
- Franklin
- Gadsden
- Gilchrist
- Glades
- Gulf
- Hamilton
- Hardee
- Hendry
- Hernando
- Highlands
- Hillsborough
- Holmes
- Indian River
- Jackson
- Jefferson
- Lafayette
- Lake
- Lee
- Leon
- Levy
- Liberty
- Madison
- Manatee
- Marion
- Martin
- Monroe
- Nassau
- Okaloosa
- Okeechobee
- Orange
- Osceola
- Palm Beach
- Pasco
- Pinellas
- Polk
- Putnam
- St. Johns
- St. Lucie
- Santa Rosa
- Sarasota
- Seminole
- Sumter
- Suwannee
- Taylor
- Union
- Volusia
- Wakulla
- Walton
- Washington

Louisiana Parishes

GMRP Oil Spill Survey

In what Louisiana parish do you primarily reside?

- Acadia
- Allen
- Ascension
- Assumption
- Avoyelles
- Beauregard
- Bienville
- Bossier
- Caddo
- Calcasieu
- Caldwell
- Cameron
- Catahoula
- Claiborne
- Concordia
- De Soto
- East Baton Rouge
- East Carroll
- East Feliciana
- Evangeline
- Franklin
- Grant
- Iberia
- Iberville
- Jackson
- Jefferson
- Jefferson Davis
- Lafayette
- Lafourche
- La Salle
- Lincoln
- Livingston
- Madison
- Morehouse
- Natchitoches
- Orleans
- Ouachita
- Plaquemines
- Pointe Coupee
- Rapides
- Red River
- Richland
- Sabine
- St. Bernard
- St. Charles
- St. Helena
- St. James
- St. John the Baptist
- St. Landry
- St. Martin
- St. Mary
- St. Tammany
- Tangipahoa
- Tensas
- Terrebonne
- Union
- Vermilion
- Vernon
- Washington
- Webster
- West Baton Rouge
- West Carroll
- West Feliciana
- Winn

Mississippi Counties

GMRP Oil Spill Survey

In what Mississippi county do you primarily reside?

- Adams
- Alcorn
- Amite
- Attala
- Benton
- Bolivar
- Calhoun
- Carroll
- Chickasaw
- Choctaw
- Claiborne
- Clarke
- Clay
- Coahoma
- Copiah
- Covington
- DeSoto
- Forrest
- Franklin
- George
- Greene
- Grenada
- Hancock
- Harrison
- Hinds
- Holmes
- Humphreys
- Issaquena
- Itawamba
- Jackson
- Jasper
- Jefferson
- Jefferson Davis
- Jones
- Kemper
- Lafayette
- Lamar
- Lauderdale
- Lawrence
- Leake
- Lee
- Leflore
- Lincoln
- Lowndes
- Madison
- Marion
- Marshall
- Monroe
- Montgomery
- Neshoba
- Newton
- Noxubee
- Oktibbeha
- Panola
- Pearl River
- Perry
- Pike
- Pontotoc
- Prentiss
- Quitman
- Rankin
- Scott
- Sharkey
- Simpson
- Smith
- Stone
- Sunflower
- Tallahatchie
- Tate
- Tippah
- Tishomingo
- Tunica
- Union
- Walthall
- Warren
- Washington
- Wayne
- Webster
- Wilkinson
- Winston
- Yalobusha
- Yazoo

Texas Counties

GMRP Oil Spill Survey

In what Texas county do you primarily reside?

- Anderson
- Andrews
- Angelina
- Aransas
- Archer
- Armstrong
- Atascosa
- Austin
- Bailey
- Bandera
- Bastrop
- Baylor
- Bee
- Bell
- Bexar
- Blanco
- Borden
- Bosque
- Bowie
- Brazoria
- Brazos
- Brewster
- Briscoe
- Brooks
- Brown
- Burleson
- Burnet
- Caldwell
- Calhoun
- Gillespie
- Glasscock
- Goliad
- Gonzales
- Gray
- Grayson
- Gregg
- Grimes
- Guadalupe
- Hale
- Hall
- Hamilton
- Hansford
- Hardeman
- Hardin
- Harris
- Harrison
- Hartley
- Haskell
- Hays
- Hemphill
- Henderson
- Hidalgo
- Hill
- Hockley
- Hood
- Hopkins
- Houston
- Howard
- Moore
- Morris
- Motley
- Nacogdoches
- Navarro
- Newton
- Nolan
- Nueces
- Ochiltree
- Oldham
- Orange
- Palo Pinto
- Panola
- Parker
- Parmer
- Pecos
- Polk
- Potter
- Presidio
- Rains
- Randall
- Reagan
- Real
- Red River
- Reeves
- Refugio
- Roberts
- Robertson
- Rockwall

GMRP Oil Spill Survey

- Callahan
- Cameron
- Camp
- Carson
- Cass
- Castro
- Chambers
- Cherokee
- Childress
- Clay
- Cochran
- Coke
- Coleman
- Collin
- Collingsworth
- Colorado
- Comal
- Comanche
- Concho
- Cooke
- Coryell
- Cottle
- Crane
- Crockett
- Crosby
- Culberson
- Dallam
- Dallas
- Dawson
- Deaf Smith
- Delta
- Hudspeth
- Hunt
- Hutchinson
- Irion
- Jack
- Jackson
- Jasper
- Jeff Davis
- Jefferson
- Jim Hogg
- Jim Wells
- Johnson
- Jones
- Kames
- Kaufman
- Kendall
- Kenedy
- Kent
- Kerr
- Kimble
- King
- Kinney
- Kleberg
- Knox
- Lamar
- Lamb
- Lampasas
- La Salle
- Lavaca
- Lee
- Leon
- Runnels
- Rusk
- Sabine
- San Augustine
- San Jacinto
- San Patricio
- San Saba
- Schleicher
- Scurry
- Shackelford
- Shelby
- Sherman
- Smith
- Somervell
- Starr
- Stephens
- Sterling
- Stonewall
- Sutton
- Swisher
- Tarrant
- Taylor
- Terrell
- Terry
- Throckmorton
- Titus
- Tom Green
- Travis
- Trinity
- Tyler
- Upshur

GMRP Oil Spill Survey

- Denton
- De Witt
- Dickens
- Dimmit
- Donley
- Duval
- Eastland
- Ector
- Edwards
- Ellis
- El Paso
- Erath
- Falls
- Fannin
- Fayette
- Fisher
- Floyd
- Foard
- Fort Bend
- Franklin
- Freestone
- Frio
- Gaines
- Galveston
- Garza
- Liberty
- Limestone
- Lipscomb
- Live Oak
- Llano
- Loving
- Lubbock
- Lynn
- McCulloch
- McLennan
- McMullen
- Madison
- Marion
- Martin
- Mason
- Matagorda
- Maverick
- Medina
- Menard
- Midland
- Milam
- Mills
- Mitchell
- Montague
- Montgomery
- Upton
- Uvalde
- Val Verde
- Van Zandt
- Victoria
- Walker
- Waller
- Ward
- Washington
- Webb
- Wharton
- Wheeler
- Wichita
- Wilbarger
- Willacy
- Williamson
- Wilson
- Winkler
- Wise
- Wood
- Yoakum
- Young
- Zapata
- Zavala

Background Information, Part I

GMRP Oil Spill Survey

Please select one of the following that best describes your affiliation.

- ○ Business/Industry
- ○ Education, K-12
- ○ Government, City
- ○ Government, County/Parish
- ○ Government, State
- ○ Government, Federal
- ○ Non-Governmental Organization
- ○ University/College
- ○ Other (please specify) _____

Indicate the number of years (in whole numbers) you have:

Conducted research in the Gulf of Mexico	
Sponsored/Administered Gulf of Mexico research programs	
Used research findings as part of your profession in the Gulf of Mexico (but not as a researcher or research sponsor/administrator)	
Conducted research directly on oil spill issues in the Gulf of Mexico or elsewhere	

Background Information, Part II

Currently, which best describes your primary relationship with Gulf of Mexico related research?

- ○ Conduct research in the Gulf of Mexico
- ○ Sponsor/Administer research in the Gulf of Mexico
- ○ Use Gulf of Mexico research findings as part of your profession (but not as a researcher or research sponsor/administrator)
- ○ Use Gulf of Mexico research findings for recreational purposes
- ○ Do not use Gulf of Mexico research findings

GMRP Oil Spill Survey

Which best describes your primary relationship with oil-spill-related research (or anticipated relationship) in the Gulf of Mexico or elsewhere?

- ○ Conduct oil spill research
- ○ Sponsor/Administer oil spill research
- ○ Use oil spill research findings as part of your profession (but not as a researcher or research sponsor/administrator)
- ○ Use oil spill related research findings for recreational purposes
- ○ Do not use oil spill related research findings

Please select one of the following that best describes your discipline or area of expertise?

- ○ Anthropology
- ○ Atmospheric sciences
- ○ Biological sciences
- ○ Chemical sciences
- ○ Computer and Information sciences
- ○ Economics
- ○ Education
- ○ Engineering
- ○ Geography/GIS
- ○ Geological sciences
- ○ Physical sciences
- ○ Political science/Law/Policy
- ○ Psychology
- ○ Sociology
- ○ Other (please specify)

Oil-Spill-Related Research Needs

There are 20 priorities listed below that were synthesized from a recent survey and five workshops that discussed oil-spill research priorities. Select up to 6 priorities that you think are most important by checking the box next to the priority.

GMRP Oil Spill Survey

Economics

- ☐ Identify the most effective types of assistance to foster economic recovery
- ☐ Assess the costs and monitor the impacts of displaced coastal populations
- ☐ Examine impacts to coastal tourism
- ☐ Assess the economic losses to commercial fishing interests, seafood processors and dealers, restaurants and related industries
- ☐ Determine the economic impact on other coastal zone segments and economies (not including tourism- and seafood-related industries)
- ☐ Quantify the impacts of the oil spill on ecosystem services in monetary and in non-monetary terms
- ☐ Conduct cost-benefit analyzes of different cleanup and restoration activities and evaluate the effectiveness of different response and restoration activities

Social Sciences

- ☐ Assess the status, well-being, vulnerability and resilience of coastal communities
- ☐ Determine the change in public perception of Gulf of Mexico coastal areas
- ☐ Examine attitudes, perceptions, beliefs and decisions of members of resource-dependent communities
- ☐ Determine how stress has impacted people's, families' and communities' health
- ☐ Examine, record and document the cultural heritage of displaced people

Environmental Sciences

- ☐ Predict the location and magnitude of oil-spill-related impacts and incorporate models of circulation and mass transport in surface and subsurface waters
- ☐ Determine the distribution of oil and evaluate the fate and persistence of oil in the ecosystem including the roles of dispersants and microbes
- ☐ Assess the impacts of oil and dispersants on barrier island, water column, coastal, nearshore, offshore and deepwater habitats and water quality
- ☐ Examine the impacts of oil and dispersants on food webs, life histories and abundance of aquatic organisms
- ☐ Determine which floral and faunal communities are most at risk due to the oil spill
- ☐ Examine the effects of volatile organic compounds, controlled burns and other oil-spill-related activities on air quality
- ☐ Determine the toxicity of the oil, dispersants and drilling mud on humans and the ecosystem
- ☐ Examine the effects of oil and dispersants on seafood safety including the potential for bioaccumulation

If the highest priority research needs <u>were not</u> included in the list above please enter up to three here (one per line with number 1 being the highest priority need).

Number 1 _____

Number 2 _____

Number 3 _____

GMRP Oil Spill Survey

Identify the single most important oil spill baseline data need that you will use (identify no more than one per discipline).

Environmental sciences	
Socioeconomic sciences	

Prioritization of ORPP Research Areas

There are other research needs for the Gulf of Mexico that may or may not be directly related to the Deepwater Horizon Oil Spill. Less than three years ago we asked people to rate the priority level of the national Ocean Research Priorities Plan and Implementation Strategy considering its relevance to the Gulf of Mexico over the next fifteen years. Answering these same questions will allow us to learn if priorities have changed since the original survey.

Rate the priority level of each research need considering its relevance to the Gulf of Mexico over the next fifteen years.

1) Stewardship of Natural and Cultural Ocean Resources

	Very Low	Low	Medium	High	Very High	No Opinion
Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments	○	○	○	○	○	○
Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability	○	○	○	○	○	○
Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability	○	○	○	○	○	○
Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts	○	○	○	○	○	○

2) Increasing Resilience to Natural Hazards

	Very Low	Low	Medium	High	Very High	No Opinion
Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events	○	○	○	○	○	○
Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards	○	○	○	○	○	○
Apply understanding to develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation	○	○	○	○	○	○

3) Enabling Marine Operations

	Very Low	Low	Medium	High	Very High	No Opinion
Understand the interactions between marine operations and the environment	○	○	○	○	○	○
Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain	○	○	○	○	○	○
Apply understanding of environmental impacts and marine operations to enhance the marine transportation system	○	○	○	○	○	○

This question continues onto the next page.

GMRP Oil Spill Survey

Prioritization of ORPP Research Areas, Part II

Rate the priority level of each research need considering its relevance to the Gulf of Mexico over the next fifteen years.

4) The Ocean's Role in Climate

	Very Low	Low	Medium	High	Very High	No Opinion
Understand ocean-climate interactions within and across regions	○	○	○	○	○	○
Understand the impact of climate variability and change on the biogeochemistry of the ocean and implications for its ecosystems	○	○	○	○	○	○
Apply understanding of the ocean to help project future climate changes and their impacts	○	○	○	○	○	○

5) Improving Ecosystem Health

	Very Low	Low	Medium	High	Very High	No Opinion
Understand and predict the impact of natural and anthropogenic processes on ecosystems	○	○	○	○	○	○
Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems	○	○	○	○	○	○
Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management	○	○	○	○	○	○

6) Enhancing Human Health

	Very Low	Low	Medium	High	Very High	No Opinion
Understand sources and processes contributing to ocean-related risks to human health	○	○	○	○	○	○
Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health	○	○	○	○	○	○
Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats	○	○	○	○	○	○
Apply understanding of ocean ecosystems and biodiversity to develop products and biological models to enhance human well-being	○	○	○	○	○	○

Final Page

Do you have any comments regarding this survey or the GMRP assessment of oil-spill-related research needs?

GMRP Oil Spill Survey

Please provide your contact information if you wish to be included in future correspondences related to this project.

First name

Last name

Organization or Affiliation

Email address

We are trying to identify the organizations that provide relevant, accurate and timely research-based information related to the Deepwater Horizon Oil Spill. Please identify up to three organizations so that we can share the results of this effort with them.

Organization 1

Name of organization

Contact name

Contact email

Organization 2

Name of organization

Contact name

Contact email

Organization 3

Name of organization

Contact name

Contact email

Upon clicking "Done" you will be sent to the Gulf of Mexico Research Plan (GMRP) webpage. Connection to the GMRP webpage will indicate that your survey response was received and recorded. Final results of this survey will also be posted here.

Thank you for your time and input. Click "Done" to submit your response to this survey.

APPENDIX C

2007 GULF OF MEXICO RESEARCH NEEDS AND INFORMATION SURVEY

Gulf of Mexico Research and Information Needs Survey

Introduction

Survey to Prioritize Gulf of Mexico Research and Information Needs

This survey is being conducted by the Gulf of Mexico Regional Research and Information Needs Project (GMRP) through the Gulf of Mexico Sea Grant College Programs and numerous partners. The results of this survey and other forms of constituent input will be used to develop a regional priorities plan for Gulf of Mexico research. The survey is designed to identify regional research needs and is structured around the Ocean Research Priorities Plan and Implementation Strategy, which was recently developed to shape the future direction of ocean research on a national level.

Your participation is essential. This survey should take less than 15 minutes to complete, but you may take as much time as necessary to provide comments.

If you would like to receive emails about the progress of the project you may do so by adding your contact information at the end of the survey. We will only use this contact information to communicate GMRP-related work and your contact information will not be shared with others.

Thank you for your help with this survey.

Residence

To sort responses into subregions we would like to collect some background information from you.

***In what state do you primarily reside?**

- ○ Alabama
- ○ Florida
- ○ Louisiana
- ○ Mississippi
- ○ Texas
- ○ Campeche
- ○ Quintana Roo
- ○ Tabasco
- ○ Tamaulipas
- ○ Veracruz
- ○ Yucatan
- ○ Other state (please specify)

Alabama Counties

Page 1

Gulf of Mexico Research and Information Needs Survey

In what Alabama county do you primarily reside?

- Autauga
- Baldwin
- Barbour
- Bibb
- Blount
- Bullock
- Butler
- Calhoun
- Chambers
- Cherokee
- Chilton
- Choctaw
- Clarke
- Clay
- Cleburne
- Coffee
- Colbert
- Conecuh
- Coosa
- Covington
- Crenshaw
- Cullman
- Dale
- Dallas
- De Kalb
- Elmore
- Escambia
- Etowah
- Fayette
- Franklin
- Geneva
- Greene
- Hale
- Henry
- Houston
- Jackson
- Jefferson
- Lamar
- Lauderdale
- Lawrence
- Lee
- Limestone
- Lowndes
- Macon
- Madison
- Marengo
- Marion
- Marshall
- Mobile
- Monroe
- Montgomery
- Morgan
- Perry
- Pickens
- Pike
- Randolph
- Russell
- St. Clair
- Shelby
- Sumter
- Talladega
- Tallapoosa
- Tuscaloosa
- Walker
- Washington
- Wilcox
- Winston

Florida Counties

Gulf of Mexico Research and Information Needs Survey

In what Florida county do you primarily reside?

- Alachua
- Baker
- Bay
- Bradford
- Brevard
- Broward
- Calhoun
- Charlotte
- Citrus
- Clay
- Collier
- Columbia
- Dade
- De Soto
- Dixie
- Duval
- Escambia
- Flagler
- Franklin
- Gadsden
- Gilchrist
- Glades
- Gulf
- Hamilton
- Hardee
- Hendry
- Hernando
- Highlands
- Hillsborough
- Holmes
- Indian River
- Jackson
- Jefferson
- Lafayette
- Lake
- Lee
- Leon
- Levy
- Liberty
- Madison
- Manatee
- Marion
- Martin
- Monroe
- Nassau
- Okaloosa
- Okeechobee
- Orange
- Osceola
- Palm Beach
- Pasco
- Pinellas
- Polk
- Putnam
- St. Johns
- St. Lucie
- Santa Rosa
- Sarasota
- Seminole
- Sumter
- Suwannee
- Taylor
- Union
- Volusia
- Wakulla
- Walton
- Washington

Louisiana Parishes

Gulf of Mexico Research and Information Needs Survey

In what Louisiana parish do you primarily reside?

- Acadia
- Allen
- Ascension
- Assumption
- Avoyelles
- Beauregard
- Bienville
- Bossier
- Caddo
- Calcasieu
- Caldwell
- Cameron
- Catahoula
- Claiborne
- Concordia
- De Soto
- East Baton Rouge
- East Carroll
- East Feliciana
- Evangeline
- Franklin
- Grant
- Iberia
- Iberville
- Jackson
- Jefferson
- Jefferson Davis
- Lafayette
- Lafourche
- La Salle
- Lincoln
- Livingston
- Madison
- Morehouse
- Natchitoches
- Orleans
- Ouachita
- Plaquemines
- Pointe Coupee
- Rapides
- Red River
- Richland
- Sabine
- St. Bernard
- St. Charles
- St. Helena
- St. James
- St. John the Baptist
- St. Landry
- St. Martin
- St. Mary
- St. Tammany
- Tangipahoa
- Tensas
- Terrebonne
- Union
- Vermilion
- Vernon
- Washington
- Webster
- West Baton Rouge
- West Carroll
- West Feliciana
- Winn

Mississippi Counties

Gulf of Mexico Research and Information Needs Survey

In what Mississippi county do you primarily reside?

- Adams
- Alcorn
- Amite
- Attala
- Benton
- Bolivar
- Calhoun
- Carroll
- Chickasaw
- Choctaw
- Claiborne
- Clarke
- Clay
- Coahoma
- Copiah
- Covington
- DeSoto
- Forrest
- Franklin
- George
- Greene
- Grenada
- Hancock
- Harrison
- Hinds
- Holmes
- Humphreys
- Issaquena
- Itawamba
- Jackson
- Jasper
- Jefferson
- Jefferson Davis
- Jones
- Kemper
- Lafayette
- Lamar
- Lauderdale
- Lawrence
- Leake
- Lee
- Leflore
- Lincoln
- Lowndes
- Madison
- Marion
- Marshall
- Monroe
- Montgomery
- Neshoba
- Newton
- Noxubee
- Oktibbeha
- Panola
- Pearl River
- Perry
- Pike
- Pontotoc
- Prentiss
- Quitman
- Rankin
- Scott
- Sharkey
- Simpson
- Smith
- Stone
- Sunflower
- Tallahatchie
- Tate
- Tippah
- Tishomingo
- Tunica
- Union
- Walthall
- Warren
- Washington
- Wayne
- Webster
- Wilkinson
- Winston
- Yalobusha
- Yazoo

Texas Counties

Gulf of Mexico Research and Information Needs Survey

In what Texas county do you primarily reside?

- Anderson
- Andrews
- Angelina
- Aransas
- Archer
- Armstrong
- Atascosa
- Austin
- Bailey
- Bandera
- Bastrop
- Baylor
- Bee
- Bell
- Bexar
- Blanco
- Borden
- Bosque
- Bowie
- Brazoria
- Brazos
- Brewster
- Briscoe
- Brooks
- Brown
- Burleson
- Burnet
- Caldwell
- Calhoun
- Gillespie
- Glasscock
- Goliad
- Gonzales
- Gray
- Grayson
- Gregg
- Grimes
- Guadalupe
- Hale
- Hall
- Hamilton
- Hansford
- Hardeman
- Hardin
- Harris
- Harrison
- Hartley
- Haskell
- Hays
- Hemphill
- Henderson
- Hidalgo
- Hill
- Hockley
- Hood
- Hopkins
- Houston
- Howard
- Moore
- Morris
- Motley
- Nacogdoches
- Navarro
- Newton
- Nolan
- Nueces
- Ochiltree
- Oldham
- Orange
- Palo Pinto
- Panola
- Parker
- Parmer
- Pecos
- Polk
- Potter
- Presidio
- Rains
- Randall
- Reagan
- Real
- Red River
- Reeves
- Refugio
- Roberts
- Robertson
- Rockwall

Gulf of Mexico Research and Information Needs Survey

- Callahan
- Cameron
- Camp
- Carson
- Cass
- Castro
- Chambers
- Cherokee
- Childress
- Clay
- Cochran
- Coke
- Coleman
- Collin
- Collingsworth
- Colorado
- Comal
- Comanche
- Concho
- Cooke
- Coryell
- Cottle
- Crane
- Crockett
- Crosby
- Culberson
- Dallam
- Dallas
- Dawson
- Deaf Smith
- Delta
- Hudspeth
- Hunt
- Hutchinson
- Irion
- Jack
- Jackson
- Jasper
- Jeff Davis
- Jefferson
- Jim Hogg
- Jim Wells
- Johnson
- Jones
- Karnes
- Kaufman
- Kendall
- Kenedy
- Kent
- Kerr
- Kimble
- King
- Kinney
- Kleberg
- Knox
- Lamar
- Lamb
- Lampasas
- La Salle
- Lavaca
- Lee
- Leon
- Runnels
- Rusk
- Sabine
- San Augustine
- San Jacinto
- San Patricio
- San Saba
- Schleicher
- Scurry
- Shackelford
- Shelby
- Sherman
- Smith
- Somervell
- Starr
- Stephens
- Sterling
- Stonewall
- Sutton
- Swisher
- Tarrant
- Taylor
- Terrell
- Terry
- Throckmorton
- Titus
- Tom Green
- Travis
- Trinity
- Tyler
- Upshur

Gulf of Mexico Research and Information Needs Survey

- Denton
- De Witt
- Dickens
- Dimmit
- Donley
- Duval
- Eastland
- Ector
- Edwards
- Ellis
- El Paso
- Erath
- Falls
- Fannin
- Fayette
- Fisher
- Floyd
- Foard
- Fort Bend
- Franklin
- Freestone
- Frio
- Gaines
- Galveston
- Garza
- Liberty
- Limestone
- Lipscomb
- Live Oak
- Llano
- Loving
- Lubbock
- Lynn
- McCulloch
- McLennan
- McMullen
- Madison
- Marion
- Martin
- Mason
- Matagorda
- Maverick
- Medina
- Menard
- Midland
- Milam
- Mills
- Mitchell
- Montague
- Montgomery
- Upton
- Uvalde
- Val Verde
- Van Zandt
- Victoria
- Walker
- Waller
- Ward
- Washington
- Webb
- Wharton
- Wheeler
- Wichita
- Wilbarger
- Willacy
- Williamson
- Wilson
- Winkler
- Wise
- Wood
- Yoakum
- Young
- Zapata
- Zavala

Background Information

Gulf of Mexico Research and Information Needs Survey

What is the total number of years you have lived in a state bordering the Gulf of Mexico?

- ○ Never lived in a state bordering the Gulf of Mexico
- ○ <1-10
- ○ 11-20
- ○ 21-30
- ○ 31-40
- ○ 41-50
- ○ 51 or more

Please select one of the following that best describes your affiliation.

- ○ Business/Industry
- ○ Education, K-12
- ○ Education, University/College
- ○ Government, City
- ○ Government, County/Parish
- ○ Government, State
- ○ Government, Federal
- ○ Non-Governmental Organization
- ○ Other (please specify)

Relationship to Gulf of Mexico Research

This section of the survey provides insight about your personal perspectives of Gulf of Mexico research and how you use research findings.

Gulf of Mexico Research and Information Needs Survey

Select the theme(s) that best describes your occupational interest (select up to three that best apply). These themes were identified in the January 2007 Ocean Research Priorities Plan and Implementation Strategy.

- ☐ **Stewardship of Natural and Cultural Ocean Resources** (e.g. examine resource dynamics, value resources, discover new uses for coastal resources)
- ☐ **Increasing Resilience to Natural Hazards** (e.g. forecast hazard events, predict impact of hazards)
- ☐ **Enabling Marine Operations, Business and Commerce** (e.g. predict maritime conditions, enhance marine transportation, understand interactions between the environment and marine operations such as ports, shipping, aquaculture, and energy extraction)
- ☐ **The Ocean's Role in Climate** (e.g. study and model ocean-climate interactions, examine impact of climate on biogeochemistry and ecosystems, project future climate change)
- ☐ **Improving Ecosystem Health** (e.g. understand and predict natural and anthropogenic impacts to ecosystems, produce socioeconomic assessments to evaluate human impacts, develop metrics for management)
- ☐ **Enhancing Human Health** (e.g. examine and model positive and negative impacts of marine based natural resources, value ocean-borne human health threats, develop ocean based products to enhance human health)
- ☐ **None of the Above**

Indicate (in the boxes to the right) the number of years you have primarily:

Conducted research in the Gulf of Mexico	
Sponsored/Administered Gulf of Mexico research programs	
Used research findings as part of your profession (but not as a researcher or research sponsor/administrator)	

***Which best describes your primary relationship with Gulf of Mexico research?**

- ○ Conduct research in the Gulf of Mexico
- ○ Sponsor/Administer research in the Gulf of Mexico
- ○ Use Gulf of Mexico research findings as part of your profession
- ○ Use Gulf of Mexico research findings for recreational purposes
- ○ Do not use Gulf of Mexico research findings
- ○ Other (please specify)

_____

Follow up Question for Researchers

Gulf of Mexico Research and Information Needs Survey

Please select only one of the following disciplines that best describes your Gulf of Mexico research?

- Anthropology
- Atmospheric sciences
- Biological sciences
- Chemical sciences
- Computer and Information sciences
- Economics
- Education
- Engineering
- Geological sciences
- Physical sciences
- Political science/Law/Policy
- Other (please specify)

Follow up Question for Administrators

Gulf of Mexico Research and Information Needs Survey

Rate the following in terms of their value in enhancing collaboration between Gulf of Mexico research programs.

	Very Low	Low	Medium	High	Very High	No Opinion
Developing new partnerships in existing regional initiatives	○	○	○	○	○	○
Increasing funding to existing regional initiatives	○	○	○	○	○	○
Developing new funding initiatives that have multi-state requirements	○	○	○	○	○	○
Developing new funding initiatives that do not have multi-state requirements	○	○	○	○	○	○
Aligning state and regional programs with national plans such as the Ocean Research Priorities Plan and Implementation Strategy	○	○	○	○	○	○
Addressing mandates for regional coordination from your agency/organization	○	○	○	○	○	○
Serving on regional work groups	○	○	○	○	○	○
Reviewing a synthesis of regional research activities	○	○	○	○	○	○
Reading documents about the results of other research	○	○	○	○	○	○

Follow up Question for Research Users

Gulf of Mexico Research and Information Needs Survey

Please rate the value of the following as a user of Gulf of Mexico research results.

	Very Low	Low	Medium	High	Very High	No Opinion
Direct one-on-one contact with researchers	○	○	○	○	○	○
Raw research data provided directly from a researcher	○	○	○	○	○	○
Access to databases that contain raw research data	○	○	○	○	○	○
Summarized data that has been interpreted by the researcher that collected the data	○	○	○	○	○	○
Research results interpreted by individuals within your organization or another third party	○	○	○	○	○	○
Inventory of current research conducted throughout the Gulf of Mexico including the names of the individuals conducting the research and project descriptions	○	○	○	○	○	○
Regional meetings where researchers are presenting results of their work	○	○	○	○	○	○
National meetings where researchers are presenting results of their work	○	○	○	○	○	○
Research results published in peer reviewed journals	○	○	○	○	○	○

Prioritization of Research Areas (page 1 of 3)

The six societal themes and subsequent research areas quoted in this section were identified in the January 2007 release of the Ocean Research Priorities Plan and Implementation Strategy. Please rate the priority level of each research area considering its relevance to the Gulf of Mexico over the next fifteen years.

Gulf of Mexico Research and Information Needs Survey

1) Stewardship of Natural and Cultural Ocean Resources

"The ocean is a source of food, minerals, and energy and is used for transportation, recreation, and tourism. The ocean preserves a record of the nation's cultural past. The ocean remains a vast, unexplored realm with the capacity to provide new pharmaceuticals, industrial products, and energy sources. At the same time, its resources are subject to many pressures, such as overfishing, habitat destruction, and competition with invasive species."

	Very Low	Low	Medium	High	Very High	No Opinion
Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments	○	○	○	○	○	○
Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability	○	○	○	○	○	○
Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability	○	○	○	○	○	○
Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts	○	○	○	○	○	○

Gulf of Mexico Research and Information Needs Survey

2) Increasing Resilience to Natural Hazards

"Communities, maritime operations, cultural resources, social services, and ecosystems are vulnerable to coastal and marine physical hazards. Although society cannot eliminate natural hazards, their impacts can be reduced. Sustained and coordinated investment in research and technology will provide the knowledge and information base to assess and reduce risk, save lives and property, ensure more rapid recovery and effective mitigation, and develop informed and effective responses to future hazard events."

	Very Low	Low	Medium	High	Very High	No Opinion
Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events	○	○	○	○	○	○
Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards	○	○	○	○	○	○
Apply understanding to develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation	○	○	○	○	○	○

This question continues onto the next page.

Prioritization of Research Areas (page 2 of 3)

Rate the priority level of each research area considering its relevance to the Gulf of Mexico over the next fifteen years.

Gulf of Mexico Research and Information Needs Survey

3) Enabling Marine Operations

"Marine operations require freedom of navigation in the global ocean and the ability to conduct mapping and charting activities, gather tide and current information, and use U.S. ports, harbors, estuaries, and the Great Lakes. Marine operations also deal with issues such as bridge clearance, dredging, navigation aids, and ice coverage. Forward-thinking, innovative research, coupled with technological advances, will permit marine operations to meet challenging requirements for increased levels of transportation and commerce in the maritime domain and to address security concerns, while balancing sustainable use and protection of the environment."

	Very Low	Low	Medium	High	Very High	No Opinion
Understand the interactions between marine operations and the environment	○	○	○	○	○	○
Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain	○	○	○	○	○	○
Apply understanding of environmental impacts and marine operations to enhance the marine transportation system	○	○	○	○	○	○

Gulf of Mexico Research and Information Needs Survey

4) The Ocean's Role in Climate

"The ocean plays a fundamental role in governing climate through its capacity to store and distribute heat and carbon. The challenge is to accurately assess the ocean's past and present state, processes, and phenomena influencing climate, and society's influence on them, and to improve predictions and projections of climate change. These predictions and projections will improve society's ability to respond to and reduce, where feasible, climate related hazards; to adapt to climate change and variations (e.g., sea-level rise, changing weather patterns); and to inform management and policy decisions addressing human and environmental impacts."

	Very Low	Low	Medium	High	Very High	No Opinion
Understand ocean-climate interactions within and across regions	○	○	○	○	○	○
Understand the impact of climate variability and change on the biogeochemistry of the ocean and implications for its ecosystems	○	○	○	○	○	○
Apply understanding of the ocean to help project future climate changes and their impacts	○	○	○	○	○	○

This question concludes on the next page.

Prioritization of Research Areas (page 3 of 3)

Rate the priority level of each research area considering its relevance to the Gulf of Mexico over the next fifteen years.

Gulf of Mexico Research and Information Needs Survey

5) Improving Ecosystem Health

"Comprehensive, well-focused, interdisciplinary research can provide the information needed to balance competing uses of the marine environment, to better predict the impacts of such use, to manage those impacts in a manner that ensures the long-term health and sustainability of marine ecosystems, and to help restore ecosystems damaged from past and current activities or events."

	Very Low	Low	Medium	High	Very High	No Opinion
Understand and predict the impact of natural and anthropogenic processes on ecosystems	○	○	○	○	○	○
Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems	○	○	○	○	○	○
Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management	○	○	○	○	○	○

Gulf of Mexico Research and Information Needs Survey

6) Enhancing Human Health

"The ocean can be a source of health hazards. Understanding the causes of health hazards and how they can be mitigated or managed will lead to fewer illnesses from contaminated seafood, polluted waters, known and emerging disease-causing microbes, and harmful algal blooms (HABs). In the next decade, efforts to enhance human health will focus on the cause, prevention, and treatment of disease. The ocean also holds abundant resources that convey a variety of health benefits to humans. Exploration of new habitats, combined with emerging biochemical and biotechnical techniques, will promote discovery and development of bioproducts that promote human health."

	Very Low	Low	Medium	High	Very High	No Opinion
Understand sources and processes contributing to ocean-related risks to human health	○	○	○	○	○	○
Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health	○	○	○	○	○	○
Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats	○	○	○	○	○	○
Apply understanding of ocean ecosystems and biodiversity to develop products and biological models to enhance human well-being	○	○	○	○	○	○

Open comments

List very high research priorities for the Gulf of Mexico over the next fifteen years that have not been addressed in previous questions.

Gulf of Mexico Research and Information Needs Survey

Are there any additional comments regarding this survey, the regional planning effort, or the use of the Ocean Research Priorities Plan as a framework to identify regional needs?

Please provide your contact information if you wish to be included in future correspondences related to this project.

First Name	
Last Name	
Organization or Affiliation	
Email Address	

Upon clicking "done" you will be sent to the Gulf of Mexico Research Plan (GMRP) website. You will be able to access preliminary survey results from this webpage. You can bookmark this page to access updated survey results at any time. Connection to the GMRP website will indicate that your survey response was received and recorded.

Thank you for your time and input. Click done to submit your response to this survey.

APPENDIX D

SAMPLE EMAILS FROM THE 2013 GULF OF MEXICO RESEARCH PLAN SURVEY

Phase I Emails: Respondents who completed the *2007 and 2010 Surveys*

Initial Email

To: [Email]
From: "stephen.sempier@usm.edu via SurveyMonkey.com" <member@SurveyMonkey.com>
Subject: 2007 and 2010 Gulf Research Survey
Body: Dear [FirstName],

Thank you very much for completing an online Gulf of Mexico research survey in 2007 and 2010. We are releasing the 2013 survey that will allow us to identify current priorities and see if they have changed over time.

The results of this survey will be shared with the Gulf of Mexico Research Initiative (GoMRI), NOAA Restore Act Science Program, National Academy of Science's Gulf of Mexico Program, Gulf Coast Ecosystem Restoration Council and other groups that are trying to identify priorities for the region. In addition, it will be used to update the Gulf of Mexico Research Plan.

Your input is especially valuable because you completed the previous two surveys. Please use the unique link (that is specifically connected to your previous responses) below to complete the survey so that we can track changes over the past six years:
https://www.SurveyMonkey.com/s.aspx

PLEASE DO NOT SHARE THIS UNIQUE LINK with others. We will broadly release this survey to the public in the coming weeks.

As always, we will keep your responses anonymous. It will take less than 15 minutes to complete this critical survey, and we appreciate your participation. If you have any questions, please contact me.

Sincerely,
Steve Sempier
Sea Grant Gulf of Mexico research planning coordinator

Click here to no longer receive emails from Survey Monkey:
https://www.SurveyMonkey.com/optout.aspx

First Reminder Email

To: [Email]

From: "stephen.sempier@usm.edu via SurveyMonkey.com" <member@SurveyMonkey.com>

Subject: Request to complete 2013 survey to follow-up previous surveys

Body: Dear [FirstName],

Last week I thanked you for completing online Gulf of Mexico research surveys in 2007 and 2010. We would appreciate your response to the 2013 survey because we value your input, and it will be instrumental in identifying if priorities have changed over the time period because you had completed the previous surveys.

Please use the unique link below (click it or copy into a web browser): https://www.SurveyMonkey.com/s.aspx

PLEASE DO NOT SHARE THIS UNIQUE LINK with others.

Your response will remain anonymous, and it will take less than 15 minutes to complete. If you have any questions, please contact me. Thank you for your time.

Sincerely,
Steve Sempier
Sea Grant Gulf of Mexico research planning coordinator

If you do not wish to receive further emails from SurveyMonkey, please click the link below, and you will be automatically removed from our mailing list. https://www.SurveyMonkey.com/optout.aspx

Final Reminder Email

To: [Email]

From: "stephen.sempier@usm.edu via SurveyMonkey.com" <member@SurveyMonkey.com>

Subject: Last request regarding survey to follow-up 2007 and 2010 surveys

Body: Dear [FirstName],

Last month you received this link to a Gulf research survey: https://www.SurveyMonkey.com/s.aspx .

Today we are broadly releasing the survey, and you may receive emails from others about it. If you would like to complete the survey and help us understand if priorities have changed over time please use the unique link above and not the link in the general announcements. Your response will remain anonymous,

and it will take less than 15 minutes to complete.

If you have any questions or would like to distribute the general survey link to others, please contact me. Thank you for your time.

Sincerely,
Steve Sempier
Sea Grant Gulf of Mexico research planning coordinator

If you do not wish to receive further emails from SurveyMonkey, please click the link below, and you will be automatically removed from SurveyMonkey's mailing list.
https://www.SurveyMonkey.com/optout.aspx

Phase II Emails: People who Previously Expressed Interest or Participated in Other Regional Planning Activities

Initial Email

To: [Email]
From: "stephen.sempier@usm.edu via SurveyMonkey.com" <member@SurveyMonkey.com>
Subject: Gulf-wide Research Survey
Body: Dear [FirstName],

During the past few years, you have participated in meetings or workshops to identify research priorities for the Gulf of Mexico. We are contacting you because of your interest and knowledge of marine, coastal and/or inland watershed issues and would greatly value your contribution to a regional research needs survey.

The results of this survey will be shared with the Gulf of Mexico Research Initiative (GoMRI), NOAA Restore Act Science Program, National Academy of Science's Gulf of Mexico Program, Gulf Coast Ecosystem Restoration Council and other groups that are trying to identify priorities for the region. In addition, it will be used to update the Gulf of Mexico Research Plan (http://www.masgc.org/gmrp), which has been used by numerous groups to fund millions of dollars of research in the region.

Please use the unique link below to complete the survey:
https://www.SurveyMonkey.com/s.aspx

PLEASE DO NOT SHARE THIS UNIQUE LINK with others. We will broadly release this survey to the public soon.

As always, we will keep your responses anonymous. It will take less than 15

minutes to complete this critical survey, and we appreciate your assistance with this important issue. If you have any questions please contact me.

Sincerely,
Steve Sempier
Sea Grant Gulf of Mexico research planning coordinator

Click here to not be contacted by SurveyMonkey:
https://www.SurveyMonkey.com/optout.aspx

Reminder Email

To: [Email]
From: "stephen.sempier@usm.edu via SurveyMonkey.com" <member@SurveyMonkey.com>
Subject: Follow-up request to complete Gulf research survey
Body: Dear [FirstName],

Last week you received this link to a Gulf research survey:
https://www.SurveyMonkey.com/s.aspx .

Today we are broadly releasing the survey and you may receive emails from others about it. We would still prefer you use the link above. Your response will remain anonymous, and it will take less than 15 minutes to complete.

If you have any questions or would like to distribute the general survey link to others, please contact me. Thank you for your time.

Sincerely,
Steve Sempier
Sea Grant Gulf of Mexico research planning coordinator

If you do not wish to receive further emails from SurveyMonkey, please click the link below, and you will be automatically removed from SurveyMonkey's mailing list.
https://www.SurveyMonkey.com/optout.aspx

Phase III Suggested Language to Contacts for Distribution of Survey

Suggested text for a listserv or newsletter piece:

Survey released to identify Gulf research needs
You can provide input to numerous groups around the Gulf of Mexico that are developing regional science and restoration plans or funding Gulf research through a single survey at:
https://www.SurveyMonkey.com/s/2013GMRP

This survey is part of an update to the Gulf of Mexico Research Plan (GMRP) (http://www.masgc.org/gmrp/). This project assists the Gulf of Mexico research community identify research and related priorities and learn if priorities shifted during the past six years.

Multiple groups already have used input collected through previous GMRP efforts to identify and fund research, and the 2013 survey results will be distributed widely as a service to the research community. The results of this survey will be shared with the Gulf of Mexico Research Initiative (GoMRI), NOAA Restore Act Science Program, National Academy of Science's Gulf of Mexico Program, Gulf Coast Ecosystem Restoration Council and other groups. The GMRP efforts are partially sponsored by NOAA and the four Gulf of Mexico Sea Grant college programs.

Responses will be anonymous, and it will take less than 15 minutes to complete this critical survey. The survey will close on Dec. 13, so complete it today.

For more information contact Steve Sempier, Sea Grant Gulf of Mexico research planning coordinator, at stephen.sempier@usm.edu.

Suggested text for an email forward:

Subject: Gulf Research Survey Released

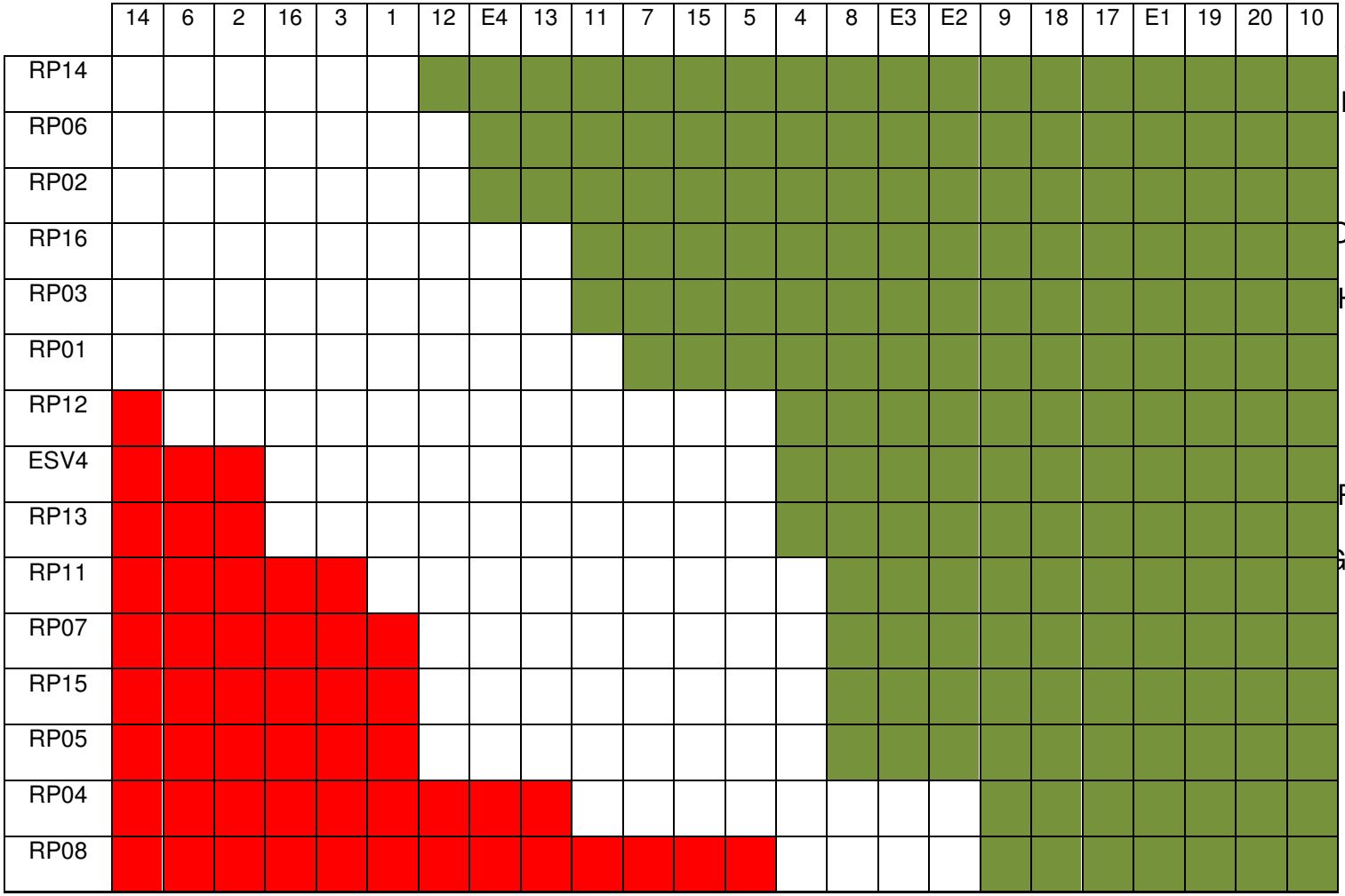
Hello,

The four Gulf of Mexico Sea Grant college programs are pleased to release the 2013 Gulf of Mexico research needs survey. You can provide input to numerous groups that are developing Gulf of Mexico regional science and restoration plans or funding Gulf research through a single survey at:
https://www.SurveyMonkey.com/s/2013GMRP

The results of this survey will be shared with the Gulf of Mexico Research Initiative (GoMRI), NOAA Restore Act Science Program, National Academy of Science's Gulf of Mexico Program, Gulf Coast Ecosystem Restoration Council and other groups that are trying to identify priorities for the region.

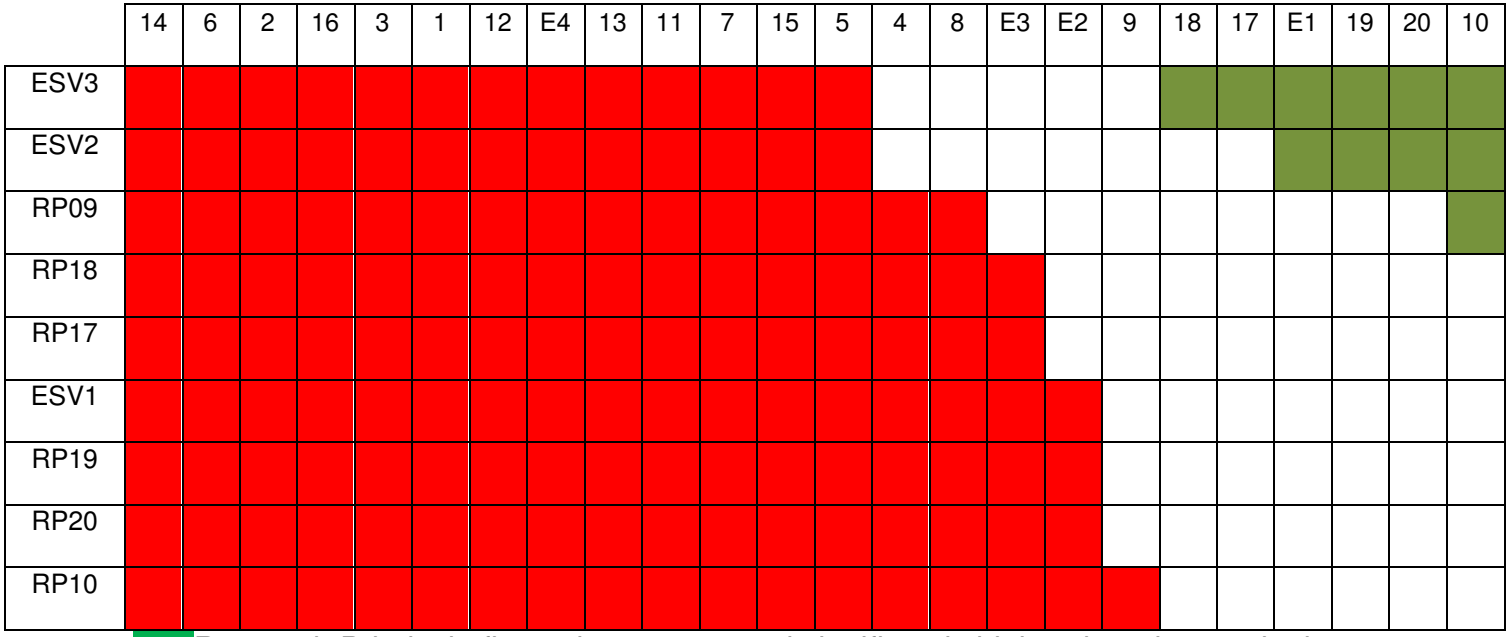
Please share this link with others that you think would be interested in completing the survey. Responses will be kept anonymous, and it will take less than 15 minutes to complete this critical survey. The survey will close on Dec. 13, so complete it today. For

more information contact Steve Sempier, Sea Grant Gulf of Mexico research planning coordinator, at stephen.sempier@usm.edu.



APPENDIX E

RESULTS OF PAIRWISE OMPARISON OF HE RATING OF RESEARCH PRIORITIES ROM THE 2013 GMRP SURVEY



Results of all of the pairwise comparison of the rating of research priorities from the 2013 GMRP survey that illustrates if a research priority in column one was rated significantly greater than (green), significantly less than (red) or no significant difference (blank) at the adjusted alpha level of .05. (Note: the top row indicates research priority code that included in the pairwise comparison and the ones that begin with “e” are the ESV related research priorities).

APPENDIX F

RESULTS FROM THE COMPARISON OF 2013 RATINGS BETWEEN GROUPS

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people in the "business" category versus the "government" category based on the 2013 GMRP survey results.

Research priority	N business	N government	P	Mean rank business	Mean rank government
RP01	90	276	.135		
RP11	90	276	.031		
RP12	90	276	.001*	152.04	193.76
RP13	90	275	.021		
RP14	89	276	<.001*	143.49	195.74
RP16	90	275	.003*	156.64	191.63
ESV4	89	276	.980		

*$p < .0125$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people in the "business" category versus the "NGO" category based on the 2013 GMRP survey results.

Research priority	N business	N NGO	P	Mean rank business	Mean rank NGO
RP01	90	89	.186		
RP11	90	90	.016		
RP12	90	90	<.001*	77.33	103.67
RP13	90	90	.001*	78.07	102.93
RP14	89	88	<.001*	75.67	102.48
RP16	90	91	.029		
ESV4	89	91	.039		

*$p < .0125$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people in the "business" category versus the "university" category based on the 2013 GMRP survey results.

Research priority	N business	N university	P	Mean rank business	Mean rank university
RP01	90	580	.430		
RP11	90	589	.003*	286.23	348.22
RP12	90	585	<.001*	252.80	351.11
RP13	90	581	<.001*	269.15	346.36
RP14	89	585	<.001*	266.61	348.29
RP16	90	578	.086		
ESV4	89	586	.539		

*$p < .0125$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people in the "government" category versus the "NGO" category based on the 2013 GMRP survey results.

Research priority	N government	N NGO	P	Mean rank government	Mean rank NGO
RP01	276	89	.844		
RP11	276	90	.279		
RP12	276	90	.287		
RP13	275	90	.056		
RP14	276	88	.757		
RP16	275	91	.922		
ESV4	276	91	.010*	176.32	207.29

*$p < .0125$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people in the "government" category versus the "university" category based on the 2013 GMRP survey results.

Research priority	N government	N university	P	Mean rank government	Mean rank university
RP01	276	580	<.001*	471.14	408.21
RP11	276	589	.190		
RP12	276	585	.074		
RP13	275	581	.038		
RP14	276	585	.300		
RP16	275	578	.050		
ESV4	276	586	.302		

*$p < .0125$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people in the "NGO" category versus the "university" category based on the 2013 GMRP survey results.

Research priority	N NGO	N university	P	Mean rank NGO	Mean rank university
RP01	89	580	.013		
RP11	90	589	.713		
RP12	90	585	.995		
RP13	90	581	.509		
RP14	88	585	.328		
RP16	91	578	.218		
ESV4	91	586	.001*	397.93	329.85

*$p < .0125$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people in the "western" U.S. Gulf of Mexico versus "northern" U.S. Gulf of Mexico in the 2013 GMRP survey.

Research priority	N western	N northern	P
RP03	320	618	.010*
RP09	322	591	.505
RP10	323	595	.025
RP13	303	597	.004*

*$p < .0167$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people in the "western" U.S. Gulf of Mexico versus "eastern" U.S. Gulf of Mexico in the 2013 GMRP survey.

Research priority	N western	N eastern	P
RP03	320	188	.121
RP09	322	182	.017
RP10	323	184	.014*
RP13	303	179	.070

*$p < .0167$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people in the "northern" U.S. Gulf of Mexico versus "eastern" U.S. Gulf of Mexico in the 2013 GMRP survey.

Research priority	N northern	N eastern	P
RP03	618	188	.669
RP09	591	182	.021
RP10	595	184	.379
RP13	597	179	.703

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that conduct research in the Gulf of Mexico versus those that sponsor research in the Gulf of Mexico based on responses to the 2013 GMRP survey.

Research priority	N conduct	N sponsor	P
RP01	489	96	0.209
RP03	491	96	0.246
RP06	495	96	0.450
RP08	475	95	0.775
RP09	470	94	0.850
RP10	472	95	0.066
RP11	493	96	0.204
RP14	494	96	0.170
RP15	494	96	0.124
RP17	491	96	0.546
RP18	491	96	0.806
RP19	486	96	0.583
RP20	482	96	0.720
ESV1	494	96	0.627
ESV2	492	96	0.224
ESV3	491	95	0.060
ESV4	492	96	0.028

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that conduct research in the Gulf of Mexico versus those that use Gulf of Mexico research for their profession based on responses to the 2013 GMRP survey.

Research priority	N conduct	N profession	P	Mean rank conduct	Mean rank profession
RP01	489	310	.124		
RP03	491	309	.001*	381.21	431.15
RP06	495	309	.910		
RP08	475	305	.353		
RP09	470	303	.048		
RP10	472	303	.001*	368.43	418.49
RP11	493	310	.089		
RP14	494	307	.248		
RP15	494	307	.006*	384.24	427.97
RP17	491	309	.429		
RP18	491	307	.464		
RP19	486	307	.752		
RP20	482	308	.274		
ESV1	494	310	.036		
ESV2	492	310	.001*	381.77	432.82
ESV3	491	309	<.001*	373.93	442.72
ESV4	492	309	<.001*	365.64	457.31

*p <.01

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that conduct research in the Gulf of Mexico versus those that use Gulf of Mexico research for recreational purposes based on responses to the 2013 GMRP survey.

Research priority	N conduct	N recreation	P	Mean rank conduct	Mean rank recreation
RP01	489	93	.647		
RP03	491	93	.001*	282.98	342.75
RP06	495	93	.584		
RP08	475	89	<.001*	269.81	350.22
RP09	470	90	<.001*	266.21	355.14
RP10	472	89	<.001*	265.84	361.39
RP11	493	92	.830		
RP14	494	91	.095		
RP15	494	91	.003*	284.66	338.25
RP17	491	92	.009*	284.41	332.51
RP18	491	91	.003*	283.05	337.08
RP19	486	91	.001*	279.59	339.25
RP20	482	89	<.001*	275.99	340.2
ESV1	494	93	.017		
ESV2	492	91	.053		
ESV3	491	91	.005*	283.5	334.65
ESV4	492	93	.001*	283.22	344.73

*p <.01

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that conduct research in the Gulf of Mexico versus those that do not use Gulf of Mexico research findings based on responses to the 2013 GMRP survey.

Research priority	N conduct	N non-user	P	Mean rank conduct	Mean rank non-user
RP01	489	89	.020		
RP03	491	92	.076		
RP06	495	92	.003*	302.41	248.76
RP08	475	91	.178		
RP09	470	88	.111		
RP10	472	91	<.001*	271.48	336.54
RP11	493	94	<.001*	304.39	239.52
RP14	494	90	.003*	300.6	248.02
RP15	494	92	.836		
RP17	491	92	.086		
RP18	491	92	.018		
RP19	486	92	.018		
RP20	482	92	.031		
ESV1	494	92	.047		
ESV2	492	92	.074		
ESV3	491	92	.276		
ESV4	492	91	.567		

*p <.01

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that sponsor research in the Gulf of Mexico versus those that use Gulf of Mexico research for their profession based on responses to the 2013 GMRP survey.

Research priority	N sponsor	N profession	P
RP01	96	310	.758
RP03	96	309	.325
RP06	96	309	.448
RP08	95	305	.378
RP09	94	303	.267
RP10	95	303	.740
RP11	96	310	.912
RP14	96	307	.546
RP15	96	307	.844
RP17	96	309	.296
RP18	96	307	.821
RP19	96	307	.758
RP20	96	308	.281
ESV1	96	310	.374
ESV2	96	310	.409
ESV3	95	309	.305
ESV4	96	309	.096

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that sponsor research in the Gulf of Mexico versus those that use Gulf of Mexico research for recreational purposes based on responses to the 2013 GMRP survey.

Research priority	N sponsor	N recreation	P	Mean rank sponsor	Mean rank recreation
RP01	96	93	.162		
RP03	96	93	.052		
RP06	96	93	.284		
RP08	95	89	<.001*	78.41	107.54
RP09	94	90	<.001*	78.09	107.55
RP10	95	89	<.001*	81.98	103.72
RP11	96	92	.408		
RP14	96	91	.798		
RP15	96	91	.248		
RP17	96	92	.129		
RP18	96	91	.040		
RP19	96	91	.004*	83.21	105.38
RP20	96	89	.001*	81.4	105.51
ESV1	96	93	.094		
ESV2	96	91	.540		
ESV3	95	91	.338		
ESV4	96	93	.289		

*p <.01

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that sponsor research in the Gulf of Mexico versus those that do not use Gulf of Mexico research findings based on responses to the 2013 GMRP survey.

Research priority	N sponsor	N non-user	P	Mean rank sponsor	Mean rank non-user
RP01	96	89	.006*	102.77	82.46
RP03	96	92	.529		
RP06	96	92	.040		
RP08	95	91	.170		
RP09	94	88	.244		
RP10	95	91	.112		
RP11	96	94	.048		
RP14	96	90	.177		
RP15	96	92	.326		
RP17	96	92	.459		
RP18	96	92	.121		
RP19	96	92	.022		
RP20	96	92	.038		
ESV1	96	92	.028		
ESV2	96	92	.013		
ESV3	95	92	.019		
ESV4	96	91	.212		

*$p < .01$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that use Gulf of Mexico research for their profession versus those that use Gulf of Mexico research for recreational purposes based on responses to the 2013 GMRP survey.

Research priority	N profession	N recreation	P	Mean rank profession	Mean rank recreation
RP01	310	93	.136		
RP03	309	93	.175		
RP06	309	93	.652		
RP08	305	89	<.001*	186.27	235.98
RP09	303	90	<.001*	186.45	232.53
RP10	303	89	.002*	187.32	227.75
RP11	310	92	.395		
RP14	307	91	.363		
RP15	307	91	.198		
RP17	309	92	.003*	191.88	231.64
RP18	307	91	.017		
RP19	307	91	.001*	189.7	232.58
RP20	308	89	.005*	190.69	227.76
ESV1	310	93	.220		
ESV2	310	91	.951		
ESV3	309	91	.925		
ESV4	309	93	.728		

*p <.01

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that use Gulf of Mexico research for their profession versus those that do not use Gulf of Mexico research findings based on responses to the 2013 GMRP survey.

Research priority	N profession	N non-user	P	Mean rank profession	Mean rank non-user
RP01	310	89	.001*	209.3	167.61
RP03	309	92	.874		
RP06	309	92	.004*	209.53	172.34
RP08	305	91	.473		
RP09	303	88	.773		
RP10	303	91	.127		
RP11	310	94	.015		
RP14	307	90	.025		
RP15	307	92	.153		
RP17	309	92	.028		
RP18	307	92	.073		
RP19	307	92	.015		
RP20	308	92	.138		
ESV1	310	92	<.001*	212.05	165.93
ESV2	310	92	<.001*	213.16	162.2
ESV3	309	92	<.001*	211.96	164.18
ESV4	309	91	.002*	209.41	170.26

*$p < .01$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by those that use Gulf of Mexico research for recreational purposes versus those that do not use Gulf of Mexico research findings based on responses to the 2013 GMRP survey.

Research priority	N recreation	N non-user	P	Mean rank recreation	Mean rank non-user
RP01	93	89	.118		
RP03	93	92	.243		
RP06	93	92	.006*	102.97	82.92
RP08	89	91	.006*	100.55	80.67
RP09	90	88	.008*	99.19	79.59
RP10	89	91	.224		
RP11	92	94	.008*	103.52	83.7
RP14	91	90	.274		
RP15	91	92	.041		
RP17	92	92	.378		
RP18	91	92	.551		
RP19	91	92	.400		
RP20	89	92	.298		
ESV1	93	92	.001*	106.01	79.85
ESV2	91	92	.002*	103.69	80.44
ESV3	91	92	.003*	103.05	81.07
ESV4	93	91	.027		

*$p < .01$

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people who identified themselves as being affiliated with a biological science versus people who identified themselves as being affiliated with another natural science based on responses to the 2013 GMRP survey.

Research priority	N biological science	N other natural science	P	Mean rank biological science	Mean rank other natural science
RP01	466	336	<.001*	426.80	366.41
RP02	464	333	<.001*	441.74	339.44
RP03	464	338	.024		
RP04	454	330	<.001*	368.72	425.22
RP05	466	342	<.001*	370.99	450.16
RP07	463	341	.002*	382.32	429.91
RP10	454	329	.100		
RP11	465	343	.338		
RP14	464	341	<.001*	433.30	361.78
RP15	465	339	.061		
RP16	463	335	<.001*	422.36	367.91
RP17	464	336	.427		
RP18	464	336	.976		
RP19	462	331	.836		
RP20	459	333	.617		
ESV1	465	340	.012*	419.80	380.02
ESV2	463	340	<.001*	428.64	365.72
ESV3	463	336	<.001*	427.00	362.80
ESV4	466	336	<.001*	427.46	365.50

*p <.0167

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people who identified themselves as being affiliated with a biological science versus people who identified themselves as being affiliated with a social science based on responses to the 2013 GMRP survey.

Research priority	N biological science	N social science	P	Mean rank biological science	Mean rank social science
RP01	466	247	<.001*	388.14	298.25
RP02	464	249	<.001*	386.73	301.61
RP03	464	251	<.001*	336.67	397.44
RP04	454	243	.275		
RP05	466	248	.006*	342.89	384.95
RP07	463	246	<.001*	334.06	394.42
RP10	454	240	.001*	330.15	380.32
RP11	465	250	.030		
RP14	464	246	<.001*	376.47	315.94
RP15	465	249	.011*	343.89	382.92
RP16	463	249	.013*	369.42	332.48
RP17	464	252	<.001*	337.88	396.47
RP18	464	252	<.001*	334.41	400.35
RP19	462	251	<.001*	336.02	395.62
RP20	459	247	.001*	335.44	387.06
ESV1	465	252	.088		
ESV2	463	251	.572		
ESV3	463	251	.497		
ESV4	466	251	.564		

*p <.0167

Mann-Whitney U post hoc test results from a comparison of rating of research priorities by people who identified themselves as being affiliated with a natural science that is not a biological science versus people who identified themselves as being affiliated with a social science based on responses to the 2013 GMRP survey.

Research priority	N other natural science	N social science	P	Mean rank other natural science	Mean rank social science
RP01	336	247	.019		
RP02	333	249	.714		
RP03	338	251	<.001*	263.36	337.60
RP04	330	243	.039		
RP05	342	248	.042		
RP07	341	246	.212		
RP10	329	240	.078		
RP11	343	250	.007*	312.28	276.04
RP14	341	246	.892		
RP15	339	249	<.001*	272.21	324.84
RP16	335	249	.523		
RP17	336	252	.003*	277.13	317.65
RP18	336	252	<.001*	269.38	324.65
RP19	331	251	<.001*	268.50	321.84
RP20	333	247	.005*	274.31	312.33
ESV1	340	252	<.001*	275.89	324.31
ESV2	340	251	.003*	279.10	318.89
ESV3	336	251	.004*	277.27	316.40
ESV4	336	251	<.001*	272.29	323.06

*p <.0167

APPENDIX G

RESULTS FROM PAIRWISE COMPARISONS OF ORPP AND ESV RESEARCH PRIORITIES TO EACH OTHER ARRANGED BY RESEARCH PRIORITY

Pairwise comparisons of research priority 1 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
1	2	-.364	.298	-1.22	.222	1.000
1	3	-.109	.298	-0.367	.714	1.000
1	6	-.513	.298	-1.721	.085	1.000
1	14	-.899	.298	-3.016	.003	.708
1	16	-.164	.298	-0.55	.582	1.000
4	1	2.164	.298	7.256	<.001	<.001
5	1	1.523	.298	5.105	<.001	<.001
7	1	1.226	.298	4.109	<.001	.011
8	1	2.669	.298	8.95	<.001	<.001
9	1	3.967	.298	13.299	<.001	<.001
10	1	5.085	.298	17.048	<.001	<.001
11	1	1.085	.298	3.636	<.001	.076
12	1	.550	.298	1.843	.065	1.000
13	1	.943	.298	3.162	.002	.433
15	1	1.387	.298	4.649	<.001	.001
17	1	4.242	.298	14.22	<.001	<.001
18	1	4.230	.298	14.18	<.001	<.001
19	1	4.571	.298	15.324	<.001	<.001
20	1	5.048	.298	16.924	<.001	<.001
ESV1	1	4.312	.298	14.457	<.001	<.001
ESV2	1	3.137	.298	10.516	<.001	<.001
ESV3	1	3.060	.298	10.261	<.001	<.001
ESV4	1	.896	.298	3.004	.003	.736

Pairwise comparisons of research priority 2 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
2	6	-.149	.298	-0.501	.616	1.000
2	14	-.536	.298	-1.796	.073	1.000
1	2	-.364	.298	-1.22	.222	1.000
3	2	.254	.298	0.853	.394	1.000
4	2	2.528	.298	8.475	<.001	<.001
5	2	1.887	.298	6.325	<.001	<.001
7	2	1.589	.298	5.329	<.001	<.001
8	2	3.033	.298	10.17	<.001	<.001
9	2	4.331	.298	14.519	<.001	<.001
10	2	5.449	.298	18.268	<.001	<.001
11	2	1.448	.298	4.856	<.001	<.001
12	2	.914	.298	3.063	.002	.604
13	2	1.307	.298	4.382	<.001	.003
15	2	1.750	.298	5.869	<.001	<.001
16	2	.200	.298	0.67	.503	1.000
17	2	4.606	.298	15.442	<.001	<.001
18	2	4.593	.298	15.4	<.001	<.001
19	2	4.935	.298	16.544	<.001	<.001
20	2	5.412	.298	18.144	<.001	<.001
ESV1	2	4.676	.298	15.677	<.001	<.001
ESV2	2	3.500	.298	11.736	<.001	<.001
ESV3	2	3.424	.298	11.481	<.001	<.001
ESV4	2	1.260	.298	4.224	<.001	.007

Pairwise comparisons of research priority 3 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
1	3	-.109	.298	-0.367	.714	1.000
4	3	2.274	.298	7.622	<.001	<.001
5	3	1.632	.298	5.472	<.001	<.001
7	3	1.335	.298	4.476	<.001	.002
8	3	2.779	.298	9.317	<.001	<.001
9	3	4.076	.298	13.665	<.001	<.001
10	3	5.194	.298	17.415	<.001	<.001
11	3	1.194	.298	4.003	<.001	.017
12	3	.659	.298	2.21	.027	1.000
13	3	1.052	.298	3.529	<.001	.115
15	3	1.496	.298	5.015	<.001	<.001
17	3	4.351	.298	14.589	<.001	<.001
18	3	4.339	.298	14.547	<.001	<.001
19	3	4.680	.298	15.691	<.001	<.001
20	3	5.157	.298	17.291	<.001	<.001
ESV1	3	4.422	.298	14.824	<.001	<.001
ESV2	3	3.246	.298	10.883	<.001	<.001
ESV3	3	3.170	.298	10.628	<.001	<.001
ESV4	3	1.005	.298	3.371	.001	.207
3	2	.254	.298	0.853	.394	1.000
3	6	-.404	.298	-1.354	.176	1.000
3	14	-.790	.298	-2.649	.008	1.000
3	16	-.055	.298	-0.183	.854	1.000

Pairwise comparisons of research priority 4 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
8	4	.505	.298	1.694	.090	1.000
9	4	1.802	.298	6.043	<.001	<.001
10	4	2.921	.298	9.792	<.001	<.001
17	4	2.078	.298	6.966	<.001	<.001
18	4	2.065	.298	6.924	<.001	<.001
19	4	2.407	.298	8.068	<.001	<.001
20	4	2.884	.298	9.669	<.001	<.001
ESV1	4	2.148	.298	7.202	<.001	<.001
ESV2	4	.972	.298	3.26	.001	.307
ESV3	4	.896	.298	3.005	.003	.733
4	1	2.164	.298	7.256	<.001	<.001
4	2	2.528	.298	8.475	<.001	<.001
4	3	2.274	.298	7.622	<.001	<.001
4	5	-.641	.298	-2.151	.032	1.000
4	6	-2.677	.298	-8.977	<.001	<.001
4	7	-.939	.298	-3.147	.002	.456
4	11	-1.080	.298	-3.62	<.001	.081
4	12	-1.614	.298	-5.412	<.001	<.001
4	13	-1.221	.298	-4.094	<.001	.012
4	14	-3.064	.298	-10.271	<.001	<.001
4	15	-.778	.298	-2.607	.009	1.000
4	16	-2.328	.298	-7.806	<.001	<.001
4	ESV4	-1.268	.298	-4.252	<.001	.006

Pairwise comparisons of research priority 5 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
4	5	-.641	.298	-2.151	.032	1.000
8	5	1.147	.298	3.845	<.001	.033
9	5	2.444	.298	8.194	<.001	<.001
10	5	3.562	.298	11.943	<.001	<.001
17	5	2.719	.298	9.117	<.001	<.001
18	5	2.707	.298	9.075	<.001	<.001
19	5	3.048	.298	10.219	<.001	<.001
20	5	3.525	.298	11.819	<.001	<.001
ESV1	5	2.790	.298	9.352	<.001	<.001
ESV2	5	1.614	.298	5.411	<.001	<.001
ESV3	5	1.538	.298	5.156	<.001	<.001
5	1	1.523	.298	5.105	<.001	<.001
5	2	1.887	.298	6.325	<.001	<.001
5	3	1.632	.298	5.472	<.001	<.001
5	6	-2.036	.298	-6.826	<.001	<.001
5	7	-.297	.298	0.996	.319	1.000
5	11	.438	.298	-1.469	.142	1.000
5	12	-9.730	.298	-3.262	.001	.306
5	13	-.580	.298	-1.943	.052	1.000
5	14	-2.422	.298	-8.121	<.001	<.001
5	15	-.136	.298	-0.456	.648	1.000
5	16	-1.687	.298	-5.655	<.001	<.001
5	ESV4	-.627	.298	-2.101	.036	1.000

Pairwise comparisons of research priority 6 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
1	6	-.513	.298	-1.721	.085	1.000
2	6	-.149	.298	-0.501	.616	1.000
3	6	-.404	.298	-1.354	.176	1.000
4	6	-2.677	.298	-8.977	<.001	<.001
5	6	-2.036	.298	-6.826	<.001	<.001
7	6	1.739	.298	5.83	<.001	<.001
8	6	3.183	.298	10.671	<.001	<.001
9	6	4.480	.298	15.02	<.001	<.001
10	6	5.598	.298	18.769	<.001	<.001
11	6	1.598	.298	5.357	<.001	<.001
12	6	1.063	.298	3.564	<.001	.101
13	6	1.456	.298	4.883	<.001	<.001
15	6	1.900	.298	6.37	<.001	<.001
16	6	.349	.298	1.171	.242	1.000
17	6	4.755	.298	15.943	<.001	<.001
18	6	4.743	.298	15.901	<.001	<.001
19	6	5.084	.298	17.045	<.001	<.001
20	6	5.561	.298	18.645	<.001	<.001
ESV1	6	4.826	.298	16.178	<.001	<.001
ESV2	6	3.650	.298	12.237	<.001	<.001
ESV3	6	3.574	.298	11.982	<.001	<.001
ESV4	6	1.409	.298	4.725	<.001	.001
6	14	-.386	.298	-1.295	.195	1.000

Pairwise comparisons of research priority 7 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
4	7	-.939	.298	-3.147	.002	.456
5	7	-.297	.298	0.996	.319	1.000
8	7	1.444	.298	4.841	<.001	<.001
9	7	2.741	.298	9.19	<.001	<.001
10	7	3.859	.298	12.939	<.001	<.001
15	7	.161	.298	0.54	.589	1.000
17	7	3.016	.298	10.113	<.001	<.001
18	7	3.004	.298	10.071	<.001	<.001
19	7	3.345	.298	11.215	<.001	<.001
20	7	3.823	.298	12.815	<.001	<.001
ESV1	7	3.087	.298	10.349	<.001	<.001
ESV2	7	1.911	.298	6.407	<.001	<.001
ESV3	7	1.835	.298	6.152	<.001	<.001
7	1	1.226	.298	4.109	<.001	.011
7	2	1.589	.298	5.329	<.001	<.001
7	3	1.335	.298	4.476	<.001	.002
7	6	1.739	.298	5.83	<.001	<.001
7	11	-.141	.298	-0.473	.636	1.000
7	12	-.676	.298	-2.265	.023	1.000
7	13	-.282	.298	-0.947	.344	1.000
7	14	-2.125	.298	-7.124	<.001	<.001
7	16	-1.390	.298	-4.659	<.001	.001
7	ESV4	-.330	.298	-1.105	.269	1.000

Pairwise comparisons of research priority 8 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
9	8	1.297	.298	4.349	<.001	.004
10	8	2.415	.298	8.098	<.001	<.001
17	8	1.573	.298	5.272	<.001	<.001
18	8	1.560	.298	5.23	<.001	<.001
19	8	1.901	.298	6.374	<.001	<.001
20	8	2.379	.298	7.974	<.001	<.001
ESV1	8	1.643	.298	5.508	<.001	<.001
ESV2	8	.467	.298	1.566	.117	1.000
ESV3	8	.391	.298	1.311	.190	1.000
8	1	2.669	.298	8.95	<.001	<.001
8	2	3.033	.298	10.17	<.001	<.001
8	3	2.779	.298	9.317	<.001	<.001
8	4	.505	.298	1.694	.090	1.000
8	5	1.147	.298	3.845	<.001	.033
8	6	3.183	.298	10.671	<.001	<.001
8	7	1.444	.298	4.841	<.001	<.001
8	11	-1.585	.298	-5.314	<.001	<.001
8	12	-2.120	.298	-7.106	<.001	<.001
8	13	-1.726	.298	-5.788	<.001	<.001
8	14	-3.569	.298	-11.965	<.001	<.001
8	15	-1.283	.298	-4.301	<.001	.005
8	16	-2.834	.298	-9.5	<.001	<.001
8	ESV4	-1.774	.298	-5.946	<.001	<.001

Pairwise comparisons of research priority 9 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
10	9	1.118	.298	3.743	<.001	.049
17	9	.275	.298	0.923	.356	1.000
18	9	.263	.298	0.881	.378	1.000
19	9	.604	.298	2.025	.043	1.000
20	9	1.081	.298	3.626	<.001	.080
ESV1	9	.346	.298	1.159	.247	1.000
9	1	3.967	.298	13.299	<.001	<.001
9	2	4.331	.298	14.519	<.001	<.001
9	3	4.076	.298	13.665	<.001	<.001
9	4	1.802	.298	6.043	<.001	<.001
9	5	2.444	.298	8.194	<.001	<.001
9	6	4.480	.298	15.02	<.001	<.001
9	7	2.741	.298	9.19	<.001	<.001
9	8	1.297	.298	4.349	<.001	.004
9	11	-2.882	.298	-9.663	<.001	<.001
9	12	-3.417	.298	-11.455	<.001	<.001
9	13	-3.024	.298	-10.137	<.001	<.001
9	14	-4.866	.298	-16.314	<.001	<.001
9	15	-2.580	.298	-8.65	<.001	<.001
9	16	-4.131	.298	-13.849	<.001	<.001
9	ESV2	-8.300	.298	-2.783	.005	1.000
9	ESV3	-.906	.298	-3.038	.002	.657
9	ESV4	-3.071	.298	-10.295	<.001	<.001

Pairwise comparisons of research priority 10 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
10	1	5.085	.298	17.048	<.001	<.001
10	2	5.449	.298	18.268	<.001	<.001
10	3	5.194	.298	17.415	<.001	<.001
10	4	2.921	.298	9.792	<.001	<.001
10	5	3.562	.298	11.943	<.001	<.001
10	6	5.598	.298	18.769	<.001	<.001
10	7	3.859	.298	12.939	<.001	<.001
10	8	2.415	.298	8.098	<.001	<.001
10	9	1.118	.298	3.743	<.001	.049
10	11	-4.000	.298	-13.412	<.001	<.001
10	12	-4.535	.298	-15.205	<.001	<.001
10	13	-4.142	.298	-13.886	<.001	<.001
10	14	-5.984	.298	-20.063	<.001	<.001
10	15	-3.698	.298	-12.399	<.001	<.001
10	16	-5.249	.298	-17.598	<.001	<.001
10	17	-8.430	.298	-2.826	.005	1.000
10	18	-.855	.298	-2.868	.004	1.000
10	19	-.514	.298	-1.724	.085	1.000
10	20	-.037	.298	-0.124	.901	1.000
10	ESV1	-.773	.298	-2.591	.010	1.000
10	ESV2	-1.948	.298	-6.532	<.001	<.001
10	ESV3	-2.024	.298	-6.787	<.001	<.001
10	ESV4	-4.189	.298	-14.044	<.001	<.001

Pairwise comparisons of research priority 11 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
4	11	-1.080	.298	-3.62	<.001	.081
5	11	.438	.298	-1.469	.142	1.000
7	11	-.141	.298	-0.473	.636	1.000
8	11	-1.585	.298	-5.314	<.001	<.001
9	11	-2.882	.298	-9.663	<.001	<.001
10	11	-4.000	.298	-13.412	<.001	<.001
15	11	.302	.298	1.013	.311	1.000
17	11	3.157	.298	10.586	<.001	<.001
18	11	3.145	.298	10.544	<.001	<.001
19	11	3.486	.298	11.688	<.001	<.001
20	11	3.964	.298	13.288	<.001	<.001
ESV1	11	3.228	.298	10.821	<.001	<.001
ESV2	11	2.052	.298	6.88	<.001	<.001
ESV3	11	1.976	.298	6.625	<.001	<.001
11	1	1.085	.298	3.636	<.001	.076
11	2	1.448	.298	4.856	<.001	<.001
11	3	1.194	.298	4.003	<.001	.017
11	6	1.598	.298	5.357	<.001	<.001
11	12	-.535	.298	-1.793	.073	1.000
11	13	-.141	.298	-0.474	.635	1.000
11	14	-1.984	.298	-6.652	<.001	<.001
11	16	-1.249	.298	-4.186	<.001	.008
11	ESV4	-.189	.298	-0.632	.527	1.000

Pairwise comparisons of research priority 12 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
4	12	-1.614	.298	-5.412	<.001	<.001
5	12	-9.730	.298	-3.262	.001	.306
7	12	-.676	.298	-2.265	.023	1.000
8	12	-2.120	.298	-7.106	<.001	<.001
9	12	-3.417	.298	-11.455	<.001	<.001
10	12	-4.535	.298	-15.205	<.001	<.001
11	12	-.535	.298	-1.793	.073	1.000
13	12	.393	.298	1.318	.187	1.000
15	12	.837	.298	2.805	.005	1.000
17	12	3.692	.298	12.378	<.001	<.001
18	12	3.680	.298	12.337	<.001	<.001
19	12	4.021	.298	13.481	<.001	<.001
20	12	4.498	.298	15.081	<.001	<.001
ESV1	12	3.762	.298	12.614	<.001	<.001
ESV2	12	2.587	.298	8.672	<.001	<.001
ESV3	12	2.511	.298	8.417	<.001	<.001
ESV4	12	.346	.298	1.16	.246	1.000
12	1	.550	.298	1.843	.065	1.000
12	2	.914	.298	3.063	.002	.604
12	3	.659	.298	2.21	.027	1.000
12	6	1.063	.298	3.564	<.001	.101
12	14	-1.449	.298	-4.859	<.001	<.001
12	16	-.714	.298	-2.394	.017	1.000

Pairwise comparisons of research priority 13 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
4	13	-1.221	.298	-4.094	<.001	.012
5	13	-.580	.298	-1.943	.052	1.000
7	13	-.282	.298	-0.947	.344	1.000
8	13	-1.726	.298	-5.788	<.001	<.001
9	13	-3.024	.298	-10.137	<.001	<.001
10	13	-4.142	.298	-13.886	<.001	<.001
11	13	-.141	.298	-0.474	.635	1.000
15	13	.444	.298	1.487	.137	1.000
17	13	3.299	.298	11.06	<.001	<.001
18	13	3.286	.298	11.018	<.001	<.001
19	13	3.628	.298	12.162	<.001	<.001
20	13	4.105	.298	13.762	<.001	<.001
ESV1	13	3.369	.298	11.296	<.001	<.001
ESV2	13	2.194	.298	7.354	<.001	<.001
ESV3	13	2.117	.298	7.099	<.001	<.001
13	1	.943	.298	3.162	.002	.433
13	2	1.307	.298	4.382	<.001	.003
13	3	1.052	.298	3.529	<.001	.115
13	6	1.456	.298	4.883	<.001	<.001
13	12	.393	.298	1.318	.187	1.000
13	14	-1.843	.298	-6.177	<.001	<.001
13	16	-1.107	.298	-3.712	<.001	.057
13	ESV4	-.047	.298	-0.158	.874	1.000

Pairwise comparisons of research priority 14 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
1	14	-.899	.298	-3.016	.003	.708
2	14	-.536	.298	-1.796	.073	1.000
3	14	-.790	.298	-2.649	.008	1.000
4	14	-3.064	.298	-10.271	<.001	<.001
5	14	-2.422	.298	-8.121	<.001	<.001
6	14	-.386	.298	-1.295	.195	1.000
7	14	-2.125	.298	-7.124	<.001	<.001
8	14	-3.569	.298	-11.965	<.001	<.001
9	14	-4.866	.298	-16.314	<.001	<.001
10	14	-5.984	.298	-20.063	<.001	<.001
11	14	-1.984	.298	-6.652	<.001	<.001
12	14	-1.449	.298	-4.859	<.001	<.001
13	14	-1.843	.298	-6.177	<.001	<.001
15	14	2.286	.298	7.664	<.001	<.001
16	14	.735	.298	2.465	.014	1.000
17	14	5.141	.298	17.237	<.001	<.001
18	14	5.129	.298	17.196	<.001	<.001
19	14	5.470	.298	18.339	<.001	<.001
20	14	5.948	.298	19.94	<.001	<.001
ESV1	14	5.212	.298	17.473	<.001	<.001
ESV2	14	4.036	.298	13.531	<.001	<.001
ESV3	14	3.960	.298	13.276	<.001	<.001
ESV4	14	1.795	.298	6.019	<.001	<.001

Pairwise comparisons of research priority 15 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
4	15	-.778	.298	-2.607	.009	1.000
5	15	-.136	.298	-0.456	.648	1.000
8	15	-1.283	.298	-4.301	<.001	.005
9	15	-2.580	.298	-8.65	<.001	<.001
10	15	-3.698	.298	-12.399	<.001	<.001
17	15	2.855	.298	9.573	<.001	<.001
18	15	2.843	.298	9.531	<.001	<.001
19	15	3.184	.298	10.675	<.001	<.001
20	15	3.661	.298	12.276	<.001	<.001
ESV1	15	2.926	.298	9.809	<.001	<.001
ESV2	15	1.750	.298	5.867	<.001	<.001
ESV3	15	1.674	.298	5.612	<.001	<.001
15	1	1.387	.298	4.649	<.001	.001
15	2	1.750	.298	5.869	<.001	<.001
15	3	1.496	.298	5.015	<.001	<.001
15	6	1.900	.298	6.37	<.001	<.001
15	7	.161	.298	0.54	.589	1.000
15	11	.302	.298	1.013	.311	1.000
15	12	.837	.298	2.805	.005	1.000
15	13	.444	.298	1.487	.137	1.000
15	14	2.286	.298	7.664	<.001	<.001
15	16	-1.551	.298	-5.199	<.001	<.001
15	ESV4	-4.910	.298	-1.645	.100	1.000

Pairwise comparisons of research priority 16 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
1	16	-.164	.298	-0.55	.582	1.000
3	16	-.055	.298	-0.183	.854	1.000
4	16	-2.328	.298	-7.806	<.001	<.001
5	16	-1.687	.298	-5.655	<.001	<.001
7	16	-1.390	.298	-4.659	<.001	.001
8	16	-2.834	.298	-9.5	<.001	<.001
9	16	-4.131	.298	-13.849	<.001	<.001
10	16	-5.249	.298	-17.598	<.001	<.001
11	16	-1.249	.298	-4.186	<.001	.008
12	16	-.714	.298	-2.394	.017	1.000
13	16	-1.107	.298	-3.712	<.001	.057
15	16	-1.551	.298	-5.199	<.001	<.001
17	16	4.406	.298	14.772	<.001	<.001
18	16	4.394	.298	14.73	<.001	<.001
19	16	4.735	.298	15.874	<.001	<.001
20	16	5.212	.298	17.474	<.001	<.001
ESV1	16	4.476	.298	15.008	<.001	<.001
ESV2	16	3.301	.298	11.066	<.001	<.001
ESV3	16	3.225	.298	10.811	<.001	<.001
ESV4	16	1.060	.298	3.554	<.001	.105
16	2	.200	.298	0.67	.503	1.000
16	6	.349	.298	1.171	.242	1.000
16	14	.735	.298	2.465	.014	1.000

Pairwise comparisons of research priority 17 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
10	17	-8.430	.298	-2.826	.005	1.000
19	17	.329	.298	1.102	.270	1.000
20	17	.806	.298	2.702	.007	1.000
ESV1	17	.070	.298	0.236	.814	1.000
17	1	4.242	.298	14.22	<.001	<.001
17	2	4.606	.298	15.442	<.001	<.001
17	3	4.351	.298	14.589	<.001	<.001
17	4	2.078	.298	6.966	<.001	<.001
17	5	2.719	.298	9.117	<.001	<.001
17	6	4.755	.298	15.943	<.001	<.001
17	7	3.016	.298	10.113	<.001	<.001
17	8	1.573	.298	5.272	<.001	<.001
17	9	.275	.298	0.923	.356	1.000
17	11	3.157	.298	10.586	<.001	<.001
17	12	3.692	.298	12.378	<.001	<.001
17	13	3.299	.298	11.06	<.001	<.001
17	14	5.141	.298	17.237	<.001	<.001
17	15	2.855	.298	9.573	<.001	<.001
17	16	4.406	.298	14.772	<.001	<.001
17	18	-.012	.298	-0.042	.967	1.000
17	ESV2	-1.105	.298	-3.706	<.001	.058
17	ESV3	-1.181	.298	-3.961	<.001	.021
17	ESV4	-3.346	.298	-11.218	<.001	<.001

Pairwise comparisons of research priority 18 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
10	18	-.855	.298	-2.868	.004	1.000
17	18	-.012	.298	-0.042	.967	1.000
19	18	.341	.298	1.144	.253	1.000
20	18	.819	.298	2.744	0.006	1.000
ESV1	18	.083	.298	0.277	.781	1.000
18	1	4.230	.298	14.18	<.001	<.001
18	2	4.593	.298	15.4	<.001	<.001
18	3	4.339	.298	14.547	<.001	<.001
18	4	2.065	.298	6.924	<.001	<.001
18	5	2.707	.298	9.075	<.001	<.001
18	6	4.743	.298	15.901	<.001	<.001
18	7	3.004	.298	10.071	<.001	<.001
18	8	1.560	.298	5.23	<.001	<.001
18	9	.263	.298	0.881	.378	1.000
18	11	3.145	.298	10.544	<.001	<.001
18	12	3.680	.298	12.337	<.001	<.001
18	13	3.286	.298	11.018	<.001	<.001
18	14	5.129	.298	17.196	<.001	<.001
18	15	2.843	.298	9.531	<.001	<.001
18	16	4.394	.298	14.73	<.001	<.001
18	ESV2	-1.093	.298	-3.664	<.001	.068
18	ESV3	-1.169	.298	-3.919	<.001	.025
18	ESV4	-3.334	.298	-11.176	<.001	<.001

Pairwise comparisons of research priority 19 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
10	19	-.514	.298	-1.724	.085	1.000
20	19	.477	.298	1.6	.110	1.000
19	1	4.571	.298	15.324	<.001	<.001
19	2	4.935	.298	16.544	<.001	<.001
19	3	4.680	.298	15.691	<.001	<.001
19	4	2.407	.298	8.068	<.001	<.001
19	5	3.048	.298	10.219	<.001	<.001
19	6	5.084	.298	17.045	<.001	<.001
19	7	3.345	.298	11.215	<.001	<.001
19	8	1.901	.298	6.374	<.001	<.001
19	9	.604	.298	2.025	.043	1.000
19	11	3.486	.298	11.688	<.001	<.001
19	12	4.021	.298	13.481	<.001	<.001
19	13	3.628	.298	12.162	<.001	<.001
19	14	5.470	.298	18.339	<.001	<.001
19	15	3.184	.298	10.675	<.001	<.001
19	16	4.735	.298	15.874	<.001	<.001
19	17	.329	.298	1.102	.270	1.000
19	18	.341	.298	1.144	.253	1.000
19	ESV1	-.258	.298	-0.866	.386	1.000
19	ESV2	-1.434	.298	-4.808	<.001	<.001
19	ESV3	-1.510	.298	-5.063	<.001	<.001
19	ESV4	-3.675	.298	-12.32	<.001	<.001

Pairwise comparisons of research priority 20 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
10	20	-.037	.298	-0.124	.901	1.000
20	1	5.048	.298	16.924	<.001	<.001
20	2	5.412	.298	18.144	<.001	<.001
20	3	5.157	.298	17.291	<.001	<.001
20	4	2.884	.298	9.669	<.001	<.001
20	5	3.525	.298	11.819	<.001	<.001
20	6	5.561	.298	18.645	<.001	<.001
20	7	3.823	.298	12.815	<.001	<.001
20	8	2.379	.298	7.974	<.001	<.001
20	9	1.081	.298	3.626	<.001	.080
20	11	3.964	.298	13.288	<.001	<.001
20	12	4.498	.298	15.081	<.001	<.001
20	13	4.105	.298	13.762	<.001	<.001
20	14	5.948	.298	19.94	<.001	<.001
20	15	3.661	.298	12.276	<.001	<.001
20	16	5.212	.298	17.474	<.001	<.001
20	17	.806	.298	2.702	.007	1.000
20	18	.819	.298	2.744	0.006	1.000
20	19	.477	.298	1.6	.110	1.000
20	ESV1	-.736	.298	-2.467	.014	1.000
20	ESV2	-1.911	.298	-6.408	<.001	<.001
20	ESV3	-1.988	.298	-6.663	<.001	<.001
20	ESV4	-4.152	.298	-13.92	<.001	<.001

Pairwise comparisons of research priority ESV1 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
10	ESV1	-.773	.298	-2.591	.010	1.000
19	ESV1	-.258	.298	-0.866	.386	1.000
20	ESV1	-.736	.298	-2.467	.014	1.000
ESV1	1	4.312	.298	14.457	<.001	<.001
ESV1	2	4.676	.298	15.677	<.001	<.001
ESV1	3	4.422	.298	14.824	<.001	<.001
ESV1	4	2.148	.298	7.202	<.001	<.001
ESV1	5	2.790	.298	9.352	<.001	<.001
ESV1	6	4.826	.298	16.178	<.001	<.001
ESV1	7	3.087	.298	10.349	<.001	<.001
ESV1	8	1.643	.298	5.508	<.001	<.001
ESV1	9	.346	.298	1.159	.247	1.000
ESV1	11	3.228	.298	10.821	<.001	<.001
ESV1	12	3.762	.298	12.614	<.001	<.001
ESV1	13	3.369	.298	11.296	<.001	<.001
ESV1	14	5.212	.298	17.473	<.001	<.001
ESV1	15	2.926	.298	9.809	<.001	<.001
ESV1	16	4.476	.298	15.008	<.001	<.001
ESV1	17	.070	.298	0.236	.814	1.000
ESV1	18	.083	.298	0.277	.781	1.000
ESV1	ESV2	-1.176	.298	-3.942	<.001	.022
ESV1	ESV3	-1.252	.298	-4.197	<.001	.007
ESV1	ESV4	-3.416	.298	-11.454	<.001	<.001

Pairwise comparisons of research priority ESV2 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
9	ESV2	-8.300	.298	-2.783	.005	1.000
10	ESV2	-1.948	.298	-6.532	<.001	<.001
17	ESV2	-1.105	.298	-3.706	<.001	.058
18	ESV2	-1.093	.298	-3.664	<.001	.068
19	ESV2	-1.434	.298	-4.808	<.001	<.001
20	ESV2	-1.911	.298	-6.408	<.001	<.001
ESV1	ESV2	-1.176	.298	-3.942	<.001	.022
ESV2	1	3.137	.298	10.516	<.001	<.001
ESV2	2	3.500	.298	11.736	<.001	<.001
ESV2	3	3.246	.298	10.883	<.001	<.001
ESV2	4	.972	.298	3.26	.001	.307
ESV2	5	1.614	.298	5.411	<.001	<.001
ESV2	6	3.650	.298	12.237	<.001	<.001
ESV2	7	1.911	.298	6.407	<.001	<.001
ESV2	8	.467	.298	1.566	.117	1.000
ESV2	11	2.052	.298	6.88	<.001	<.001
ESV2	12	2.587	.298	8.672	<.001	<.001
ESV2	13	2.194	.298	7.354	<.001	<.001
ESV2	14	4.036	.298	13.531	<.001	<.001
ESV2	15	1.750	.298	5.867	<.001	<.001
ESV2	16	3.301	.298	11.066	<.001	<.001
ESV2	ESV3	-.076	.298	-0.255	.799	1.000
ESV2	ESV4	-2.241	.298	-7.512	<.001	<.001

Pairwise comparisons of research priority ESV3 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
9	ESV3	-.906	.298	-3.038	.002	.657
10	ESV3	-2.024	.298	-6.787	<.001	<.001
17	ESV3	-1.181	.298	-3.961	<.001	.021
18	ESV3	-1.169	.298	-3.919	<.001	.025
19	ESV3	-1.510	.298	-5.063	<.001	<.001
20	ESV3	-1.988	.298	-6.663	<.001	<.001
ESV1	ESV3	-1.252	.298	-4.197	<.001	.007
ESV2	ESV3	-.076	.298	-0.255	.799	1.000
ESV3	1	3.060	.298	10.261	<.001	<.001
ESV3	2	3.424	.298	11.481	<.001	<.001
ESV3	3	3.170	.298	10.628	<.001	<.001
ESV3	4	.896	.298	3.005	.003	.733
ESV3	5	1.538	.298	5.156	<.001	<.001
ESV3	6	3.574	.298	11.982	<.001	<.001
ESV3	7	1.835	.298	6.152	<.001	<.001
ESV3	8	.391	.298	1.311	.190	1.000
ESV3	11	1.976	.298	6.625	<.001	<.001
ESV3	12	2.511	.298	8.417	<.001	<.001
ESV3	13	2.117	.298	7.099	<.001	<.001
ESV3	14	3.960	.298	13.276	<.001	<.001
ESV3	15	1.674	.298	5.612	<.001	<.001
ESV3	16	3.225	.298	10.811	<.001	<.001
ESV3	ESV4	-2.165	.298	-7.257	<.001	<.001

Pairwise comparisons of research priority ESV4 to the other twenty-three research priorities in the 2013 GMRP survey based on SPSS 22's post hoc test of the Friedman test. Red cells indicate significant difference at p<.05.

First research priority	Second research priority	Test statistic	Std. error	Std. test statistic	Sig.	Adj. sig.
4	ESV4	-1.268	.298	-4.252	<.001	.006
5	ESV4	-.627	.298	-2.101	.036	1.000
7	ESV4	-.330	.298	-1.105	.269	1.000
8	ESV4	-1.774	.298	-5.946	<.001	<.001
9	ESV4	-3.071	.298	-10.295	<.001	<.001
10	ESV4	-4.189	.298	-14.044	<.001	<.001
11	ESV4	-.189	.298	-0.632	.527	1.000
13	ESV4	-.047	.298	-0.158	.874	1.000
15	ESV4	-4.910	.298	-1.645	.100	1.000
17	ESV4	-3.346	.298	-11.218	<.001	<.001
18	ESV4	-3.334	.298	-11.176	<.001	<.001
19	ESV4	-3.675	.298	-12.32	<.001	<.001
20	ESV4	-4.152	.298	-13.92	<.001	<.001
ESV1	ESV4	-3.416	.298	-11.454	<.001	<.001
ESV2	ESV4	-2.241	.298	-7.512	<.001	<.001
ESV3	ESV4	-2.165	.298	-7.257	<.001	<.001
ESV4	1	.896	.298	3.004	.003	.736
ESV4	2	1.260	.298	4.224	<.001	.007
ESV4	3	1.005	.298	3.371	.001	.207
ESV4	6	1.409	.298	4.725	<.001	.001
ESV4	12	.346	.298	1.16	.246	1.000
ESV4	14	1.795	.298	6.019	<.001	<.001
ESV4	16	1.060	.298	3.554	<.001	.105

APPENDIX H

AGGREGATED RESULTS OF ALL ANALYSES BY RESEARCH PRIORITY

This section presents the aggregated results of all the tests by each research priority. The order of the research priorities is based on the results of the relative rating of research priorities compared to each other. Research priorities are ordered by tier with the highest rated priorities presented first.

Summary of ORPP research priority 14 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP14
Research Priority:	Understand and predict the impact of natural and anthropogenic processes on ecosystems
ORPP Theme:	Improving Ecosystem Health
2013 Ratings Tier:	1
Differences in Year Approach I:	2007 > 2010 2007 > 2013
Differences in Year Approach II:	2007 > 2010 2007 > 2013
Differences in Affiliation:	government > business NGO > business university > business
Differences in Region:	N/A
Differences in Relation to Research:	conduct > non-user
Differences in Discipline:	biological > other natural biological > social

Summary of ORPP research priority 6 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP6
Research Priority:	Understand the response of coastal and marine systems to natural hazards and apply that understanding to assessments of future vulnerability to natural hazards
ORPP Theme:	Increasing Resilience to Natural Hazards
2013 Ratings Tier:	1
Differences in Year Approach I:	N/A
Differences in Year Approach II:	N/A
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > non-user profession > non-user conduct > non-user
Differences in Discipline:	N/A

Summary of ORPP research priority 2 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP2
Research Priority:	Understand interspecies and habitat/species relationships to support forecasting resource stability and sustainability
ORPP Theme:	Stewardship of Natural and Cultural Ocean Resources
2013 Ratings Tier:	1
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2007 > 2010
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	N/A
Differences in Discipline:	biological > other natural biological > social

Summary of ORPP research priority 16 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP16
Research Priority:	Apply understanding of marine ecosystems to develop appropriate indicators and metrics for sustainable use and effective management
ORPP Theme:	Improving Ecosystem Health
2013 Ratings Tier:	1
Differences in Year Approach I:	2007 > 2010
Differences in Year Approach II:	2007 > 2010 2007 > 2013
Differences in Affiliation:	government > business
Differences in Region:	N/A
Differences in Relation to Research:	N/A
Differences in Discipline:	biological > other natural biological > social

Summary of ORPP research priority 3 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP3
Research Priority:	Understand human-use patterns considering economic, sociological, and cultural factors that may influence resource stability and sustainability
ORPP Theme:	Stewardship of Natural and Cultural Ocean Resources
2013 Ratings Tier:	1
Differences in Year Approach I:	2007 > 2010
Differences in Year Approach II:	2013 > 2010 2007 > 2010
Differences in Affiliation:	N/A
Differences in Region:	west > north
Differences in Relation to Research:	recreation > conduct profession > conduct
Differences in Discipline:	social > biological social > other natural

Summary of ORPP research priority 1 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP1
Research Priority:	Understand the status and trends of resource abundance and distribution through more accurate, timely and large scale assessments
ORPP Theme:	Stewardship of Natural and Cultural Ocean Resources
2013 Ratings Tier:	1
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2013 > 2010 2007 > 2010
Differences in Affiliation:	government > university
Differences in Region:	N/A
Differences in Relation to Research:	profession > non-user sponsor > non-user
Differences in Discipline:	biological > other natural biological > social

Summary of ORPP research priority 12 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP12
Research Priority:	Understand the impact of climate variability and change on the biogeochemistry of the ocean and implications for its ecosystems
ORPP Theme:	The Ocean's Role in Climate
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	N/A
Differences in Affiliation:	government > business NGO > business university > business
Differences in Region:	N/A
Differences in Relation to Research:	N/A
Differences in Discipline:	N/A

Summary of ecosystem service valuation priority 4 and notation of any significant differences found between groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	ESV4
Research Priority:	Apply the value of Gulf of Mexico ecosystems services to inform decisions related to restoration, conservation, protection, development and use of service
ORPP Theme:	Ecosystem Service Valuation
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	N/A
Differences in Affiliation:	NGO > government NGO > university
Differences in Region:	N/A
Differences in Relation to Research:	recreation > conduct profession > conduct profession > non-user
Differences in Discipline:	biological > other natural social > other natural

Summary of ORPP research priority 13 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP13
Research Priority:	Apply understanding of the ocean to help project future climate changes and their impacts
ORPP Theme:	The Ocean's Role in Climate
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2007 > 2010
Differences in Affiliation:	NGO > business university > business
Differences in Region:	west > north
Differences in Relation to Research:	N/A
Differences in Discipline:	N/A

Summary of ORPP research priority 11 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP11
Research Priority:	Understand ocean-climate interactions within and across regions
ORPP Theme:	The Ocean's Role in Climate
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2007 > 2010
Differences in Affiliation:	university > business
Differences in Region:	N/A
Differences in Relation to Research:	recreation > non-user conduct > non-user
Differences in Discipline:	other natural > social

Summary of ORPP research priority 7 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP7
Research Priority:	Apply understanding to develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation
ORPP Theme:	Increasing Resilience to Natural Hazards
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	N/A
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	N/A
Differences in Discipline:	other natural > biological social > biological

Summary of ORPP research priority 15 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP15
Research Priority:	Apply understanding of natural and human caused processes to develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems
ORPP Theme:	Improving Ecosystem Health
2013 Ratings Tier:	2
Differences in Year Approach I:	2007 > 2010 2007 > 2013
Differences in Year Approach II:	2013 > 2010 2007 > 2010 2007 > 2013
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > conduct profession > conduct
Differences in Discipline:	social > biological social > other natural

Summary of ORPP research priority 5 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP5
Research Priority:	Understand how hazard events initiate and evolve and apply that understanding to improve forecasts of future hazard events
ORPP Theme:	Increasing Resilience to Natural Hazards
2013 Ratings Tier:	2
Differences in Year Approach I:	2007 > 2010
Differences in Year Approach II:	2013 > 2010 2007 > 2010
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	N/A
Differences in Discipline:	other natural > biological other natural > social

Summary of ORPP research priority 4 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP4
Research Priority:	Apply advanced understanding and technologies to enhance the benefits of various natural resources from the open ocean and coasts
ORPP Theme:	Stewardship of Natural and Cultural Ocean Resources
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2013 > 2010 2007 > 2010
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	N/A
Differences in Discipline:	other natural > biological

Summary of ORPP research priority 8 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP8
Research Priority:	Understand the interactions between marine operations and the environment
ORPP Theme:	Enabling Marine Operations
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	N/A
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > conduct recreation > non-user recreation > profession recreation > sponsor
Differences in Discipline:	N/A

Summary of ecosystem service valuation priority 3 and notation of any significant differences found between groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	ESV3
Research Priority:	Estimate the value of the services provided by coastal and offshore ecosystems of the Gulf of Mexico
ORPP Theme:	Ecosystem Service Valuation
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	N/A
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > conduct recreation > non-user profession > conduct profession > non-user
Differences in Discipline:	biological > other natural social > other natural

Summary of ecosystem service valuation priority 2 and notation of any significant differences found between groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	ESV2
Research Priority:	Quantify services provided by coastal and offshore ecosystems of the Gulf of Mexico
ORPP Theme:	Ecosystem Service Valuation
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	N/A
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > non-user profession > conduct profession > non-user
Differences in Discipline:	biological > other natural social > other natural

Summary of ORPP research priority 9 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP9
Research Priority:	Apply understanding of environmental factors affecting marine operations to characterize and predict conditions in the maritime domain
ORPP Theme:	Enabling Marine Operations
2013 Ratings Tier:	2
Differences in Year Approach I:	N/A
Differences in Year Approach II:	N/A
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > conduct recreation > non-user recreation > profession recreation > sponsor
Differences in Discipline:	N/A

Summary of ORPP research priority 18 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP18
Research Priority:	Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health
ORPP Theme:	Enhancing Human Health
2013 Ratings Tier:	3
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2007 > 2010 2007 > 2013
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > conduct
Differences in Discipline:	social > biological social > other natural

Summary of ORPP research priority 17 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP17
Research Priority:	Understand sources and processes contributing to ocean-related risks to human health
ORPP Theme:	Enhancing Human Health
2013 Ratings Tier:	3
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2007 > 2013
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > conduct recreation > profession
Differences in Discipline:	social > biological social > other natural

Summary of ecosystem service valuation priority 1 and notation of any significant differences found between groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	ESV1
Research Priority:	Understand how people perceive the services provided by coastal and offshore ecosystems of the Gulf of Mexico
ORPP Theme:	Ecosystem Service Valuation
2013 Ratings Tier:	3
Differences in Year Approach I:	N/A
Differences in Year Approach II:	N/A
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > non-user profession > non-user
Differences in Discipline:	biological > other natural social > other natural

Summary of ORPP research priority 19 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP19
Research Priority:	Understand how human use and valuation of ocean resources can be affected by ocean-borne human health threats and how human activities can influence these threats
ORPP Theme:	Enhancing Human Health
2013 Ratings Tier:	3
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2007 > 2010 2007 > 2013
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > conduct recreation > profession recreation > sponsor
Differences in Discipline:	social > biological social > other natural

Summary of ORPP research priority 20 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP20
Research Priority:	Apply understanding of ocean ecosystems and biological diversity to develop products and biological models to enhance human well-being
ORPP Theme:	Enhancing Human Health
2013 Ratings Tier:	3
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2007 > 2010
Differences in Affiliation:	N/A
Differences in Region:	N/A
Differences in Relation to Research:	recreation > conduct recreation > profession recreation > sponsor
Differences in Discipline:	social > biological social > other natural

Summary of ORPP research priority 10 and notation of any significant differences found between survey years or groups in the 2013 GMRP survey that were described earlier in this document.

Research Priority Code:	RP10
Research Priority:	Apply understanding of environmental impacts and marine operations to enhance the marine transportation system
ORPP Theme:	Enabling Marine Operations
2013 Ratings Tier:	3
Differences in Year Approach I:	N/A
Differences in Year Approach II:	2013 > 2010 2007 > 2010
Differences in Affiliation:	N/A
Differences in Region:	west > east
Differences in Relation to Research:	recreation > conduct recreation > profession recreation > sponsor profession > conduct non-user > conduct
Differences in Discipline:	social > biological

APPENDIX I

INSTITUTIONAL REVIEW BOARD NOTICE OF COMMITTEE ACTION

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.6820 | Fax: 601.266.4377 | www.usm.edu/irb

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **CH10072602**
PROJECT TITLE: **2013 Gulf of Mexico Regional Research Survey**
PROJECT TYPE: **Change in a Previously Approved Prject**
RESEARCHER(S): **Stephen Sempier**
COLLEGE/DIVISION: **College of Science & Technology**
DEPARTMENT: **Coastal Sciences**
FUNDING AGENCY/SPONSOR: **Sea Grant**
IRB COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **09/30/2013 to 09/29/2014**

Lawrence A. Hosman, Ph.D.
Institutional Review Board

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