Initial Results
from the 2013 Gulf of Mexico Research Plan Survey

A customized report prepared for the:

Gulf of Mexico Alliance
Coastal Community Resilience Priority Issue Team

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Introduction

The four Sea Grant College Programs in the Gulf of Mexico region released surveys in 2007, 2010 and 2013 that asked about regional research and related needs. This was part of an effort to develop and update the Gulf of Mexico Research Plan (GMRP). For the 2013 GMRP survey, **1,668 people** answered at least a portion of the survey. Hundreds of people from each of the Gulf of Mexico states and beyond completed the survey, and they represented a broad cross section of people from government, universities, business/industry, NGOs and other groups. Charts that illustrate demographic information about the people who completed the survey are included in the Appendix. This is one of six separate reports created for each of the GOMA Priority Issue Teams (PITs).

The report

This report contains two sections that were developed based on the open-ended questions from the 2013 GMRP survey. The questions asked respondents to describe Gulf of Mexico research priorities, stressors and barriers to implementing a regional research plan.

Section I: Word Trees

The first section contains word trees that were developed using keywords related to each PIT. Word trees provide a quick way to provide some context on the keywords people used answering the questions. Most of the word trees only contain the first four or five words before and after the keyword in order to be readable in this document.

Section II: Research Priorities by subcategory

The second section is an analysis of open-ended research priorities through the lens of the PIT. The 2013 GMRP survey presented a standardized list of research priorities. It also asked people to identify up to three additional research priorities in open-ended text boxes. There were a total of **1,003 research priorities described**. These research priorities were linked to PITs. In some cases the same research priority could connect to a topic that is covered by more than one PIT. In addition, subcategories were created to better organize similar or related research priorities within a PIT and in many cases subcategories were based on PIT focus areas. The priorities were alphabetized within each subcategory. Table 1 in the Appendix summarizes the number of research priorities linked to each PIT and subcategory.

The research priorities are listed as bullets that are organized by PIT and subcategory. In many cases people's response to the question was not a true research priority. However, these bullets were retained so that readers can see the scope and breadth of input that was provided. Finally, the bullets are **unedited, actual responses** that survey respondents provided.

Next steps

Significant survey analysis and reporting still needs to be completed for the 2013 GMRP survey, which closed in November 2013. Additional details will be shared in the coming months along with a comparison between responses in the 2007, 2010 and 2013 GMRP surveys. For more information, please contact Steve Sempier, Mississippi-Alabama Sea Grant, at stephen.sempier@usm.edu.

Cover: The 50 most frequently used words by people who completed the 2013 GMRP survey. Word size reflects the frequency the word was used with larger words being used more frequently.

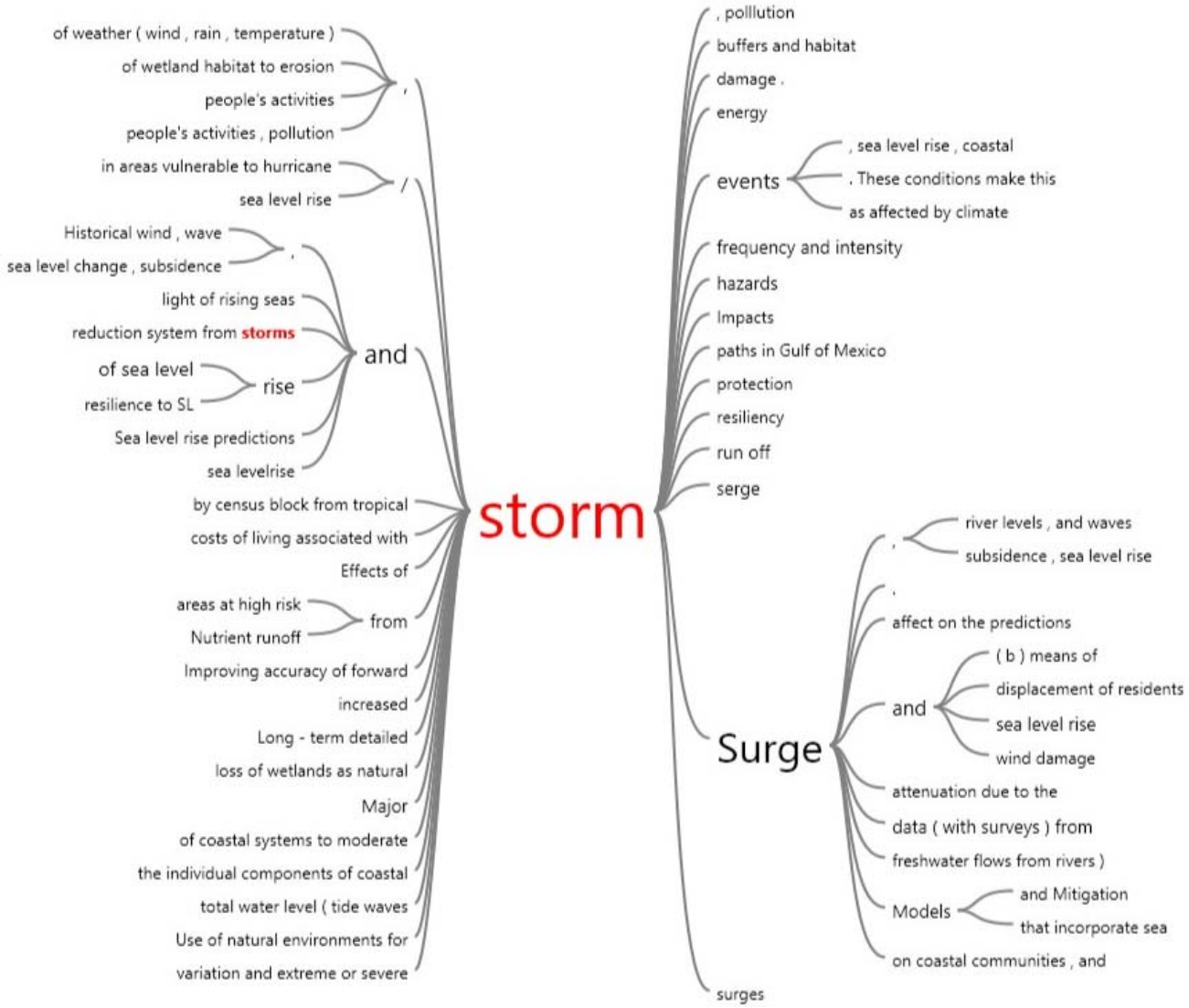
Section I: Word Trees

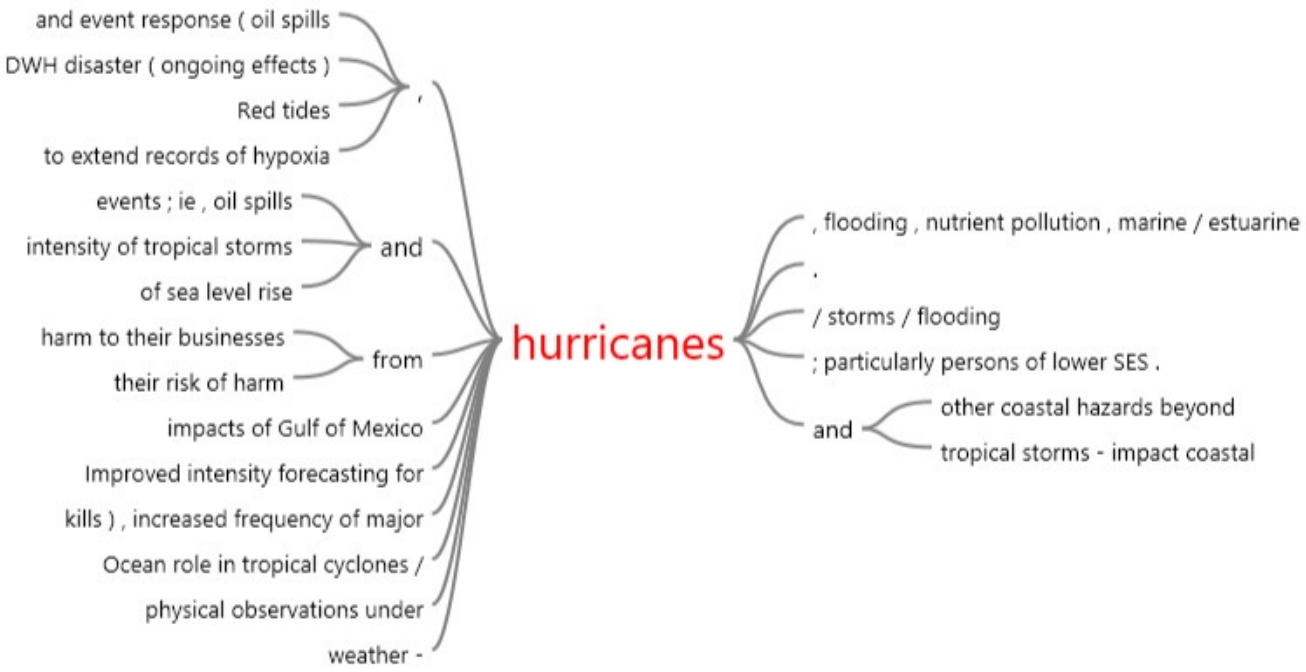
Word trees were created for several keywords related to the **GOMA Coastal Community Resilience Priority Issue Team**. The keywords used in the diagrams below are:

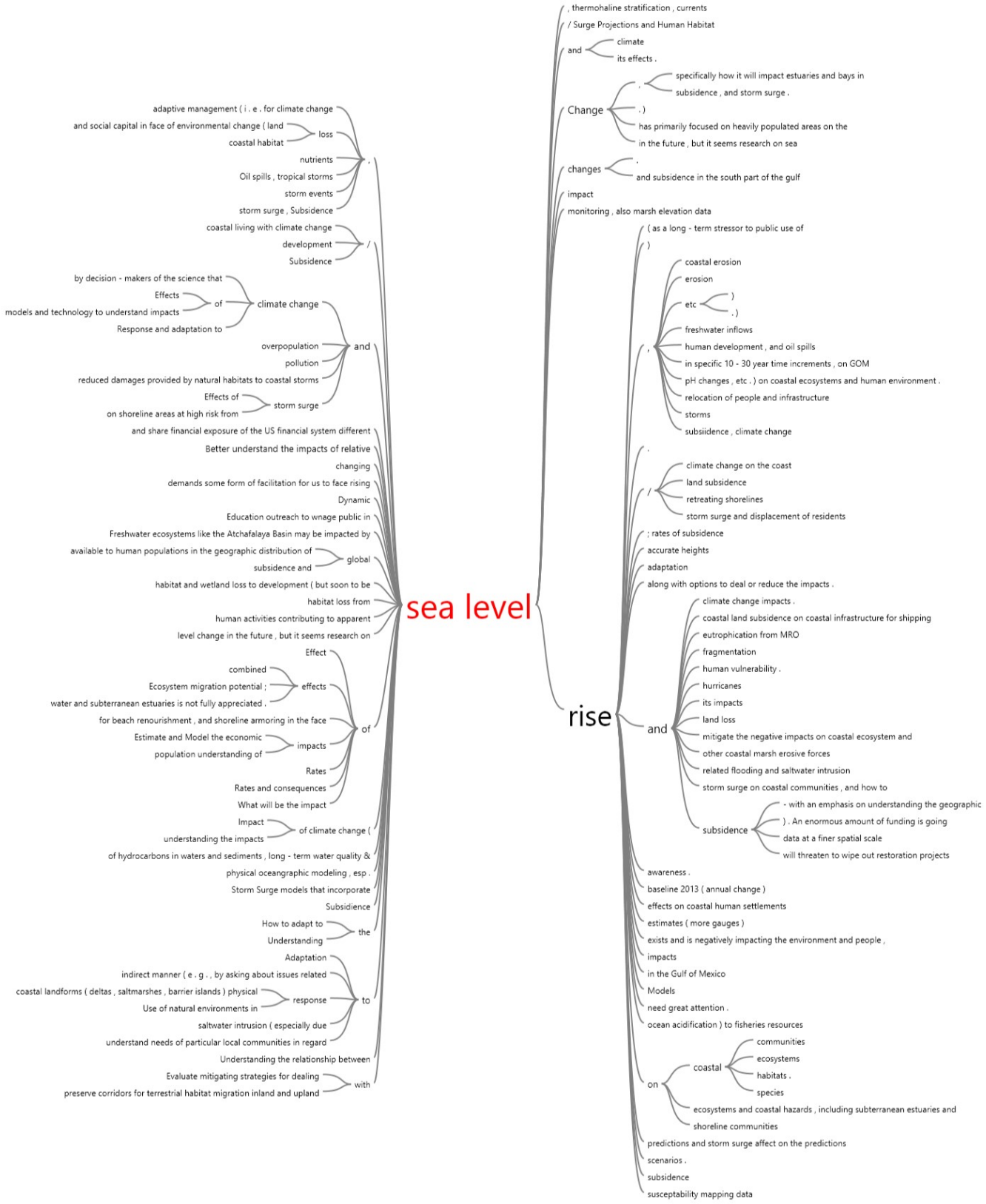
- Resilience
- Storm
- Hurricane
- Sea level
- Freshwater

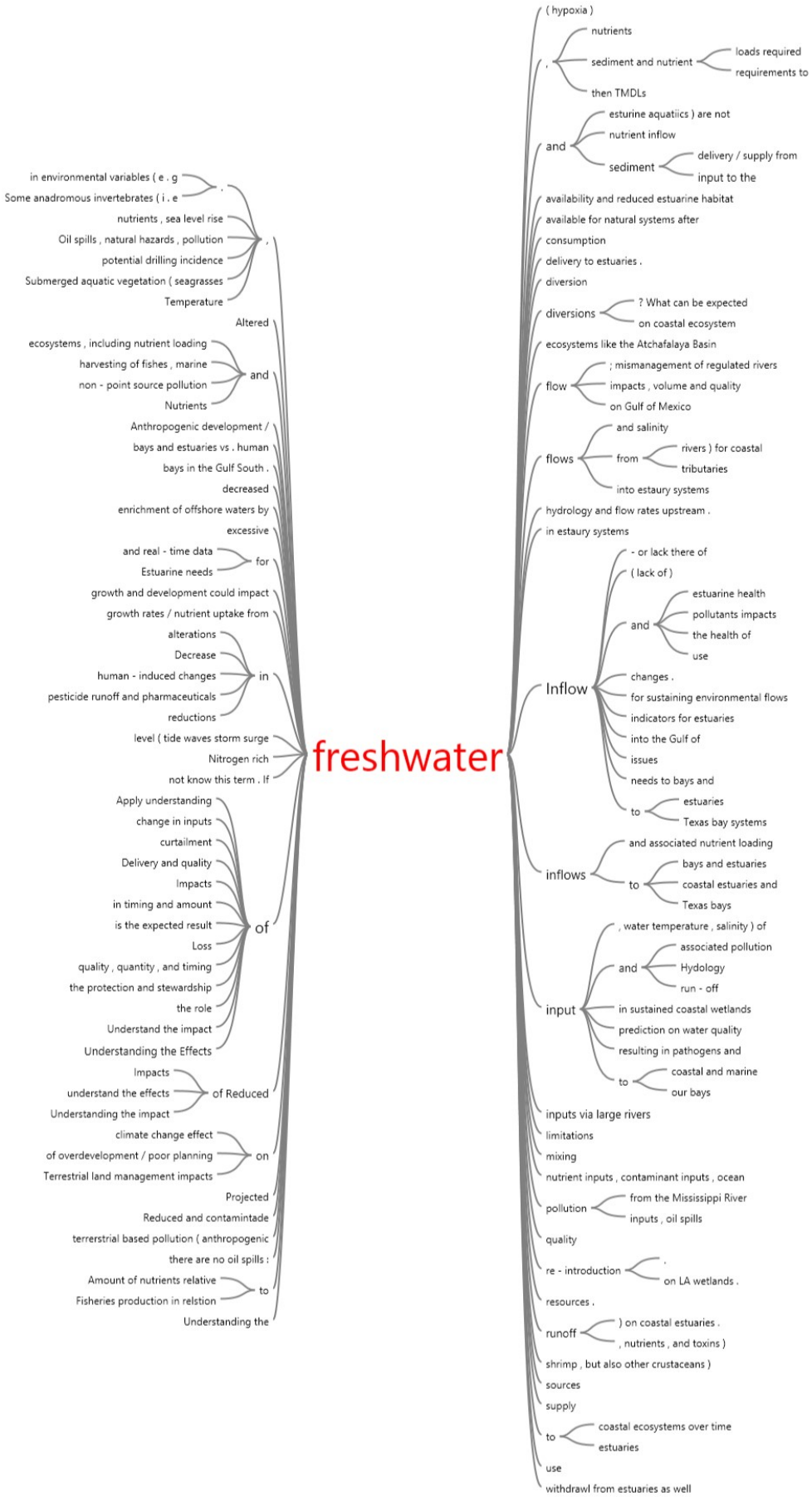
While analyzing the open-ended survey responses “freshwater” and similar concepts were mentioned numerous times. Often this related to freshwater input. This may be an area that is not explicitly addressed by the GOMA PITs so the word tree was included here. Additional details can be provided upon request.

resilience
,
Human biomarkers of stress
of human implementation into existing social systems sustainability
/ temporal variability in salinity affects the sensitivity and
coastal
Developing management tools that facilitate
Mississippi River diversion and
community
individual and
coastal
advanced modeling of components of
characterizing factors influencing
Understand
Defining
ecosystem
factors driving community and individual
Impact of community engagement on that community's
Increasing
investigate the influence multi - stressor on biological
Quantify the variation in human
,
disease and mental health in vulnerable , disaster prone
restoration activities)
based on manmade (oil spill) vs . natural (hurricane ,
for Gulf Coast communities
in
disaster events
response to natural and human initiated disaster
of coastal wetlands .
to
climate change
hazard events on the Gulf
manmade disasters (e . g . oil spills)
National Hazards
SL rise and storm energy


storm
of weather (wind , rain , temperature)
of wetland habitat to erosion
people's activities
people's activities , pollution
,
in areas vulnerable to hurricane
sea level rise
/
Historical wind , wave
sea level change , subsidence
,
light of rising seas
reduction system from storms
of sea level
resilience to SL
rise
Sea level rise predictions
sea levelrise
and
by census block from tropical
costs of living associated with
Effects of
areas at high risk
Nutrient runoff
from
Improving accuracy of forward
increased
Long - term detailed
loss of wetlands as natural
Major
of coastal systems to moderate
the individual components of coastal
total water level (tide waves
Use of natural environments for
variation and extreme or severe
, polllution
buffers and habitat
damage .
energy
events
, sea level rise , coastal
. These conditions make this
as affected by climate
frequency and intensity
hazards
Impacts
paths in Gulf of Mexico
protection
resiliency
run off
serge
Surge
,
river levels , and waves
subsidence , sea level rise
,
affect on the predictions
and
(b) means of
displacement of residents
sea level rise
wind damage
attenuation due to the
data (with surveys) from
freshwater flows from rivers)
Models
and Mitigation
that incorporate sea
on coastal communities , and
surges


and event response (oil spills
DWH disaster (ongoing effects)
Red tides
to extend records of hypoxia
,
events ; ie , oil spills
intensity of tropical storms
of sea level rise
and
harm to their businesses
their risk of harm
from
impacts of Gulf of Mexico
Improved intensity forecasting for
kills) , increased frequency of major
Ocean role in tropical cyclones /
physical observations under
weather -
hurricanes
, flooding , nutrient pollution , marine / estuarine
.
/ storms / flooding
; particularly persons of lower SES .
and
other coastal hazards beyond
tropical storms - impact coastal


sea level
,
adaptive management (i . e . for climate change
and social capital in face of environmental change (land
loss
coastal habitat
nutrients
Oil spills , tropical storms
storm events
storm surge , Subsidence
/
coastal living with climate change
development
Subsidence
and
climate change
by decision - makers of the science that
Effects
of
models and technology to understand impacts
Response and adaptation to
overpopulation
pollution
reduced damages provided by natural habitats to coastal storms
storm surge
Effects of
on shoreline areas at high risk from
and share financial exposure of the US financial system different
Better understand the impacts of relative
changing
demands some form of facilitation for us to face rising
Dynamic
Education outreach to wnage public in
Freshwater ecosystems like the Atchafalaya Basin may be impacted by
global
available to human populations in the geographic distribution of
subsidence and
habitat and wetland loss to development (but soon to be
habitat loss from
human activities contributing to apparent
level change in the future , but it seems research on
of
Effect
effects
combined
Ecosystem migration potential ;
water and subterranean estuaries is not fully appreciated .
impacts
for beach renourishment , and shoreline armoring in the face
Estimate and Model the economic
population understanding of
Rates
Rates and consequences
What will be the impact
of climate change (
Impact
understanding the impacts
of hydrocarbons in waters and sediments , long - term water quality &
physical oceangraphic modeling , esp .
Storm Surge models that incorporate
Subsidience
the
How to adapt to
Understanding
to
Adaptation
response
indirect manner (e . g . , by asking about issues related
coastal landforms (deltas , saltmarshes , barrier islands) physical
Use of natural environments in
saltwater intrusion (especially due
understand needs of particular local communities in regard
with
Understanding the relationship between
Evaluate mitigating strategies for dealing
preserve corridors for terrestrial habitat migration inland and upland
rise
, thermohaline stratification , currents
/ Surge Projections and Human Habitat
and
climate
its effects .
Change
,
specifically how it will impact estuaries and bays in
subsidence , and storm surge .
.)
has primarily focused on heavily populated areas on the
in the future , but it seems research on sea
changes
.
and subsidence in the south part of the gulf
impact
monitoring , also marsh elevation data
(as a long - term stressor to public use of
)
,
coastal erosion
erosion
etc
)
.)
freshwater inflows
human development , and oil spills
in specific 10 - 30 year time increments , on GOM
pH changes , etc .) on coastal ecosystems and human environment .
relocation of people and infrastructure
storms
subsiidence , climate change
.
/
climate change on the coast
land subsidence
retreating shorelines
storm surge and displacement of residents
; rates of subsidence
accurate heights
adaptation
along with options to deal or reduce the impacts .
and
climate change impacts .
coastal land subsidence on coastal infrastructure for shipping
eutrophication from MRO
fragmentation
human vulnerability .
hurricanes
its impacts
land loss
mitigate the negative impacts on coastal ecosystem and
other coastal marsh erosive forces
related flooding and saltwater intrusion
storm surge on coastal communities , and how to
subsidence
- with an emphasis on understanding the geographic
) . An enormous amount of funding is going
data at a finer spatial scale
will threaten to wipe out restoration projects
awareness .
baseline 2013 (annual change)
effects on coastal human settlements
estimates (more gauges)
exists and is negatively impacting the environment and people ,
impacts
in the Gulf of Mexico
Models
need great attention .
ocean acidification) to fisheries resources
on
coastal
communities
ecosystems
habitats .
species
ecosystems and coastal hazards , including subterranean estuaries and
shoreline communities
predictions and storm surge affect on the predictions
scenarios .
subsidence
susceptability mapping data


freshwater
(hypoxia)
nutrients
,
sediment and nutrient
loads required
requirements to
then TMDLs
and
esturine aquatiics) are not
nutrient inflow
sediment
delivery / supply from
input to the
availability and reduced estuarine habitat
available for natural systems after
consumption
delivery to estuaries .
diversion
diversions
? What can be expected
on coastal ecosystem
ecosystems like the Atchafalaya Basin
flow
; mismanagement of regulated rivers
impacts , volume and quality
on Gulf of Mexico
flows
and salinity
from
rivers) for coastal
tributaries
into estaury systems
hydrology and flow rates upstream .
in estaury systems
Inflow
- or lack there of
(lack of)
and
estuarine health
pollutants impacts
the health of
use
changes .
for sustaining environmental flows
indicators for estuaries
into the Gulf of
issues
needs to bays and
to
estuaries
Texas bay systems
inflows
and associated nutrient loading
to
bays and estuaries
coastal estuaries and
Texas bays
input
, water temperature , salinity) of
and
associated pollution
Hydology
run - off
in sustained coastal wetlands
prediction on water quality
resulting in pathogens and
to
coastal and marine
our bays
inputs via large rivers
limitations
mixing
nutrient inputs , contaminant inputs , ocean
pollution
from the Mississippi River
inputs , oil spills
quality
re - introduction
.
on LA wetlands .
resources .
runoff
) on coastal estuaries .
, nutrients , and toxins)
shrimp , but also other crustaceans)
sources
supply
to
coastal ecosystems over time
estuaries
use
withdrawl from estuaries as well
in environmental variables (e . g
Some anadromous invertebrates (i . e
.
nutrients , sea level rise
Oil spills , natural hazards , pollution
potential drilling incidence
Submerged aquatic vegetation (seagrasses
Temperature
,
Altered
ecosystems , including nutrient loading
harvesting of fishes , marine
non - point source pollution
and
Nutrients
Anthropogenic development /
bays and estuaries vs . human
bays in the Gulf South .
decreased
enrichment of offshore waters by
excessive
and real - time data
Estuarine needs
for
growth and development could impact
growth rates / nutrient uptake from
alterations
Decrease
human - induced changes
pesticide runoff and pharmaceuticals
reductions
in
level (tide waves storm surge
Nitrogen rich
not know this term . If
Apply understanding
change in inputs
curtailment
Delivery and quality
Impacts
in timing and amount
is the expected result
Loss
quality , quantity , and timing
the protection and stewardship
the role
Understand the impact
Understanding the Effects
of
Impacts
understand the effects
Understanding the impact
of Reduced
climate change effect
of overdevelopment / poor planning
Terrestrial land management impacts
on
Projected
Reduced and contamintade
terrerstrial based pollution (anthropogenic
there are no oil spills :
Amount of nutrients relative
Fisheries production in relstion
to
Understanding the

Section II: Research Priorities by subcategory

Open-ended Research Priorities arranged by subcategory

The bullets below are **unedited responses** to the 2013 GMRP Survey questions that asked people to identify their top three research priorities for the Gulf of Mexico over the next 5-15 years.

Several subcategories were created for the **GOMA Coastal Community Resilience Priority Issue Team**. Several of these were organized around the GOMA PIT focus areas of:

- Climate or sea level-specific
- Management
- Assessment
- Tropical Storm-specific
- Communication

Specific Priorities related to Climate or Sea Level

- Calculate and share financial exposure of the US financial system different sea level rise scenarios.
- changing sea level
- Climate change impacts
- Climate change impacts, vulnerability and risk assessment.
- Coastal human community adaptation to ecosystem change associated with climate change.
- coastal living with climate change/sea level rise
- Coastal subsidence
- Coastal sustainability in respose to RSLR.
- combined effects of sea level rise and coastal land subsidence on coastal infrastructure for shipping and ports
- consistent delineation of a MHW and MLLW shoreline
- Determine the costs and benefits of various climate adaptation strategies.
- Determine the costs of existing and projected climate change impacts to natural, built, and social systems.
- Develop capabilities for routine predictions of total water level (tide+waves+storm surge+freshwater flows from rivers) for coastal communities and critical coastal infrastructure
- Dynamic Sea Level Rise Models
- Effect of sea level rise on ecosystems and coastal hazards, including subterranean estuaries and groundwater.
- Estimate and Model the economic impacts of sea level rise and storm surge on coastal communities, and how to make policy changes to make the coastal community more resilient.
- Evaluate mitigating strategies for dealing with Sea Level Rise and human vulnerability.
- Facing the reality of rise in relative water levels and creating a plan to accomodate it.
- Forecasting impact of rising water level
- Global warming and its effects on the Gulf of Mexico.
- How to adapt to the sea level rise and mitigate the negative impacts on coastal ecosystem and the built environment.
- Impact of climate change (sea level rise, pH changes, etc.) on coastal ecosystems and human environment.
- Impact of climate change on hurricane
- interaction between climate change and natural hazard mitigation

- inundation and sea-level rise modelling
- Man made climate change is a ruse. No more money or resources should used.
- Natural Hazards and climate
- Positive & negative feedbacks of climate change that will adversely affect the Gulf
- Rates and consequences of sea level rise
- Relative Sea-level rise documentation and prediction.
- research the total enthalpy in the Gulf to determine how extremely minute variances in the overall temperature profile can have huge impact on the total energy source and how that can influence Hurricane growth and track
- Response and adaptation to climate change and sea level rise
- Sea level
- Sea level change
- Sea level change
- sea level change
- Sea level change
- Sea level impact
- Sea level rise and its impacts
- Sea level rise effects on coastal human settlements
- Sea level rise predictions and storm surge affect on the predictions
- Sealevel rise and it's implications
- social-ecological systems adaptation to climate change
- Storm Surge models that incorporate sea level rise
- The impacts of sea leve rise, including salt water intrusion, on coastal ecosystem and the built environment.
- Understanding how climate change affects the Gulf of Mexico
- Understanding seawater rise and economic impact
- Understanding the options available to human populations in the geographic distribution of global sea level rise along with options to deal or reduce the impacts.
- Understanding the relationship between sea level rise and subsidence - with an emphasis on understanding the geographic variation in subsidence - particularly in coastal Louisiana.
- Understanding the sea level rise in the Gulf of Mexico
- use models and technology to understand impacts of climate change and sea level rise on coastal communities
- What will be the impact of sea level rise, in specific 10-30 year time increments, on GOM barrier islands?

Management

- applying smart growth principles to coastal development and planning
- Coastal human community adaptation to human alterations of coastal systems.
- Community response to changing environment
- creating resilient communities along the coast.
- Design and construction of sustainable infrastructure in the Gulf
- Developing management tools that facilitate coastal resilience to climate change
- Development of methods to mitigate the effect of increases in water level in the Gulf
- Equitable reimbursement of property that is prone to damage or damaged by coastal storms
- Estimate and Model the economic impacts of sea level rise and storm surge on coastal communities, and how to make policy changes to make the coastal community more resilient.

- Facing the reality of rise in relative water levels and creating a plan to accomodate it.
- How to adapt to the sea level rise and mitigate the negative impacts on coastal ecosystem and the built environment.
- How to relocate people, homes and business' that are or have been damaged by coastal storms
- Improve the models for the prediction of hurricane landfall and intensity and surge. - the European models outperform ours by a considerable degree.
- interaction between climate change and natural hazard mitigation
- Know HOW to: Recover losses caused by human error and natural disasters. Know how to be prepared when Natural disasters happen. Know how the environment can benefit from these changes in the environment and animal habitat
- Multimodal transportation capacity and coordination during and after an evacuation.
- Natural and Man Made Disaster Recovery - Resilient Best Practices
- Perceptions of risk; land and water use issues
- Physical Adaptation to Catastrophic Flooding Events
- Protection against inappropriate development
- Relocation strategies
- Research to support the conversion to and development of resilient human habitation in the coastal region.
- Restrict future development that will cause ecological destruction or would be hazardous to health.
- Set aside natural areas that are prone to coastal storms so that they cannot be developed
- Strategies for relocating development away from insinuation and vulnerable areas.
- The development of tools which enable citizens and local officials to quantify and visualize development alternatives along the Gulf Coast
- understand needs of particular local communities in regard to sea level rise adaptation
- Understanding the options available to human populations in the geographic distribution of global sea level rise along with options to deal or reduce the impacts.
- Use of natural environments for storm protection

Assessment

- Assess the predictability of both benefits and hazards (for humans) associated with the Gulf of Mexico.
- Changes along the coastline
- Changes in patterns of coastal resource consumption over time in relation to hazard events and human reliance on Gulf Coast ecosystems
- characterizing factors influencing individual and community resilience
- Determine the costs and benefits of various climate adaptation strategies.
- Determine the costs of existing and projected climate change impacts to natural, built, and social systems.
- Discern "vulnerable communities" along the GoM coast relative to risk assessment for hazard exposure.
- Establish current and historical baselines in order to properly place events and changes in the GoM into a historical context. This is the proper way in which to assess hazards, impacts and changes.
- Evaluate vulnerability of coastal communities given changes on the GM
- Factors affecting the ability of Gulf Coast citizens to mitigate their risk of harm from hurricanes; particularly persons of lower SES.
- Factors affecting the ability of small business owners in the Gulf Coast region to mitigate the risk of harm to their businesses from hurricanes.
- factors driving community and individual resilience
- hazard impacts on human populations

- how disasters affect vulnerable populations (low income, people of color, etc.)
- impact of property insurance on ownership and new construction
- Quantify the variation in human resilience based on manmade (oil spill) vs. natural (hurricane, floods) disaster events
- research the total enthalpy in the Gulf to determine how extremely minute variances in the overall temperature profile can have huge impact on the total energy source and how that can influence Hurricane growth and track
- Risk analysis of multiple hazards in the gulf
- Sea level rise effects on coastal human settlements
- Sea level rise predictions and storm surge affect on the predictions
- Social Science research is badly needed, particularly on land use change.
- study the effect of past and current coastal development on the cost of insurance, the cost of maintenance of infrastructure. determine how much of our problem has been self-inflicted because local governments refuse to responsibly manage construction on eroding shorelines
- Support regional vulnerability assessments that include multiple factors that cause significant environmental change (not only SLR) to the coastal and estuarine environments, e.g. navigation infrastructure, human population infrastructure, water management (quality and quantity), sediment management, and agriculture.
- Understand individual and community resilience in response to natural and human initiated disaster
- Understanding the effects of global change on human infrastructure and priorities - particularly improving the science of global change to reduce variability in outcomes.
- use models and technology to understand impacts of climate change and sea level rise on coastal communities

Specific Priorities related to Tropical storms

- coastal hazards associated with tropical storms
- Factors affecting the ability of Gulf Coast citizens to mitigate their risk of harm from hurricanes; particularly persons of lower SES.
- Factors affecting the ability of small business owners in the Gulf Coast region to mitigate the risk of harm to their businesses from hurricanes.
- Frequency and intensity of tropical storms and hurricanes
- Hurricane impacts
- Hurricane impacts on the upper oceas and coastal ocean
- Hurricane intensity predictions
- Hurricane landfall.
- Improve the models for the prediction of hurricane landfall and intensity and surge. - the European models outperform ours by a considerable degree.
- Improved intensity forecasting for hurricanes and tropical storms - impact coastal communities as well as the oil/gas industry and shipping
- Ocean role in tropical cyclones/hurricanes
- research the total enthalpy in the Gulf to determine how extremely minute variances in the overall temperature profile can have huge impact on the total energy source and how that can influence Hurricane growth and track
- Sea level rise predictions and storm surge affect on the predictions
- Use geologic data to extend records of hypoxia, hurricanes and other coastal hazards beyond the historical period. How else can we know if what we face is exceptional or a phase in climate cycling.

Communications

- Coastal community perceptions about risks, and increasing risk literacy
- Define resiliency and economic services in a manner that those individuals/culture groups affected by these "terms" can clearly understand their meanings, since they are the once being affected by these decision "tools."
- Impact of community engagement on that community's resilience to hazard events on the Gulf
- The relationships/interactions between local communities and the Gulf Coast and the impact these relationships have on hazard mitigation

Other research priorities related to Resilience

- Ability of coastal systems to moderate storm damage.
- Capacity building - community resiliency studies in the aftermath of oil spills.
- Coast line recession.
- coastal community resilience
- Coastal erosion
- coastal erosion
- coastal land change
- Coastal monitoring of weather parameters.
- Community and social capital in face of environmental change (land loss, sea level rise, etc.)
- community resiliency
- Defining resilience for Gulf Coast communities
- development of engineering ressources for risk management and mitigation of disasters
- disaster preparedness
- disaster recovery
- Effective "no-regret" policies for localities to prepare for potential impacts of climate change
- geohazards
- Hurricane landfall.
- Improve the models for the prediction of hurricane landfall and intensity and surge. - the European models outperform ours by a considerable degree.
- Improve wind field forecasts that are needed to improve accuracy of weather forecasts
- Improving accuracy of forward storm paths in Gulf of Mexico
- Improving big impact weather forecasting science
- Improving severe weather warning science (phenomena, how they form and evolve)
- Increasing Resilience to National Hazards
- land erosion
- Local weather events such as sea breezes, convective initiation, extreme temperature prediction.
- Mississippi River diversion and coastal resilience
- non-structural flood mitigation
- Promote advanced modeling of components of individual and community resilience in disaster events
- Resilience
- Resilience to manmade disasters (e.g. oil spills)
- resilient coastal communities
- Salt water encroachment into aquifers
- short term predictability of extreme event
- Social vulnerability and resiliency

- Understand human-use patterns and the impacts of resource instability (decline, unsustainable use, etc) on human communities (social, economic, and cultural aspects)
- urbanization impacts on coastal resources
- Water shed effects to coastal communities

Appendix—Demographic Statistics from the 2013 Gulf of Mexico Research Plan Survey

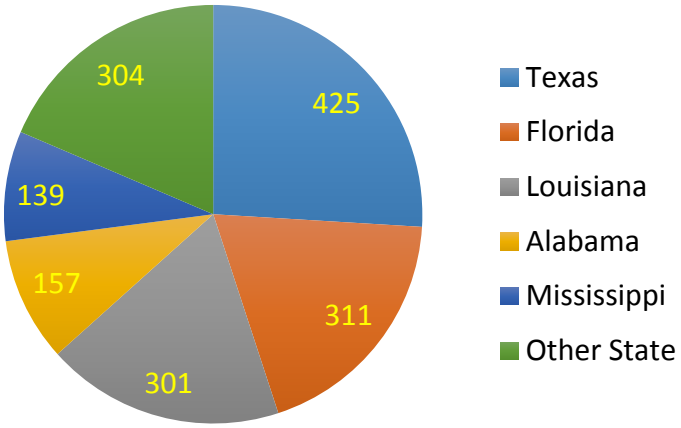


Figure 1. Number of respondents to the 2013 GMRP survey by state (N=1,637).

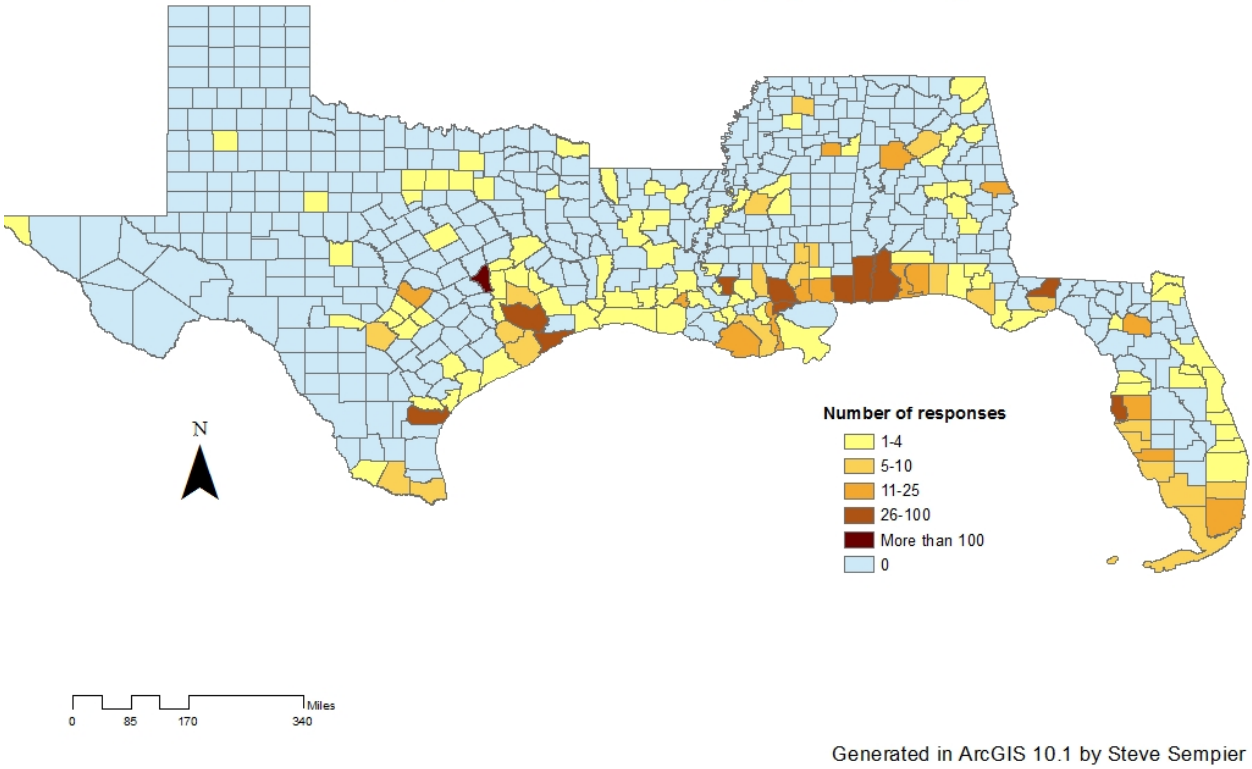


Figure 2. Number of responses to the 2013 GMRP survey by county for U.S. Gulf of Mexico states (N=1,315).

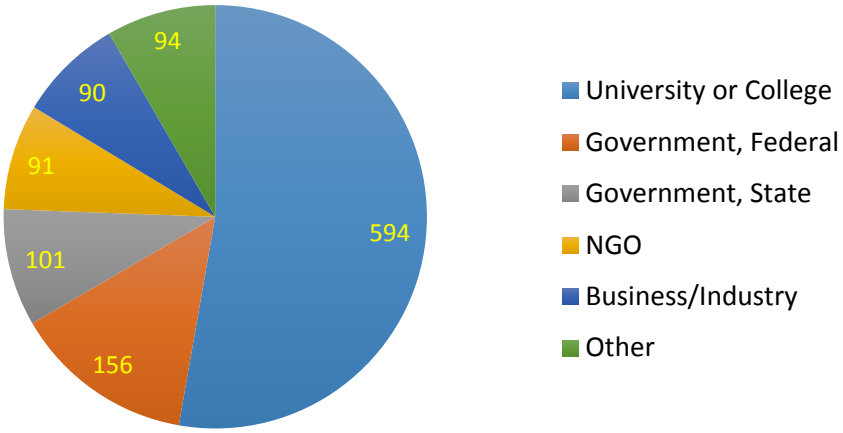


Figure 3. Number of 2013 GMRP survey respondents by affiliation (N=1,126).

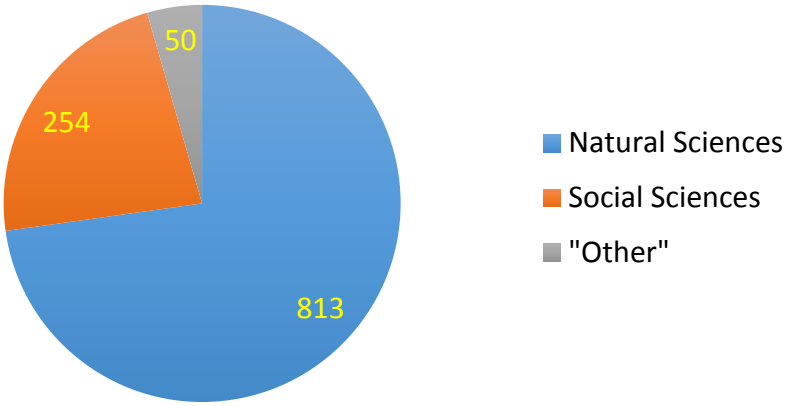


Figure 4. Number of 2013 GMRP survey respondents by area of expertise aggregated into “natural sciences,” “social sciences” and “other” (N=1,117).

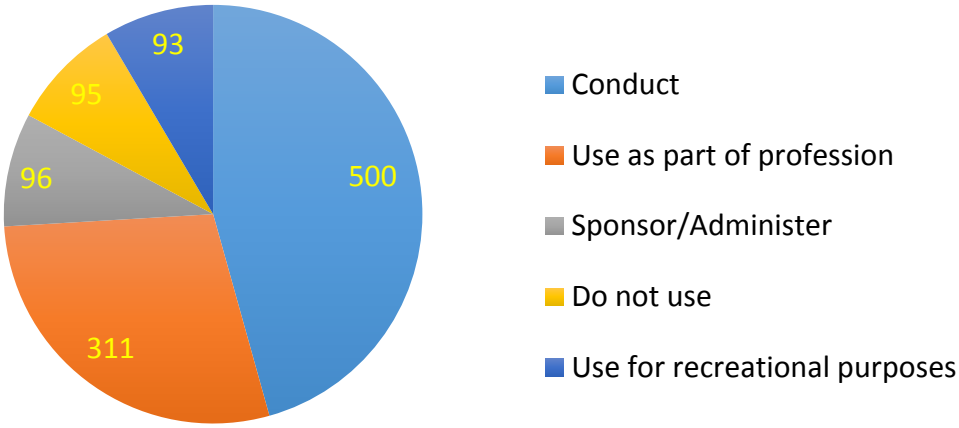


Figure 5. Number of 2013 GMRP survey respondents categorized by their primary relationship to Gulf of Mexico research (N=1,095).

Appendix—2013 GMRP Survey Demographic Statistics

Table 1. Number of research priorities identified in open-ended responses to the 2013 GMRP survey that related to GOMA PITs and subcategories. Note that the same research priority may have linked to multiple PITs and/or subcategories.

Priority Issue Team and Subcategories	Number of Research Priority References
Ecosystem Integration and Assessment	**55**
Ecosystem health	19
Ecosystem service valuation	15
Ecosystem connectivity	9
Ecosystem change over time	4
"Other" EIA	9
Education	**25**
Habitat Conservation and Restoration	**233**
Monitoring changes in habitat	68
Ecosystem services	32
Technological development	19
Regional sediment plan	17
Policy change	14
Expand partnerships	4
"Other" Habitat Conservation and Restoration	102
Nutrients	**48**
Hypoxia	13
Nutrient reduction	13
Nutrient characterization and criteria	11
"Other" Nutrients	12
Resilience	**144**
Climate or sea level-specific	52
Management	29
Assessment	26
Tropical Storm-specific	14
Communication	4
"Other" Resilience	37
Water Quality	**88**
Monitoring	13
Pathogens	5
Mercury	4
Harmful Algal Blooms	1
"Other" Water Quality	67
Other Topics	**583**

Appendix—2013 GMRP Survey Demographic Statistics