**COMMENTS AND RECOMMENDATIONS**
**ON THE**
**NOAA RESTORE ACT SCIENCE PROGRAM**
**DRAFT SCIENCE PLAN**


Report submitted by:


**Gulf Coast Ecosystem Restoration Science Program**
**Advisory Working Group**


Report submitted to:


**Science Advisory Board**
**National Oceanic and Atmospheric Administration**


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**Introduction and Charge to Work Group**

The Gulf Coast Ecosystem Restoration Science Program Advisory Working Group (RSPAWG, or Working Group for brevity) is one of six Working Groups charged with advising the NOAA Science Advisory Board (SAB). The RSPAWG Terms of Reference (http://www.sab.noaa.gov/Working_Groups/standing/docs/2013/RSPAWGTermsOfReference_Final_SABapprovedJul2013.pdf) state that "the RSPAWG will function to provide informed regional advice to the NOAA RESTORE Act Science Program on Gulf of Mexico RESTORE-related ecosystem science and monitoring.  It shall also formally coordinate between the multiple organizations conducting RESTORE-related science as prescribed by the RESTORE Act."

The first formal charge to the Working Group was to review the first draft of the NOAA RESTORE Act Science Program's Science Plan (Science Plan for brevity) and to submit initial review comments and recommendations to the NOAA SAB.  In its first in-person meeting at the University of Southern Mississippi Gulf Coast Campus (USM-GCC), in Long Beach, MS, 18-20 June 2014, the RSPAWG reviewed the Science Plan as drafted by NOAA.  To evaluate the four Focus Areas the Working Group divided itself into smaller Focus Area Teams.  The task of each Focus Area Team was to review all comments and recommendations from the in-person meeting. A two to three member writing team for each Focus Area team compiled all comments and recommendations and submitted a draft Focus Area report to a three-member Overview Team. The Overview Team in conjunction with the Working Group Co-chairs drafted an initial version of this report and vetted the findings and initial recommendations with the Working Group.  This report represents a summary of the comments and recommendations to the NOAA Science Board that were developed by these Focus Area Teams and reviewed by the entire Working Group membership.

**Overarching Comments and Recommendations**

The overarching comment of our Working Group is that the draft NOAA Restore Act Science Plan was too focused or specific in some areas (e.g. Marine Protected Areas and turtle excluder devices).  We feel that the specificity was extracted from the number of existing management and research needs documents previously drafted by federal, state and NGO organizations and reviewed in the development of the Science Plan. The Science Plan should address the higher-level science needs for the entire Gulf of Mexico (GoM) region including waters of the GoM, watersheds impacting the GoM, and interconnected processes within the GOM and adjacent waterbodies and uplands (e.g. the Florida Loop Current).

There was also concern expressed that the Science Plan did not adequately address the role of science in informing management decisions. The Working Group recommends that the focus of the Science Plan be on the identification and articulation of the science needs in support of supporting and informing improved decision making in each of the four Focus Areas.

The prioritization of Long-term Science Priorities is the responsibility of NOAA and represents a challenge that must consider the current status of the science, the need for the science to support management decisions, and the availability of funds. The development of a Science Plan that proposes science activities beyond the scope of realistic funding levels serves no value in the context of the RESTORE Act Science Program. In addition to funding levels, a crosswalk between RESTORE Act elements 1603, 1604 and 1605 is critical, because there are many programs involved in Gulf of Mexico research and recovery. A crosswalk would help identify gaps and reduce redundancies that could help prioritize research.

Other concerns voiced at our meeting last month related to redundancy and cross-over of Focus Area priorities and logical sequencing of Focal Areas and Long-term Science Priorities. Accordingly, in the next section of this report, the Focus Area Teams identify the specifics and corrective recommendations within each assigned Focus Area pertinent to these overarching themes. The Focus Area group teams also aimed to identify areas where there is cross-over of priorities between Focus Areas.

While the recommended revised listing of Focus Areas and associated Science Priorities (next section of this report and summarized in Appendix C) represents a logical and linear progression of activities (Figure 1), it is not to be construed as a prioritization of either Focus Areas or Science Priorities. Our Working Group did not prioritize Focus Areas or associated Science Priorities, as this is a responsibility of NOAA. We do recognize this that this is a circular process where entry into the circle is dependent upon where the science is to be performed and what science is to be performed (Figure 2).
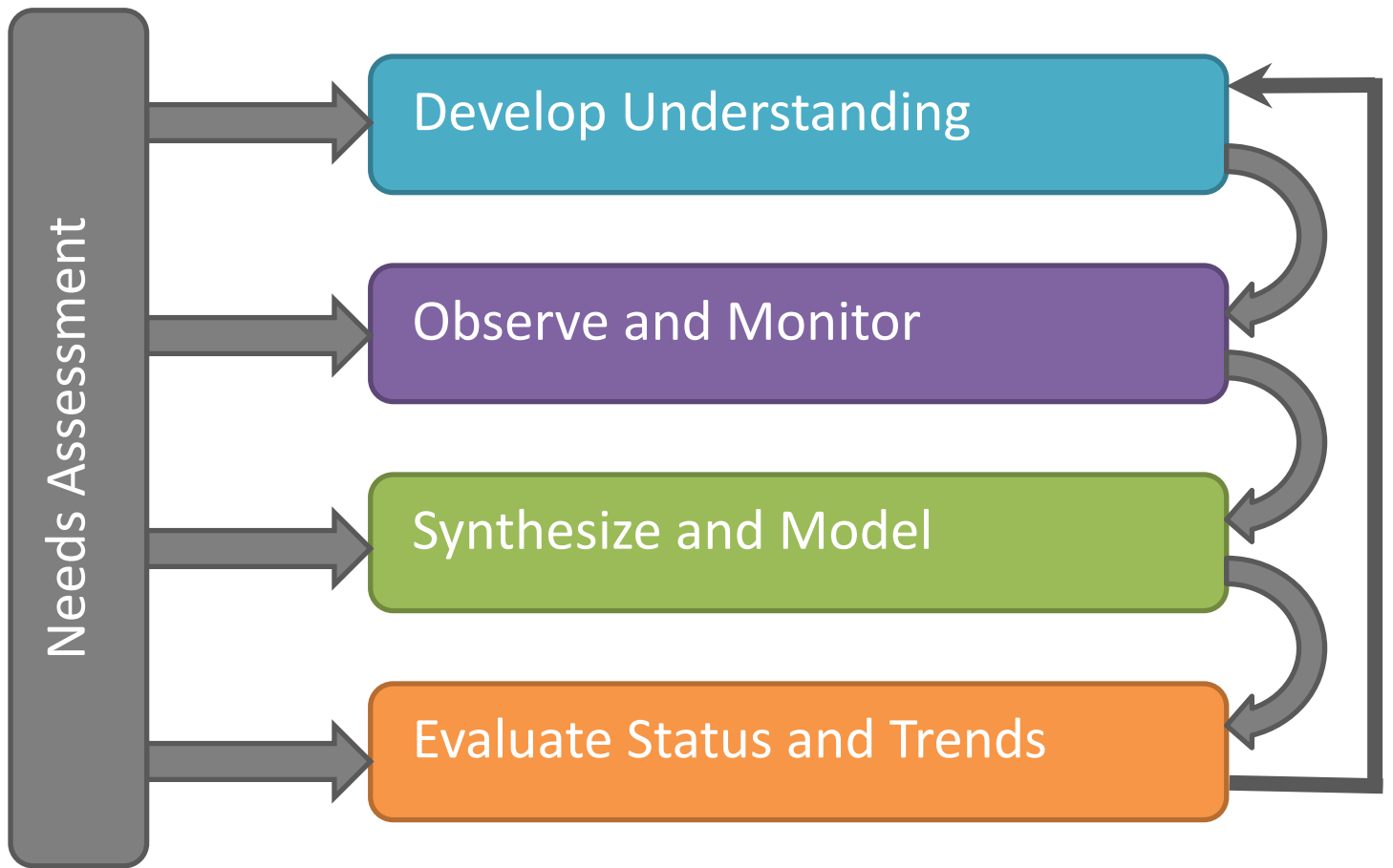
Figure 1. Logical and linear progression of Focus Areas and associated Long-term Science Priorities (Graphic courtesy of A. Hermes).
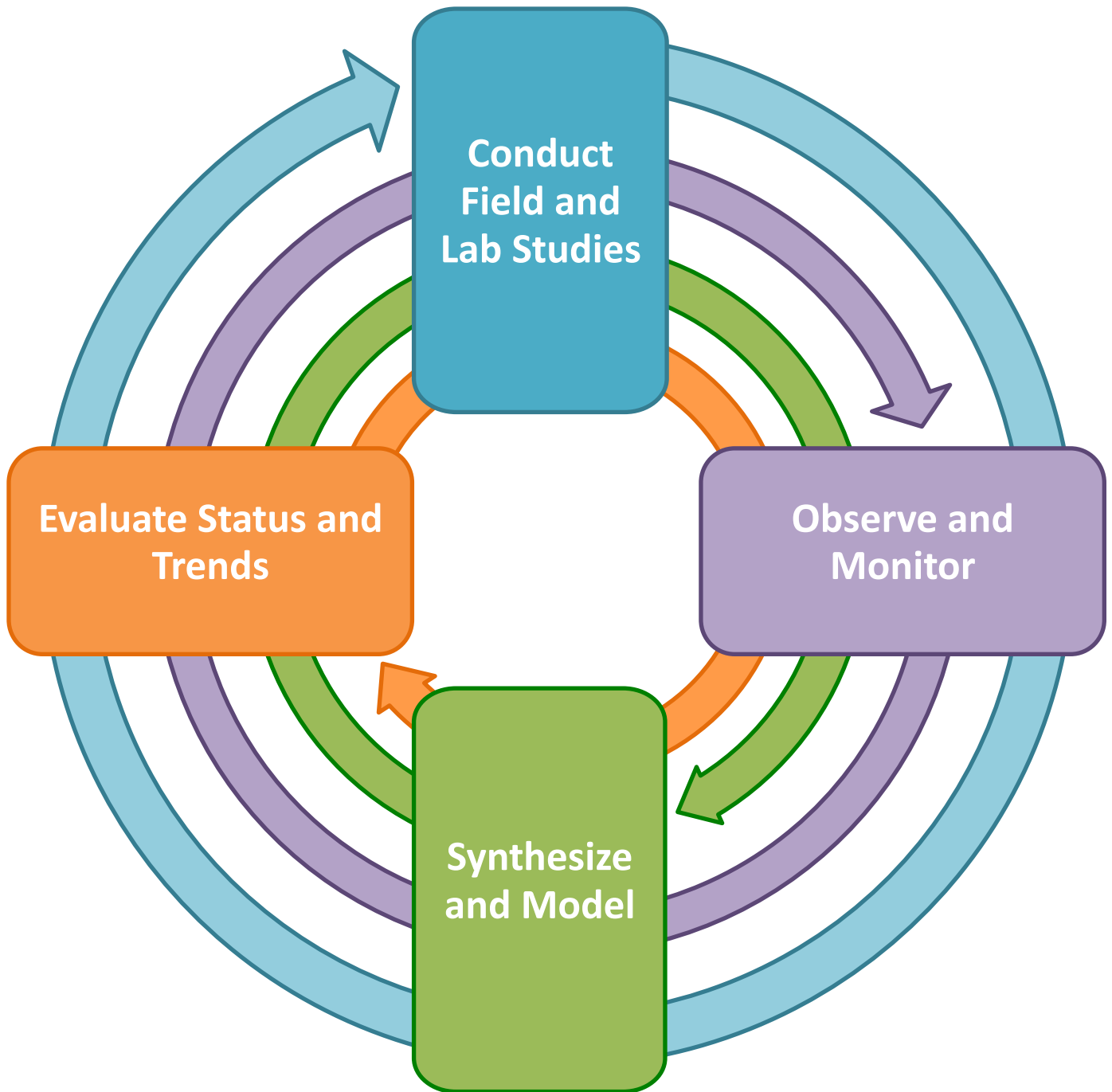
Figure 2. Circular representation of hypothesis-driven science where entry is dependent upon "what" and "where" (Graphic courtesy of A. Hermes).

**General Recommendations and Suggested Revisions**

Utilizing the structure of group discussion, smaller Focus Area Team review and comment, and an integrated Overview Team approach, the Work Group recommends a modification to the Focus Areas

and associated Long-term Science Priorities as presented in the draft Science Plan. To assist the NOAA SAB and Science Plan authors in the review of our recommendations, under separate cover we are providing an annotated Word copy of the draft Science Plan (referred to as the Annotated Draft Science Plan) containing suggested edits and comments. This annotated document reflects the collective effort of the Working Group to support the advancement of the Science Plan.

To assist the Working Group in linking Focus Areas and Long-term Science Priorities, a cross-walk was created to link the Focus Area and associated Science Priorities as presented in the original draft Science plan (Appendix A). Appendix B represents the recommended restructuring of the Long-term Science Plan. Appendix C represents the Work Groups recommended focus and structure of the Focus Areas and associated Long-term Science Priorities. For each of the four Focus Areas, the general thought process used by the Work Group is summarized below. For specific comments and suggested edits, refer to the Annotated Draft Science Plan.

*Focus Area 1: [title edited] Ecosystem structure, function, and connectivity through integrated field and laboratory studies.*

The Working Group recommends editing the Focus Area 1 theme (shown above) and reorganizing the content of Focus Area 1 by moving Priority 1.1 to Focus Area 3 for modeling and synthesis; move Priority 1.4 up to Priority 1.1 to be consistent with the Focus Area 1 theme; move priority 1.3 to position 1.2 and re-title "Increase comprehensive understanding of watershed, sediment, and nutrient impacts on coastal ecology and habitats"; move priority 1.2 down to position 1.3, but consider also moving this modeling priority to Focus Area 3 for modeling and synthesis (Figure 3). This reorganization will place data acquisition ahead of modeling to better inform model development (the topics of Priorities 1.1 and 1.2) in Focus Area 3. Therefore, a better order for the Priorities under Focus Area 1 would be 1.4, 1.3 and 1.2. Specific edits, including revised wording for the Priorities are included later in this report.

| Original | Recommended |
|----------|-------------------------|
| 1.1 | 3.2 with new title |
| 1.2 | 3.1 |
| 1.3 | 1.2 with modified title |
| 1.4 | 1.1 with modified title |

Figure 3. Crosswalk of original and proposed changes to structure of Focus Area 1 science priorities.

*Focus Area 2: [title edited] Comprehensive monitoring and observation of marine resources.*

The Working Group suggests that the Focus Area 2 title be edited to "Comprehensive monitoring and observation of marine resources." The Working Group recommends that Priority 2.1 be retitled "Develop and implement advanced physical, chemical and biological technologies to improve monitoring and observations" to be inclusive of physicochemical and biological monitoring needs; further, the working group suggests that Priority 2.2 be retitled "Network and integrate newly created and existing Gulf monitoring projects, systems and programs" to broaden the scope well beyond fisheries dependent and independent data acquisition as emphasized in the draft Science Plan.

The activities listed in the original Focus Area 2 support the proposed broadened focus area, however, a balanced emphasis on physical and biological parameters monitoring should be sought, and some of the activities will need to be moved under different priorities.

*Focus Area 3: [title edited] Interdependency of human socioeconomics and coastal ocean ecosystems.*

The Working Group recommends that Focus Area 3 as drafted be removed from the draft Science Plan. Developing processes for data management and sharing is an overarching management need for the program. The Science Plan should outline the research that is needed to inform management rather than outlining the management activities themselves. The Working Group acknowledges that removing a Focus Area may not be a possibility and so specific edits have been suggested to clarify and strengthen the supporting text for Focus Area 3.  Specifically, Priority 3.1 is a management activity and not a science need, and thus is not appropriate for the Science Plan. The text could be retained to describe data management needs that span the other Focus Areas. Priority 3.2 could be incorporated into Focus Area 4 as a new priority.

The original Focus Area title is not indicative of the Working Group recommended revised area of focus, and the Working Group recommends that it be revised as listed above.

*Focus Area 4: [title edited] Status and trends of socioeconomic and environmental health, sustainability and resiliency.*

The Focus Area title is not indicative of the area's focus, and the Working Group suggests that it be revised as listed above.  Similar to suggestions for Focus Area 3, the Working Group would like to reiterate that this plan should be soundly based in science needs to inform management. Therefore, we suggest revising the title of Priority 4.1 to eliminate the mixing of science and management needs. We have made a suggestion for revising the title of Priority 4.2 to ensure that it follows naturally from the efforts and products of Priority 4.1.

**Appendix A: Numbering Crosswalk of Draft Long-term Science Priorities**

In an effort to link the original 10 Long-term Science Priorities (Draft) with the Focus Areas as associated in the Draft Science Plan, the numbering crosswalk was developed and outlined below. As an example, Science Priority 3 (Quantify sediment…) is listed in the Draft Science Plan as the third priority under Focus Area 1; hence it is referred to in this document as Priority 1.3

Priority 1 - Forecasting, analysis and modeling of climate change and weather effects on the sustainability and resiliency of Gulf ecosystems. *(Priority 1.1)*

Priority 2 - Construct accurate, actionable and accessible ecosystem models for the Gulf of Mexico. *(Priority 1.2)*

Priority 3 - Quantify sediment, nutrients, and water flow as they relate to the connection and function of coastal habitats and understand the relationship between these flows. *(Priority 1.3)*

Priority 4 - Provide a more comprehensive understanding of life histories of living marine resources, food web dynamics, and habitat utilization (e.g., connecting habitats, ontogeny, and food webs) as guidance for living marine resources management. *(Priority 1.4)*

Priority 5 - Coordinate and integrate existing Gulf monitoring to develop a network of LMR monitoring systems including fisheries dependent and independent data collection. *(Priority 2.2)*

Priority 6 - Develop a better understanding of ecosystem services and other determinants of resilience for coupled social and ecological systems. *(Priority 4.1)*

Priority 7 - Collect information and develop decision support tools needed to implement, monitor and adaptively manage habitat including coastal and marine protected areas. *(Priority 3.2)*

Priority 8 - Develop and implement advanced engineering, tagging and biological technologies to improve monitoring. *(Priority 2.1)*

Priority 9 - Create an integrative, unified, and easily accessible data framework that tabulates, synthesizes and provides opportunity for analysis of new and existing social and environmental data in order to develop long-term trend information. *(Priority 3.1)*

Priority 10 - Identify or develop state of health indicators for the Gulf of Mexico ecosystem, including the socio-economic component. *(Priority 4.2)*

**Appendix B: Draft and Recommended Revised Long-term Science Priorities**

As outlined in Appendix A, the italicized priority numbers and priorities are as referenced in the in annotated Draft Science Plan. The priorities that are indented and bold-faced are the recommended revised Long-term Science Priorities. Note, this is not a prioritized list of priorities, but rather a listing of priorities.

*Priority 1.1: Forecasting, analysis and modeling of climate change and weather effects on the sustainability and resiliency of Gulf ecosystems.*

> To be merged with

*Priority 1.2: Construct accurate, actionable and accessible ecosystem models for the Gulf of Mexico.*

> **Priority 3.2: Model weather and climate change effects on health, sustainability and resiliency of Gulf ecosystems.**

*Priority 1.3: Quantify sediment, nutrients, and water flow as they relate to the connection and function of coastal habitats and understand the relationship between these flows.*

> **Priority 1.2: Increase comprehensive understanding of watershed, sediment, and nutrient impacts on coastal ecology and habitats.**

*Priority 1.4: Provide a more comprehensive understanding of life histories of living marine resources, food web dynamics, and habitat utilization (e.g., connecting habitats, ontogeny, and food webs) as guidance for living marine resources management.*

> **Priority 1.1: Increase comprehensive understanding of living marine resource life histories, food web dynamics, and habitat utilization.**

*Priority 2.1: Develop and implement advanced engineering, tagging and biological technologies to improve monitoring.*

> **Priority 2.1: Develop and implement advanced physical, chemical and biological technologies to improve monitoring.**

*Priority 2.2: Coordinate and integrate existing Gulf monitoring to develop a network of LMR monitoring systems including fisheries dependent and independent data collection.*

> **Priority 2.2: Network and integrate newly created and existing Gulf monitoring projects, programs and systems.**

*Priority 3.1: Create an integrative, unified, and easily accessible data framework that tabulates, synthesizes and provides opportunity for analysis of new and existing social and environmental data in order to develop long-term trend information.*

> **Priority 3.1: Create accessible data framework for social and environmental data query, analysis and synthesis.**

*Priority 3.2: Collect information and develop decision support tools needed to implement, monitor and adaptively manage habitat including coastal and marine protected areas.*

> **Priority 4.3: Map and monitor demographic, socioeconomic and environmental health status and trends to inform management practices.**

*Priority 4.1: Develop a better understanding of ecosystem services and other determinants of resilience for coupled social and ecological systems.*

> **Priority 4.1: Increase comprehensive understanding of Gulf ecosystem services and vulnerabilities.**

*Priority 4.2: Identify or develop state of health indicators for the Gulf of Mexico ecosystem, including the socio-economic component.*

> **Priority 4.2: Validate system-wide indicators of Gulf coast environmental and socioeconomic conditions.**

**Appendix C: Recommended Focus Area and Priority Outline**

Focus Area 1: Ecosystem structure, function and connectivity through integrated field and laboratory studies.

Priority 1.1 - Increase comprehensive understanding of living marine resource life histories, food web dynamics, and habitat utilization.

Priority 1.2 - Increase comprehensive understanding of watershed, sediment, and nutrient impacts on coastal ecology and habitats.

Focus Area 2: Comprehensive monitoring and observation of marine resources.

Priority 2.1 - Develop and implement advanced physical, chemical and biological technologies to improve monitoring and observations.

Priority 2.2 - Network and integrate newly created and existing Gulf monitoring projects, programs and systems.

Focus Area 3: Interdependency of human socioeconomics and coastal ocean ecosystems.

Priority 3.1 - Create accessible data framework for social and environmental data query, analysis and synthesis.

Priority 3.2 - Model weather and climate change effects on health, sustainability and resiliency of Gulf ecosystems.

Focus Area 4: Status and trends of socioeconomic and environmental health, sustainability and resiliency.

Priority 4.1 - Increase comprehensive understanding of Gulf ecosystem services and vulnerabilities.

Priority 4.2 - Validate system-wide indicators of Gulf coast environmental and socioeconomic conditions.

Priority 4.3 - Map and monitor demographic, socioeconomic and environmental health status and trends to inform management practices.