

## **Ecosystem Integration and Assessment Governors' Action Plan II**

### ***Current and Future Challenges***

Coastal and marine planners and managers in the Gulf of Mexico (GOM) States are faced with a complex environment in which to make difficult decisions regarding protection, restoration, enhancement and management of the various coastal and marine resources within the region. As the ninth largest body of water in the world, the GOM accounts for one-third of the coterminous U.S. coastline and drains 41% of the continental U.S. (Turner 2003). The productive value of the commercial fishing, tourism, oil and gas and shipping industries in the GOM totaled more than \$120 billion in 2003 (Colgan 2006). Commercial and recreational fisheries within the GOM are known to be some of the most productive in the world (GulfBase). In 2006, about 3.6 million GOM residents participated in marine recreational fishing, and the commercial domestic landings weighed in at 1,285,691 pounds valued at \$662,938 (NMFS 2007). Tourism and recreation comprises 70 % of employment in the ocean economy in the GOM region (Colgan 2006), and tourism growth exceeds the national average. From 1990 to 2003 the GOM experienced a 50 % increase in tourism jobs compared to a 30 % increase in ocean-related tourism jobs nationwide (Colgan 2006). Oil and gas production in the region accounts for about 25 % of total production for the country (Iledare and Olatubi 2006).

Natural disasters such as the 2005 hurricanes Katrina and Rita undoubtedly cause significant, measurable economic losses in the infrastructure that supports coastal communities. However, economic losses from the physical or functional loss of natural resources are more difficult to assess but are probably significant as well. The ability to evaluate loss and quality of these vital natural resources is critical for sustainable management. In the *Governors' Action Plan for Healthy and Resilient Coasts*, released in 2006, the focus was centered on *habitats*. The Plan identified the need for "Identification and Characterization of Gulf Aquatic Habitats" as one of five priority theme areas requiring action. Once established, the priority issue team (PIT) for Identification and Characterization of Gulf Aquatic Habitats (also known as the Habitat ID PIT) identified the need to "provide comprehensive access to uniform, quality-assured coastal habitat observations in the Gulf region." But the Alliance partners recognized that the need for data and assessment capabilities goes beyond just habitat. Effective resource management requires managers to have a comprehensive knowledge of *ecosystem* health throughout the Gulf of Mexico.

### ***Accomplishments under the Governors' Action Plan for Healthy and Resilient Coasts***

The overall goal for the Habitat ID PIT in Phase I of the Governors' Acton Plan was to identify, inventory and assess the current state of and trends in priority coastal, estuarine, nearshore and offshore Gulf of Mexico habitats to better inform resource management decisions. The 36- Month Outcome was to produce a prototype Web portal to provide public access to and delivery of current and historic local, state and federal Gulf of Mexico habitat data. This goal was successfully reached with the launch of the Priority

Habitat Information System (PHINS). The team identified several Action Items to support this goal. The status and accomplishments of those activities are as follows:

**ID-1:A1** – *Coordinate state and federal collection of information and complete an existing inventory of habitat data and supporting gap analysis.* Numerous activities were undertaken to address this action item. A data inventory was initiated to identify various sources of biological, geological, and physical and chemical data within the Gulf of Mexico. The inventory is on the Alliance Website or available upon request. A coordination meeting was held to improve understanding of individual database development efforts and to identify leveraging opportunities among the various efforts. The PIT focused on: (1) the Priority Habitat Information System (PHINS), (2) the Gulf of Mexico Regional Collaborative (GoMRC) and (3) the Florida Geospatial Assessment of Marine Ecosystems (GAME), which is a geospatial data discovery effort. Both GoMRC and GAME were ongoing projects when implementation of the Action Plan was initiated. The PHINS was the result of Action Plan implementation (see below for more details). The EPA’s Gulf of Mexico Program Office (GMPO) funded Florida Fish and Wildlife Research Institute to expand the Florida GAME project to all U.S. portions of the Gulf of Mexico. Over 1000 Gulf-coast data records from Florida GAME have been identified and uploaded into PHINS. Currently, the GAME database has over 1800 records, most of which are from Florida’s west and southern coast but including Gulf States as well. All information collected for the GAME project is geospatial in nature but may not be GIS ready. This data discovery and collection will continue into Phase II. The GOMRC utilizes data discovered by GAME and PHINS to implement decision support tools for natural resources planning and management. The GMPO also funded NatureServe to continue developing and to implement the Coastal and Marine Ecological Classification Standard (CMECS) in the Gulf of Mexico. Additional data acquisition and compilation efforts included: (1) mapping of oyster reefs, geology and bathymetry in Apalachicola Bay (Apalachicola National Estuarine Research Reserve [NERR], USGS and NOAA), (2) development and launching of the NOAA Digital Coast Legislative Atlas, and (3) mapping seagrass beds in Texas.

**ID-1:A2** – *Establish the Federal Data Management Group (FDMG), a team to work with state, local, and federal entities to identify specific requirements for a regional data management platform and portal.* A Federal Data Management Group was established immediately upon implementation of the Action Plan. NOAA, along with USGS and USACE serve as co-chairs for this group and provide staff assistance to the group's activities. Requirements for a regional data management system were evaluated and a pilot system linking NOAA/USGS/USACE data was established (see PHINS below). As co-facilitator for the Habitat ID PIT, EPA assisted with identifying requirements for the platform and provided resources and facilitation support for State meetings to identify data needs. The Habitat ID PIT met with all five Gulf States for an initial briefing of PHINS and to gain the States input into further development of PHINS. States provided suggestions on how to improve PHINS accessibility and to improve the usefulness of the system to the States and their data and resource management staff.

**ID-1:A3** – *Establish standard metadata format to streamline metadata development.* All habitat information uploaded into PHINS must be compliant with Federal Geographic Data Committee (FGDC) Metadata standard requirements. A metadata tool, Metadata Enterprise Resource Management Aid ([MERMAid](#)), developed by NOAA’s National

Coastal Data Development Center was made available to PHINS users to develop, validate, manage and publish metadata records to the Digital Library.

**ID-1:A4** – *Establish a data management platform and portal that will provide access and delivery of existing local, state, and federal data.* The Priority Habitat Information System was completed and released for public review. PHINS was developed to provide users with habitat information and foundation geospatial data. Housed at the USGS, National Wetlands Research Center, PHINS consists of two main components: the [Digital Library](#) and the [Map Viewer](#). The Digital Library is a Web-based data access and delivery system for metadata, reports, imagery, posters, presentations, and synthesis products related to the Gulf of Mexico Alliance. The [Map Viewer](#) allows users to generate online maps from data stored at participating agencies. Improvements, such as better search options and organization of results, are routinely made to PHINS based on user feedback and will continue into Phase II. CMECS is providing the ontology standard for PHINS. A proposal has been submitted to the FGDC to have CMECS adopted as the National standard for Coastal and Marine habitats. During Phase II, NOAA's National Coastal Data Development Center (NCDDC) will work with the PHINS technical team to link PHINS into their Regional Ecosystem Data Management portal.

**ID-1:A5** – *Coordinate regional data management training, software and hardware acquisition to Gulf state agencies.* Data management training is coordinated among the Federal agencies providing such training and appropriate State entities such as the Estuary Programs and the NERRS.

**ID-1:A6** – *Initiate GIS and metadata training to the state and local Gulf States resource managers.* Personnel from the NOAA Coastal Services Center (CSC) traveled to Apalachicola, Florida, to deliver geographic information systems (GIS) and data documentation training to staff members from Franklin County and the Apalachicola NERR. A CSC-funded grant enabled the Reserve to develop GIS capability and purchase hardware and software. Once the grant concludes, the NERR will turn over the software to Franklin County, which will use it to track permitting activities, thereby supporting natural resource management efforts. CSC staff also traveled to Corpus Christi, Texas, to provide geographic information systems (GIS) training. NOAA NCDDC staff provides metadata training upon request. This is an on-going, long-term activity.

**IDA-1:A7** – *Evaluate the types of technologies and procedures needed to map Gulf of Mexico seafloor habitats and establish a baseline information and mapping system.* The State of Florida, the Southeastern Regional Partnership for Planning and Sustainability (SERPPAS) and USGS hosted a mapping technology workshop in St. Petersburg with the goal to make decisions on priorities for mapping around Florida. NOAA, Gulf Coast Services Center and CSC held a workshop to share information on mapping technologies and to evaluate mapping applications for the Coastal and Marine Ecological Classification Standard. Evaluation of the technology is complete and mapping guidance is under development. A mapping and technology fact sheet will be developed for outreach purposes.

### ***Long-term Partnership Goal***

Expand activities beyond habitat to identify data, fill data gaps and develop ecosystem decision support tools to inform resource management decisions for all priority issue teams.

*How does this support the health of the Gulf of Mexico?*

Much information has been gathered and scientific research conducted on GOM environments during the last 50 years, but there is no information system that allows easy access to data and analyses for scientists conducting GOM-wide comparative studies. Nor is there a convenient way for managers and policy makers to tap into the knowledge gained from this research. A major difficulty is that the pertinent data are in many forms of print and electronic media and reside in local, state, and federal government offices, non-government organizations, and universities. Today, however, Geographic Information Systems and Web-based database applications provide a way to broadly disseminate information. A natural resource data portal and information system will enable resource managers to develop sound recommendations for managing valued coastal resources. These resources contribute to the economic vitality and sustainability of the Gulf of Mexico residents.

The Habitat ID PIT has been renamed the Ecosystem Integration and Assessment (EIA) PIT. This decision was based on the applicability of the data platform, which this group is developing, to all other PITs. The products and tools developed by this PIT will assist the other PITs with identifying and prioritizing actions where the ecosystems and coastal communities intersect. The tools will provide a means to tie information and data to geography, which will give environmental problems and solutions a real-world context. This will give the public, managers, and scientists alike a better understanding of the issues facing the GOM. The EIA PIT will continue and expand the work begun in 2006 to search, compile, and disseminate information related to GOM habitats through the Web.

### ***Newspaper Headlines***

To be developed.

### ***Action***

**EIA-1:** Enhance and broaden the Priority Habitat and Information System to provide public access and delivery of current and historic local, state and federal Gulf of Mexico environmental data.

### ***Action Description***

One common denominator among all the PITs within the Alliance has been the need for data awareness and access. PHINS was developed to maximize habitat data use, promote collaboration, improve decision making and link project information, reports, and spatial data into a Gulf-wide information access and delivery system. Enhancements to PHINS to expand beyond habitat data will provide a useful tool for all resource managers. These tools, along with future data acquisition to fill gaps, will aid efforts to restore benthic

environments, improving the resolution of sea level rise analyses, and help to predict storm surge and other storm related incidents for the coast.

An initial Gulf of Mexico Regional Ecosystem Data Management (REDM) Web Portal has been established at NCDDC and is compatible with the PHINS. NCDDC is mission-tasked to facilitate the establishment of Regional Ecosystem Data Assembly Portals that provide access to data and information through the cataloging, formatting, archiving, and dissemination of data streams in collaboration with federal and state agencies, regional observing system associations, academic researchers, and non-governmental organizations. As part of the REDM development, NCDDC has established a collection of web-based services that provide for the collection and delivery of custom aggregated data and information streams. These services include the following: Encryption and Authentication, Collection, Notification, Subscription, and Planning Services (see attachment). These data management services support service oriented architecture (SOA) that will benefit the GOMA data management architectures and ensure interoperability between distributed and diverse data providers. REDM is not an archive, it does not replace the data providers “ownership” of the data, but serves as a venue that provides transparent discovery and access to the data provider holdings through data vocabularies (ontologies) that relate specific data sets to GOMA thematic concepts. Furthermore, NCDDC will ensure, where appropriate, that GOMA data sets are archived at the appropriate NOAA National Data Center if directed.

### ***Results at the End of Five Years***

- Expand the function of PHINS to provide data access and assessment support services for all Alliance members.

### ***Who Will Lead and Support This Action?***

To be determined at All Hands mtg.

### ***Why do this?***

To be addressed at All Hands mtg.

### ***Action Steps***

- Develop ‘best practices’ document to record work invested in developing PHINS
- Assess data needs of all Alliance PITs and make data readily accessible to resource managers
- Assess user needs to define specific database and modeling products such as habitat maps
- Develop a plan to archive and maintain historical data and commit to an integrated data management strategy
- Provide central coordination and support data search and compilation for the individual Gulf States
- Develop a geospatial database and visualization system for accessing and integrating natural resource data

- Develop an acquisition strategy to fill data gaps
- Compile available high resolution bathymetry and topographic data for the entire Gulf and initiate development of a high-resolution topographic-bathymetric map
- Investigate opportunities to develop a Gulf-wide VDatum
- Identify and map sediment data
- Identify and map freshwater inflow patterns
- Identify and provide access to habitat conservation plans and map existing conservation lands and restoration sites
- Collaborate with the Education PIT to market PHINS and fully assess users needs
- Acquire SPOT imagery and make available for activities such as habitat classification, coastal change analyses, inundation mapping

### ***Action***

**EIA-2:** Develop a Gulf of Mexico Ocean and Coastal Mapping and Monitoring Master Plan.

### ***Action Description***

This activity will produce a comprehensive mapping and monitoring plan for the Gulf of Mexico that will provide an approach to the acquisition of physical and environmental datasets to support the activities of all of the Alliance PITs. The plan will identify mapping and monitoring requirements, identify ongoing mapping programs that may be leveraged, and present a strategy to not only acquire baseline data, but to establish a program of mapping that will facilitate monitoring of changes to the Gulf of Mexico.

### ***Results at the End of Five Years***

- Gulf of Mexico Ocean and Coastal Mapping and Monitoring Master Plan
- Significant steps to full implementation of the Mapping Master Plan, including acquisition of lidar elevation and imagery data along the Gulf of Mexico coastline
- Identification and generation of data products to support economic, environmental, and engineering assessments and coastal zone management decision makers across the Gulf

### ***Who Will Lead and Support This Action?***

The U.S. Army Corps of Engineers (USACE), U.S. Naval Oceanographic Office, and the NOAA National Ocean Service, will lead this activity through the Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX), which is centrally located on the Mississippi Gulf Coast, and a partnership in airborne coastal mapping and charting. This activity will leverage the USACE National Coastal Mapping Program (NCMP), which is scheduled to begin surveying in the Gulf of Mexico for the second time in FY10. The NCMP planning process includes a series of planning meetings in which coastal mapping requirements are identified by USACE Districts and their local stakeholders. NCMP provides the business requirement and motivation to develop a comprehensive mapping and monitoring master plan that incorporates the needs of Federal, State, and local needs.

JALBTCX performs a similar function across the U.S. as they implement their mapping program. In addition to JALBTCX, other Federal agencies such as USGS will be drawn into the planning as well as State agencies, industry and academia to ensure requirements are identified and to later help formulate an efficient and comprehensive measurement plan that will utilize a range of surveying and mapping technologies.

### *Why do this?*

Delineation and monitoring of habitats, wetlands, patterns of sediment transport, and communities vulnerable to coastal flooding and sea-level rise are dependent on high-quality, high-resolution elevation and imagery data, acquired on a recurring basis. Without these data, and more importantly, without recurring data, it is impossible to quantify change or rates of change whether it is coastal erosion or loss of habitat. This information is required to make good management decisions about our coastal resources, from beaches to fisheries, to water quality. However, the Gulf is too large for any one agency to map and monitor, thus a collaborative approach is required, one that identifies all mapping and monitoring requirements with on-going mapping programs. Once these are identified a gap analysis can be performed to identify where additional resources are required. By producing a Gulf mapping and monitoring master plan, we can communicate needs and actions to the broader Gulf community.

### *Action Steps*

- In year 1, hold a series of workshops to identify mapping and monitoring requirements, such as habitat, sedimentation (erosion, dredging), wetland change, and communities vulnerable to coastal flooding and sea-level rise, using a wide range of vessel, aircraft, and satellite borne sensors, encompassing the needs of all Gulf of Mexico Alliance PITs. In addition to mapping needs, the workshops will help enumerate repeat intervals for mapping and specific products and maps in order to accurately measure and monitor change and rates of change. The information identified is necessary to formulate a comprehensive list of requirements and products that will be used in development of the Mapping and Monitoring Master Plan. Motivating factors include by FY10, the USACE National Coastal Mapping Program will need this information to create their plan and begin their survey along the coast. Workshops will be used to pull in GCOOS participation and support for long term measuring and monitoring requirements. The deliverable for this action step is a series of regional mapping and monitoring needs reports with specific products identified.
- Leverage on-going efforts by the Interagency Working Group on Ocean and Coastal Mapping to inventory all relevant mapping programs, to identify programs, capabilities, and assets to leverage to produce mapping data. In the first 18 months, the IWG-OCM will provide an inventory of Federal, State, and other coastal mapping programs that may be leveraged to support mapping requirements identified through the series of workshops. This is possible through an existing IWG-OCM effort, which may expand depending on response throughout the region.

- By the end of year 2, establish a communications and writing team for the Mapping Master Plan. The communications team will ensure all agencies are receiving and sending information needed to create a mapping and monitoring master plan. The writing team will compile results from all the regional workshops into a common format and make certain the reports provide a common level of detail and information to be compiled into a Gulf-wide plan. They will assemble all relevant information from the IWG-OCM Inventory effort so that with the inventory and list of Gulf mapping requirements, a strategy to meet the requirements can be produced, including a gap analysis.
- By the end of 30 months, identify strategy which includes existing federal, state, and local mapping programs to produce recurring data across the Gulf. The writing team will provide data to a multi-agency team to identify what agencies are mapping what sections of the Gulf and what spatial and temporal gaps exist. They will also identify known products and match them with the list of requirements. For both mapping and product gaps, this team will make recommendations how to efficiently fill the gaps.
- Implement the Gulf Mapping and Monitoring Master Plan. By the end of year 4, data and decision-support products will begin to be available through coordination with on-going mapping programs, GCOOS, IWG-OCM, and other relevant mapping programs. Establish GCOOS as the repository for managing the list of mapping and monitoring requirements to ensure they are updated and periodically validated through the user community.

### ***Action***

**EIA-3:** Finalize and implement the Coastal and Marine Ecological Classification Standard (CMECS)

### ***Action Description***

PHINS may be further enhanced by developing and implementing a standard habitat classification system to allow efficient searching, sorting and reporting of existing data. CMECS has been selected to provide this enhancement. CMECS provides a standardized nomenclature and structure for synthesizing data and characterizing habitats so information can be aggregated or disaggregated over a range of spatial scales using a geographic information system (GIS). CMECS has also recently been submitted to the Federal Geographic Data Committee for consideration to be adopted as the National standard for coastal and marine habitats. Application and testing of the CMECS system in distinct habitat types to refine usefulness as a National standard is necessary.

### ***Results at the End of Five Years***

- Develop an on-line management application, accessible to Gulf state managers that will transform, integrate and characterize habitat data into a standard classification.
- All NOAA marine sanctuaries and estuarine research reserves within the Gulf of Mexico will have classified habitat maps.

### ***Who Will Lead and Support This Action?***

To be determined at All Hands mtg.

### ***Why do this?***

To be addressed at All Hands mtg.

### ***Action Steps***

- Translate the nomenclature and terminology for data identified during the inventory of existing data to the CMECS classification
- Develop a crosswalk to provide guidelines for users on how to consistently and efficiently tie their data to CMECS
- Develop methods to classify remote sensing data into the CMECS classification structure
- Develop a web-based tool for ontology
- Develop CMECS-classified habitat data maps
- Develop a strategy and criteria for habitat assessment and prioritization
- Complete habitat assessments within the Gulf of Mexico for the National Fish Habitat Action Plan
- Digitize Gulf habitat atlas

### ***Action***

**EIA-4:** Determine the Value of Ecological and Socioeconomic Services within the Gulf of Mexico

### ***Action Description***

The many natural resources found within the Gulf of Mexico serve our coastal communities and society as a whole in a variety of ways such as recreation, commercial fishing, ports and oil and gas exploration and production. However, the economic value of these services is poorly understood. Activities such as shipping and dredging may negatively impact the economic value while activities such as restoration and conservation may benefit the economy. Gulf resource managers and others must be able to place the services in an economic framework to assess potential economic impacts of various management actions.

### ***Results at the End of Five Years***

- Document the economic value of select Gulf of Mexico natural resources and assess economic impacts of natural resource losses or gains.

### ***Who Will Lead and Support This Action?***

To be determined at All Hands mtg.

### ***Why do this?***

To be addressed at All Hands mtg.

### ***Action Steps***

- Inventory ecological and socioeconomic services provided by natural resources
- Assess and determine value of ecosystem services
- Identify and assign the ecological services provided by habitats according to their location and determine the value of the habitat components of the ecosystem
- Produce procedures and tools for mapping ecosystem services and the values of those services for Gulf of Mexico habitats

**EIA-5:** Produce an Emergent Wetlands Status and Trends Report and Geospatial Data Set

### ***Action Description***

Emergent wetlands around the coastal fringe of the Gulf of Mexico have seen a significant decline over the past several decades. An Emergent Wetlands Status and Trends Report patterned after the Seagrass Status and Trends Report will provide scientists and decision-makers with the background information and data to help guide restoration activities, climate change implications, public land acquisition, and opportunities for future scientific research.

### ***Results at the End of Five Years***

- Produce a status and trends report for Emergent Wetlands of the Gulf of Mexico.

### ***Who Will Lead and Support This Action?***

To be determined at All Hands mtg.

### ***Why do this?***

To be addressed at All Hands mtg.

### ***Action Steps***

- Establish a team of GOM experts to commit to writing state-level synthesis chapters and a series of vignettes for the report.
- Collect all the wetland habitat datasets into a single seamless dataset for multiple decades.
- Extract the Emergent Wetlands from the geospatial data layer along with acreages by historical date.
- Utilize experts to write sections of the report from the data provided with a single copy editor to review and revise.

- Send to experts in the field for peer review of the manuscripts.
- Use USGS Enterprise Publishing Network to edit the document and produce the graphics.
- Print the Status and Trends Report for distribution.

## ***Action***

**EIA-6:** International Data Access

### ***Action Description***

The Gulf of Mexico is not solely influenced by activities within the United States.

### ***Results at the End of Five Years***

- Broaden PHINS data input opportunities to include Mexico and the Caribbean.

### ***Who Will Lead and Support This Action?***

To be determined at All Hands mtg.

### ***Why do this?***

To be addressed at All Hands mtg.

### ***Action Steps***

- Assess opportunities to bring in data from Mexico and the Caribbean and add these data as appropriate and feasible.
- Establish initial contacts and initiate agreements to support and facilitate international data into PHINS for bi-national data management.