

1.2 Plenary Papers

1.2.1 Introduction

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International coordination of environmental science initiatives between the United States and Mexico is a high priority for GOM stakeholders. As the scientific and regulatory communities work together to ensure the safe and responsible use of offshore resources, including oil and gas reserves, joint environmental research on priority issues will be essential. The dynamic nature of the GOM is such that it will take the combined efforts of all nations bordering the world's ninth largest water body to address priority research issues fundamental to a better understanding of its ecosystem functioning and the interaction of the oceanic and coastal waters of the Gulf.

Continuing and escalating challenges to the health and productivity of the GOM are threats to our national security, economy, and environmental health. The GOM is of great strategic importance to the United States. As illustrated in “Gulf 360: State of the Gulf of Mexico” (Yoskowitz et al. 2013), the United States, Mexico, and Cuba are integrally linked through demographic, economic, and ecological commonalities. The GOM is often called the “working Gulf” and for good reason. No other coastal waters are more important to the nation's energy security and overall economic health (Yoskowitz 2009). The Gulf economy generates \$230 billion in economic activity each year. If this region was a country, it would be the twenty-ninth largest economy in the world (Felder and Camp 2009). The Gulf is foundational to our energy security, accounting for 54% of US crude oil and 52% of US natural gas production, with 47% of US refining capacity found along the margins of the GOM (NOS 2011). Twelve of this country's twenty largest ports are in the Gulf (NDC 2017).

It can also be called the “living Gulf” because it is, essentially, the nation's fish market, yielding 1.5 billion pounds of seafood annually (NMFS 2016). The Gulf also accounts for 44% of all US recreational fishing, providing a \$16.2 billion a year economic boost to the region (SA 2013). The Gulf has about 40% of the wetlands in the nation, and most, if not all, of the nation's seagrass and mangrove habitats (Felder and Camp 2009). It is home to over 15,419 species from all five kingdoms of life, making it one of the most biodiverse seas in the world (Felder and Camp 2009).

There are numerous threats to the health and productivity of the Gulf that would benefit from international attention. Harmful algal blooms (NOAA 2016), oil spills (Robertson 2010), invasive species (Showalter 2003), sea-level rise (Davis 2011), and overfishing (NOS 2011) lead the list of environmental concerns common to all Gulf countries. There are also numerous opportunities for the three Gulf countries to work together to assure that ongoing and future economic development of shared or adjacent ocean resources proceeds with appropriate environmental considerations and coordinated resource management. An ecologically- and economically-sustainable GOM is possible when we can agree on science-driven solutions to the problems we face.

The GOMWIR brought together leading research entities and scientists from the United States and Mexico, along with peers from Cuba, under the organizing guidance of the BOEM. In addition to BOEM, the NASEM-GRP, NOAA, GOMRI, and the Gulf of Mexico Alliance (GOMA) joined HRI in organizing and funding GOMWIR. Thanks to the combined efforts of the organizing sponsors, more than 165 of the Gulf's leading coastal and marine scientists came together as part of the “State of the Gulf Summit” held in Houston, Texas the last week of March 2017. This was the largest international gathering of scientists ever to focus on the southern GOM with a common objective to discuss the current state of science

throughout the Gulf LME, across a range of disciplines, and to develop recommendations for future binational research partnerships with relevance to offshore energy activities.

1.2.1.1 Background/Relevance of GOMWIR to BOEM Issues

International coordination of environmental science initiatives between the United States and Mexico is a high priority because of changes in Mexican policy concerning oil and gas development in that country. For the first time in more than a half century, non-Mexican oil and gas companies are now allowed to partner with Mexico on their offshore oil and gas development. As the scientific and regulatory communities in both countries work together to ensure the safe and responsible use of offshore oil and gas resources, opportunities for joint scientific studies of the environment (e.g., monitoring) will be necessary. These developments will transcend international boundaries to help ensure that decision-making is informed by the best available science from an ecosystem-based, basinwide perspective. Moving forward, broader information exchange is required for joint science needs across a range of environmental and social science disciplines to advance coordination on offshore energy management in the GOM.

1.2.1.2 GOMWIR Objectives and Goals

GOMWIR was designed to gather information on the GOM LME with specific focus on the southern Gulf. BOEM has a long-standing research program, the Environmental Studies Program, to help inform the regulation and management of oil and gas development on the US Outer Continental Shelf (OCS), including the northern GOM. This information is extensive and widely available. An important objective of GOMWIR is to do the same for the southern Gulf and eventually all of the GOM where resource development, especially oil and gas, could be well informed through joint international efforts. Other federal resource agencies, like NOAA, also recognize the benefit of increased knowledge of the southern GOM in meeting both their domestic and international responsibilities. Research and management organizations like the NASEM-GRP, GOMRI, and GOMA have broad charters that necessitate regarding the Gulf as an LME transcending international borders. Academic organizations and institutions, like the Gulf of Mexico University Research Collaborative (GOMURC) and HRI, also have missions of broad international scope for the Gulf.

GOMWIR was organized around an initial workshop to include leading scientists from the three Gulf countries to develop collaborative research addressing Gulf-wide issues from an LME perspective. This has become especially urgent as the United States and Mexico strengthen coordination on issues related to Mexican energy reform, the Transboundary Hydrocarbon Reservoirs Agreement, and other evolving issues related to international opportunities for economic development in the GOM.

The information generated by GOMWIR is of value to the federal agencies charged with regulating and managing resources in their respective exclusive economic zones and where those responsibilities overlap internationally. The United States and Mexican states bordering the Gulf will also benefit from this effort as will the scientific community. GOMWIR has helped to improve understanding of the current state of international environmental science related to ocean stewardship of the GOM LME and will help researchers and others to develop a roadmap to address critical information gaps through joint research. BOEM specifically benefits from this information as it works to minimize the adverse impacts from offshore energy development activities in the Gulf and to fill information gaps through its Environmental Studies Program as a result of international coordination.

The goals of GOMWIR were:

1. To develop an inventory of GOM LME research in international waters that can be used to inform interested stakeholders about current state of science across disciplines with relevance to ocean energy management needs and to provide a foundational database for an international workshop.

2. To review extant research and related programs and identify knowledge gaps for future research opportunities in the GOM across a range of disciplines.
3. To synthesize information gained through the inventory and workshop in a proceedings document to provide recommendations for high-priority international environmental science needs in the GOM and inform future research to inform resource management and regulatory needs.
4. To establish an international network of research-oriented organizations and institutions with a focus on the GOM to facilitate collaborative research which addresses priority international research in the GOM as identified by GOMWIR.

1.2.1.3 GOMWIR Design and Structure

HRI assembled an international team of scientists from the United States, Mexico, and Cuba to assure overall success of GOMWIR in achieving the stated objectives and accomplishing its goals.

The GOMWIR Inventory is focused on GOM LME research in international waters and designed to inform the current state of the science across disciplines with specific relevance to ocean energy management needs. The inventory includes the following elements:

- An annotated bibliography of peer-reviewed literature, reports, and other publications of Mexican origin that address one or more of the thematic areas and relate to international waters of the GOM.
- An annotated listing of Mexican research programs that address one or more of the thematic areas in international waters of the GOM.
- An annotated listing of Mexican data sources that address one or more of the thematic areas in international waters of the GOM.

The GOMWIR Workshop was held March 29–30, 2017 in Houston, Texas following the “State of the Gulf Summit” (March 26–28). Several of the activities scheduled for the summit were key to informing the workshop. The workshop provided the opportunity for interactions between participants, many representing active research programs, to identify knowledge gaps key to informing future research opportunities in the GOM. About 165 scientists from the United States, Mexico, and Cuba with expertise from a broad range of disciplines participated in the workshop. Participation was by invitation only with a target of 20–60 attendees in each of three thematic areas for a maximum of 180 workshop participants. Assuring a diverse mix of expertise and experience was a focus of workshop planning. All participants were screened to have one or more of the following attributes:

- International research experience in Mexico and the GOM
- Experience or expertise in nearshore systems: GOM
- Experience or expertise in deep-water systems: GOM
- Experience or expertise in socioeconomic aspects related to the GOM
- Particular knowledge or experience in one or more of the thematic areas

GOMWIR was organized around three thematic areas, which are of specific interest to BOEM’s Environmental Studies Program:

Baseline Studies that generate data that describe existing conditions and define a starting point to monitor trends of potentially impacted resources and civil society.

Fates and Effects Studies that evaluate the physical, chemical and biological processes that affect or are affected by the impacts of oil and gas activities, spilled oil, and oil dispersants, as well as the societal impacts of energy development.

Environmental Monitoring that generates data timeseries to assess effects of industry activities, and to determine effectiveness of mitigation measures contained within stipulations and conditions of permit approval for activities for offshore energy leases.

Topics of interest addressed during the workshop broadly included marine mammals and protected species, habitat and ecology, physical oceanography, water and air quality, and social science and economics, with consideration given to appropriate observational, laboratory, and modeling methods. A priority was identification of interdisciplinary approaches that integrate perspectives across disciplines and encourage or help facilitate ecosystem-based understanding and management approaches.

The GOMWIR Proceedings was designed to synthesize information gained through the inventory and workshop to provide recommendations for high-priority international environmental science needs in the GOM to inform research planning and studies development plans.

The GOMWIR Network will establish an international network of researchers and institutions that will facilitate collaborations and encourage joint efforts between academic and non-governmental science-based organizations to address priority research questions identified by GOMWIR and its proceedings. The GOMURC, CIIMAR-GOMC, CIGOM, and the RESTORE Centers of Excellence will help provide the foundation for this network, along with other institutions that are interested in contributing or have previously contributed to GOM international research.

1.2.1.4 References

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