



Gulf of Mexico Fishery Management Council

Managing Fishery Resources in the U.S. Federal Waters of the Gulf of Mexico

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John Hankinson, Executive Director
Gulf Coast Ecosystem Restoration Task Force
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Dear Mr. Hankinson,

The Deepwater Horizon Oil Spill was the largest pollution event in United States history. Consequently, it is likely to have significant and unprecedented ecological and socioeconomic impacts on Gulf of Mexico waters and its associated human and non-human residents. Given the spill's unparalleled size and duration, it is impossible to predict its full impact. However, characterizing both immediate and long-term effects is critical to: providing sound science-based information for restoration of Gulf resources, mitigating the ecological and socioeconomic consequences; and gauging the effectiveness of restoration efforts. The Gulf of Mexico Fishery Management Council strongly encourages development and implementation of programmatic and research activities necessary to understand the impacts of the oil spill on Gulf of Mexico's marine resources, habitats, and residents. Gulf Council members and staff have thoughtfully helped me prepare this response to your call for comment to the Gulf Coast Ecosystem Restoration Task Force's request to help guide future restoration efforts. Clearly our interest is seeing restoration of the Gulf's fisheries but we have thought broader in terms of large-scale restoration that will improve the overall condition of habitats and resources in the Gulf.

Rather than produce a long list of variables to be gathered as part of a large-scale and protracted sampling effort, we prefer to offer a series of questions to help direct research and investigation efforts to fully resolve the direction that restoration efforts should logically take. The questions below are grouped into five theme areas that were most likely affected by the oil spill: 1) human health and safety, 2) ecosystems and essential habitat, 3) socioeconomics, 4) habitat restoration, and 5) fisheries. Additionally, under each theme we add commentary to highlight specific research priorities within these broad areas and provide a synopsis for needs and likely research outcomes.

Human Health and Safety

The Deepwater horizon oil spill has the potential to directly affect human health to harmful chemical exposure or indirectly through consumption of contaminated seafood. As a result, it is imperative to comprehensively assess the extent and concentration of oil, dispersant, and

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associated by-products both within marine and coastal systems and in seafood products consumed by humans. We offer two questions below that, when answered, should go far in helping to resolve many of the “unknowns” regarding the oil spill’s effects on human health:

1. What are the immediate and long-term effects of the oil spill on human health and safety (i.e., concerns about contact or consumption of affected organisms)?
2. What is the spatial and temporal extent of the oil spill impact?

While considerable effort has gone into tracking the fate and concentration of released oil, dispersant, and related hydrocarbons, considerable uncertainty remains concerning the impact of this spill to human health. A vigilant monitoring network is necessary to identify hazards, prevent consumption of contaminated seafood, and minimize interaction with affected areas/habitats.

Ecosystems and Essential Habitat

The Gulf of Mexico is a diverse and productive ecosystem. However, impacts on marine populations and disruptions to vital ecosystem processes may result from this spill. Recovery from the oil spill will require an improved understanding of ecosystem status, oil spill interactive effects with natural and other human disturbances, and the potential for cumulative effects of oil on ecosystem health. To improve our understanding of long- and short-term effects, we highlight several areas of investigation:

1. What are the immediate and long-term effects of the oil spill on the Gulf of Mexico marine and coastal ecosystems?
2. Were some fisheries-related trophic groups more severely impacted than others as a result of the oil spill?
3. What are the interactive effects of the oil spill with other stressors (e.g., hypoxic/dead zones) in the Gulf of Mexico?
4. Has the oil spill resulted in a reduction in the ecological services provided by the Gulf ecosystem?
5. Can we quantify impacts to nursery habitat for economically and/or ecologically important species?
6. What data are necessary to enhance scientific knowledge of impacts to the *Sargassum* community and the potential of *Sargassum* to serve as nursery habitat for ecologically and/or economically important species?

An event such as the Deepwater Horizon spill is unprecedented in its scope. Thus, it is difficult to predict the extent of ecological impacts. However, a 2.1 million gallon spill in the Caribbean near the Panama Canal in 1986 caused severe damage to coastal areas including sensitive estuarine and coastal habitats that provide nursery habitat for many species. Extensive mortality of corals, seagrasses, mangroves, and other species were quantified relative to pre-spill abundances in the same area. Negative impacts from exposure to dispersants were also reported. The analysis of this spill also contradicted previous laboratory experiments where little impact on corals were detected from oil exposure, indicating the importance of long-term ecological studies necessary to detect environmental impacts. Of particular concern are the severe effects detected from this 1986 Caribbean spill, as the Deepwater Horizon spill is currently estimated at about 210 million gallons – a 100 fold increase over the earlier Caribbean spill.

In the 1986 Caribbean spill, sub-lethal effects on many organisms were also reported. Corals were stressed by oil exposure and subsequently more susceptible to disease with potential adverse effects to growth and reproductive output. Similar patterns may be observed in shellfish, seagrasses, or other habitat-providing species that inhabit the Gulf of Mexico. These effects may cause more severe population level impacts than the initial mortality from the spill. This pattern has been observed during hypoxic events throughout the world, where sub-lethal effects are often more detrimental than immediate losses from low-oxygen events (i.e., fish kills). Non-lethal oil spill impacts may include reduced growth rates or reproductive capacity and increased incidence of disease. As these effects may influence a large proportion of a population and impacts can be cumulative, the potential for serious long-term population or habitat impacts remains a paramount concern.

An additional concern of floating oil or other toxic substances is its effect on *Sargassum* mats and associated biological communities. *Sargassum*, a floating seaweed community, constitutes a surface substrate that is abundant, widespread, and ecologically important habitat in the pelagic waters of the Gulf of Mexico. It is also used by many species as nursery habitat. However, oil floating at the surface is toxic to *Sargassum*, and may substantially impact the abundance of these seaweeds and their associated organisms, potentially affecting recruitment success and fishery yields of species for several years. Since the spill, oil slicks and *Sargassum* mats have been observed in the same areas, yet the ecological, fishery, and economic impacts are unknown. Experts estimate that if widespread mortality occurs among *Sargassum* spp., it may take several years for the community of associated organisms to recover. Moreover, there may be substantial impacts on the fishery-related species that rely on *Sargassum* as habitat. Research documenting the distribution, abundance, and biological communities of *Sargassum* in the Gulf of Mexico are critical to assessing and mitigating impacts.

Consequently, our interest regarding oil spill impacts on the *Sargassum* community are several. As a habitat in the epipelagic zone, *Sargassum* and its associated community of organisms has a high potential to more clearly demonstrate oil spill and dispersant affects on biological communities. Moreover, the *Sargassum*-associated community is composed of juvenile stages of many ecologically important fishes, some of which have a strong relationship to fisheries for the adult forms of these species. Lastly, examining the *Sargassum* community in detail relative to the oil spill should serve future efforts to evaluate ecological impacts to the Gulf ecosystem as well as assess rates of restoration.

Socioeconomics

The Deepwater Horizon oil spill is having significant and unprecedented socioeconomic impacts on Gulf of Mexico waters and residents. These impacts are likely to continue into the near future. Oil spills have resulted in long-lasting impacts that affect fisheries yields, tourism, economics, and associated employment. As a result of the Deepwater Horizon oil spill, NOAA Fisheries Service prohibited recreational and commercial fishing effort in large portions of the Gulf of Mexico (up to 88,152 sq. miles) to ensure public safety and assure consumer confidence in Gulf of Mexico seafood. The questions posed below will serve to guide efforts to direct resources toward improving the socioeconomic standing of the Gulf's human communities.

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1. What are the socioeconomic impacts of this spill on affected residents and communities that are dependent on Gulf of Mexico fishery resources?
2. How has the closure of a large area of the Gulf of Mexico affected the production networks (processors, wholesalers, consumers) for Gulf of Mexico fishery resources?
3. How has the public's perception of Gulf seafood been affected by the oil spill?

The socio-cultural importance and economic impact of marine fisheries throughout the Gulf of Mexico is substantial. Anglers in the Gulf of Mexico take approximately 24 million recreational fishing trips annually while commercial fishermen land 1 billion pounds annually. These activities support 360,000 jobs and provide recreation, livelihood and support many communities dependent on fishing activities. Fishing activity usually peaks during summer due to favorable weather and the availability of prized species (e.g., red snapper). Unfortunately, fishing opportunities along with corresponding economic impacts were severely restricted disrupting coastal communities throughout the Gulf of Mexico. Considerable effort is necessary to document and mitigate the impacts on affected residents.

Habitat Restoration

The Deepwater Horizon oil spill will require extensive restoration efforts to mitigate effects to humans, sensitive species, and habitats. A primary objective of this restoration effort is to ensure that the Gulf of Mexico ecosystem is returned to an acceptable ecological state (determined by stakeholders and based on historical data or other means). This includes returning or enhancing critical habitats, fisheries yields, and economic outputs while restoring the legacy and demand of Gulf of Mexico products. The questions below are purposefully broad but help guide the overall restoration effort while elucidating impacts on our most fragile natural resources:

1. What are reasonable goals and timelines for recovery from the oil spill?
2. Can we identify ecological indicators to monitor the effectiveness of restoration efforts?
3. What are the impacts of the oil spill and restoration efforts to threatened or endangered species?

Accomplishing this goal requires a thorough understanding of interactions among physical, biological, and human components of the ecosystem. Unfortunately, our understanding of these factors is inadequate to fully assess or monitor ecosystem status, thus impairing our ability to determine appropriate restoration goals.

Fisheries

The Gulf of Mexico is home to a variety of species that support important fisheries, several of which are intensively managed. Unfortunately, a large-scale disturbance affects fish populations, creates uncertainty in stock status, and requires substantial research efforts to gauge impacts on important species and their critical life-stages. The spill occurred in a portion of the Gulf and at a time of the year that are especially critical to successful spawning for many of these species (e.g., bluefin tuna, red snapper). Survivorship of juvenile fishes may have been severely reduced. This reduction could potentially affect harvestable biomass in subsequent years and reduce the reproductive capacity of the stock several years into the future. These affects have severe economic consequences, increase uncertainty in the management of Gulf resources, and

require intensive, long-term management action to monitor and mitigate fish stock responses. To improve our efforts with this responsibility, we highlight the following research questions:

1. How can we enhance scientific knowledge of oil spill impacts to species/life-stages of ecologically and/or economically important species?
2. Has the oil spill resulted in a change in life history features (e.g., age structure, growth, reproductive potential) in federally-managed fishery resources in the Gulf?
3. Are there oil dispersant(s) that are effective in dispersing oil but also have a minimal effect on various life history stages of federally-managed fishes?
4. Has the oil spill resulted in changes to the distribution and abundance of federally-management fish stocks?
5. Are there direct or indirect effects of interaction with oil and/or dispersants to federally-managed fish species and associated habitats?
6. Are adequate long-term data on fishery species health available that resource managers can use for adaptive management - a “foundational element” identified by the Task Force to improve fisheries management?
7. What can be learned from the oil spill that would facilitate the development of innovations to improve fishing gear and capture methodologies?
8. Are tracking tools available for evaluating effectiveness of restoration efforts so that stakeholders and decision makers can ‘course correct’ if needed?
9. What are the preferred (type, frequency, intensity, etc.) fisheries data that would best illuminate future effects of oil spill impacts on fisheries?

The Gulf Council’s attempt at providing suggestions for restoration activities, especially with regard to fisheries is neither exhaustive nor comprehensive. The Council does believe, however, that the work efforts outlined above, through proposed research questions, will go far in giving purposeful direction to restoration activities in the Gulf that are related to the oil spill.

Focus Species

In addressing the above questions, it would be prudent and efficient to direct efforts toward a few indicator species as opposed to a large suite of species. The Gulf Council suggests that restoration research questions focus on at least four key fish species. These include red snapper, gag, gray triggerfish and king mackerel. The reasoning for focusing on these species is that each of these species have fishery management plans currently in place and, therefore, there are considerable historical data available. In addition, each of these is important to both recreational and commercial fishing sectors. Moreover, each of these species has attributes that makes them appropriate as sentinel species. Red snapper is a hard bottom associated species that has a greater abundance in the western Gulf. Gag is a hard bottom associated species that has a greater abundance in the eastern Gulf. Gray triggerfish can inhabit bottom, mid-water and surface areas and is broadly distributed throughout the Gulf over the most of the continental shelf. King mackerel is a pelagic species that is widely distributed throughout the Gulf.

Focus on Species’ Life History Features

When examining the focus species indicated above, it would also be expeditious to concentrate data gathering on a few, fishery-aligned life history features. These include: stock abundance estimates, natural mortality, age and growth, accumulation of toxins in tissues, and reproduction (fecundity, gonosomatic indices, fitness, etc.).

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Habitats of Concern

The Gulf of Mexico includes a broad variety of habitats, many of which have been designated as Essential Fish Habitat. As with the consideration above, it would be inefficient to expend resources to monitor and study all habitats just as it is inefficient to investigate all species. The Gulf Council suggests focusing (but not to the exclusion of all other habitats) investigative resources on hard bottom areas such as the Florida Middle Grounds, the Desoto Canyon and the Texas Flower Gardens. This offers the ability to sample on either side, as well as proximate to the oil spill affected area. In addition, the aforementioned investigation of the *Sargassum* community affords a perspective of impacts on the epipelagic zone of the northern Gulf – a zone that is home to the larval and juvenile stages of many fisheries-associated species.

On behalf of the Gulf of Mexico Fishery Management Council, I greatly appreciate the opportunity to offer suggestions that may help direct the future research and restoration efforts necessary to restore and protect Gulf of Mexico resources for enjoyment by current and future generations.

Please contact the Council staff, any Council member, or me should you require further clarification or elucidation on this matter.

Sincerely,



Robert Shipp, Ph.D.
Council Chair

SB:JF

C: Gulf Council, Council technical staff