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Effects of the Deepwater Horizon Oil Spill on Epipelagic Fish Populations in the Northeast Gulf of Mexico

Matthew Long  
*University of North Florida*

Chase Long  
*University of North Florida*

Arianne Leary  
*University of North Florida*

Robert E. Hueter  
*Mote Marine Laboratory*

David W. Kerstetter  
*Nova Southeastern University, kerstett@nova.edu*

See next page for additional authors

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Authors
Matthew Long, Chase Long, Arianne Leary, Robert E. Hueter, David W. Kerstetter, and James Gelsleichter

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Long-term monitoring of dolphins in the Gulf of Mexico

Presenter: Kaitlin Frasier
Scripps Institution of Oceanography

Authors: Kaitlin Frasier, Scripps Institution of Oceanography; Karlina P. Merkens, Scripps Institute of Oceanography; Mark A. McDonald, WhaleAcoustics; Sean M. Wiggins, Scripps Institute of Oceanography; Simone Baumann-Pickering, Scripps Institute of Oceanography; Marie A. Roch, Scripps Institute of Oceanography; John A. Hildebrand, Scripps Institute of Oceanography

Abstract:
Delphinids were continuously monitored during and after the Deepwater Horizon oil spill at five sites in the northeastern Gulf of Mexico, using High-frequency Acoustic Recording Packages (HARPs). These sites are within the known habitat ranges of 11 species of delphinids. Surface oil reached two sites, while three unexposed sites functioned as “controls”. Presence of dolphin vocalizations (clicks and whistles) was documented at each site over two years following the oil spill. Towed array recordings with concurrent visual identifications were used to determine species-specific vocalization characteristics. These were compared with the long-term autonomously recorded vocalizations. Acoustic propagation models were used to estimate delphinid detection ranges at each site. The data provide a comparative view of delphinid presence relative to oil coverage, as well as preliminary information needed for studying long-term responses of delphinids to the oil spill.

Development of a Towed Camera System Indexing Reef Fish Density: Applications to MPA Assessment

Presenter: Sarah Grasty
The University of South Florida

Authors: Sarah Grasty, University of South Florida; Chad Lembke, University of South Florida; Gino Gonzalez, University of South Florida; Alex Silverman, University of South Florida; Steven Butcher, University of South Florida; Steve Murawski, University of South Florida

Abstract:
The development of rapid assessment methods to determine spatial abundance and biomass of Gulf of Mexico reef fishes is of great priority as these data are integral for the evaluation of current marine protected areas (MPAs) and proposals to limit fishing in other habitats. Here, we describe the development of a towed camera system (C-BASS or Camera-Based Assessment System) that will have the capability to facilitate large-scale quantitative assessments of economically important reef fish stocks, as well as their habitat, both within and outside MPAs. There are three sites off the West Florida Shelf which are a part of this study: Steamboat Lumps, Madison Swanson, and the Florida Middle Grounds, all of which are reserves with varying degrees of fishing regulations. This camera system could be utilized by virtually any research vessel possessing a conventional CTD rosette system, and thus has the potential to enhance both the quantity and quality of available data on habitat associations and density distributions of fishes in the Gulf of Mexico and elsewhere.

Effects of the Deepwater Horizon Oil Spill on Epipelagic fish populations in the northeast Gulf of Mexico

Presenter: Matthew Long
UNF

Authors: Chase Long, University of North Florida; Arianne Leary, University of North Florida; Robert E. Hueter, David Kerstetter, Mote Marine Laboratory; NSU Oceanographic Center; Jim Gelsleichter, University of North Florida

Abstract:
The Deepwater Horizon Oil Spill contaminated large areas of the waters of the Gulf of Mexico. Contamination from the spill poses serious health risks to many of the epipelagic populations of marine wildlife that reside within or around the primary contamination
zone. Prior oil spills, such as the Exxon Valdez Oil Spill, have resulted in population-level impacts on some wildlife species. It is for this reason that monitoring the health of epipelagic fish species that were potentially impacted by the spill must be undertaken. The goals of this study were to assess whether epipelagic fish species in the northeast Gulf of Mexico were exposed to and affected by oil-related contaminants, particularly polycyclic aromatic hydrocarbons (PAHs). PAHs are the most toxic constituents of oil, and therefore have the greatest potential impact on the species examined. Multiple biomarkers of PAH exposure and effects were examined in epipelagic species, such as swordfish, oilfish, tunas, and a number of shark species collected from contaminated sites in order to determine the impacts of the spill. These biomarkers were compared to samples taken from the southwest Atlantic in order to determine whether the fish residing in the Gulf of Mexico are experiencing the effects of oil exposure.

**Trophic Dynamics and Feeding Ecology within the Southeast Florida Coastal Pelagic Fish Complex**

**Presenter:** Travis A. Moore  
Nova Southeastern University Oceanographic Center, Fisheries Research Laboratory  
**Authors:** Travis A. Moore, Nova Southeastern University; David W. Kerstetter, Nova Southeastern University  
**Abstract:**  
The trophic interactions and feeding ecology of coastal pelagic fishes remains poorly known. To elucidate these ecological relationships, this study focused on six species: king mackerel, blackfin tuna, skipjack tuna, little tunny, wahoo, and dolphinfish. From March 2010 to March 2012, samples from over 500 fishes were collected opportunistically from recreational anglers in southeast Florida. The stomach, gonads, muscle tissue, and liver tissue were collected from each specimen, as well as length data. Stable isotope analysis of carbon $\delta^{13}C$ and $\delta^{15}N$ in the muscle tissue was conducted along with descriptions of stomach contents. The combined analyses provide a more complete evaluation of the trophic interactions and positions among the coastal pelagic community. The preliminary analysis of stomach contents and $\delta^{13}C$ data for blackfin tuna, king mackerel, and little tunny (-16.5 to 20.5) shows a diverse diet of fish, squid, and crustaceans. The $\delta^{13}C$ and $\delta^{15}N$ data together indicates differences in trophic position and diet among the species in the coastal pelagic complex.

**Spatiotemporal Effects of the Deep Water Horizon Oil Spill on Productivity of Important Recreational and Commercial Fisheries of the Gulf of Mexico**

**Presenter:** Debra Murie  
University of Florida  
**Authors:** Debra J. Murie, University of Florida; Daryl C. Parkyn, University of Florida; Robert Ahrens, University of Florida  
**Abstract:**  
Changes in the productivity of recreational and commercial fisheries can have profound ecological and economic consequences. The primary goal of our study is to determine the extent that the Deep Water Horizon (DWH) oil spill impacted the growth and productivity of important recreational and commercial fisheries in the Gulf of Mexico. To address this concern, our study will compare the growth of representative fish species before and after the DWH oil spill event, and with additional comparison to a control area that was not physically impacted. Age-specific growth of fish prior to the DWH oil spill will be estimated using their otoliths or "ear stones." Otoliths show annual patterns of concentric growth rings similar to a cross-section of a tree trunk, and they record the entire growth history of the fish from birth to capture. Fish species chosen for this study are representative of different habitats (inshore estuarine areas, reefs, sand/mud, offshore waters) and trophic levels (detritivore, demersal carnivore, piscivore, pelagic carnivore), and include spotted seatrout, red drum, striped mullet, sheepshead, southern flounder, red snapper, gag, gray snapper, greater amberjack, and king mackerel. Spatial and temporal changes in growth of these fishes will be estimated through the growth increments in their otoliths and then incorporated into age-based stock production assessments to estimate changes in productivity. At a fisheries ecosystem level, the historical growth of these fishes will be explored using otolith sclerochronology, where the widths of the growth increments (rings) are matched to known environmental variables. Sclerochronology will be used in combination with Autoregressive Integrated Moving Average (ARIMA) models and intervention (impact) analysis to statistically evaluate the impact of the DWH oil spill on their growth patterns. This study will develop the framework to provide a better understanding of the relative impacts of environmental catastrophic events on growth and productivity of coastal fish stocks in the Gulf of Mexico.