

American Fisheries Society Conference 2017

Session Title: Synthesis of Florida's RESTORE Act Centers of Excellence Fish and Wildlife Research: What Does it Mean for Gulf Resources?

Session Organizer: Elizabeth Fetherston-Resch

Speakers and Titles (15 minutes each with 5 min Q&A):

Tools for Assessing Fisheries and Modeling Ecosystems

- **Dr. Steven G. Smith**, University of Miami. Estimation of Biological Indicators for Assessing Recreational Fisheries
- **Ms. Allison White**,* Florida International University. Informing fishery-independent reef fish surveys through advanced survey techniques
- **Mr. Chad Lembke**, University of South Florida. Demonstration of Fisheries Assessment Applications for Underwater Gliders
- **Ms. Makenzie Burrows**,* University of South Florida. Egg and larval DNA barcoding to support Gulf reef-fish stock assessments
- **Dr. Elizabeth Babcock**, University of Miami. Improving the Use of Products Derived from Monitoring Data in GOM Ecosystem Models
- Facilitated Panel Discussion – What does this mean for Gulf resources?

Insights in Fisheries and Wildlife

- **Dr. Dean Grubbs**, Florida State University. Monitoring Oil Spill Effects and Recovery in Large Deep-sea Fishes
- **Dr. Brian Walker**, Nova Southeastern University. Hardbottom Mapping and Community Characterization of the West-Central Florida Gulf Coast
- **Dr. Will Patterson**, University of Florida. Ecosystem Responses to Installation of Artificial Reefs: from Phytoplankton to Fishes
- **Dr. Dave Chagaris**, University of Florida. An Ecosystem Modeling Approach to Evaluating Impacts and Management of Invasive Lionfish in the Gulf of Mexico

*Student presentation; **Confirmed speaker**

Session Description in Brief:

The Florida RESTORE Act Centers of Excellence Program administered ten fish and wildlife research grants with its first round of funding stemming from the *Deepwater Horizon* oil spill penalties. These two-year projects were funded to further the science in support of marine fish and wildlife management and development of new tools, approaches and technologies in the field. Advancements in a number of individual fields of marine fish and sea turtle research are expected. This symposium will bring together researchers from the Centers of Excellence institutions to present their findings individually, and engage in a panel discussion of what the results mean for the state of Florida's Gulf coast fish and wildlife resources as well as provide their perspective on future collaborations and synthesis work.

Session Abstracts

Using Autonomous Underwater Gliders to Map Fish in the Eastern Gulf of Mexico

Keywords: Communities and Ecosystems, Habitat and Water Quality, Marine Fisheries Management and Population Dynamics

While underwater gliders evolved as tools influenced by the needs of physics observations, their utility has blossomed into many areas of research. Fisheries stock management is an area where consistent and sustained observations from gliders could provide valuable information. Such an effort to combine traditional glider collected water column variables with three acoustical data sets to track and enumerate fish populations is underway in the eastern Gulf of Mexico. A team of academic, federal, state, and private collaborators is utilizing gliders within a test region off of Tampa Bay to track acoustically tagged fish, quantify soniferous species, and estimate water column biomass. The data sets collected by the glider are being compared to traditional moored and vessel mounted methods. The test region follows a natural gas pipeline populated with acoustically tagged Red Grouper and Red Snapper, as well as moored tag telemetry receivers and passive acoustic recorders. The glider is seasonally deployed in this region and equipped with a tag receiver, passive acoustic recorder, 200 kHz echosounder, CTD, fluorometer, and dissolved oxygen sensor. Comparison of glider fish detections with moored detections will be presented.

Slot: Thursday, August 24, 2017: 8:00 AM-11:20 AM

Scheduled Time: 8:00 AM

Presenting Author: Chad Lembke
University of South Florida

Second author: Steven Murawski
Third author: Susan Lowerre-Barbieri
Fourth author: David Mann
Fifth author: J. Christopher Taylor, PhD

Improving the Use of Products Derived from Monitoring Data in Gulf of Mexico Ecosystem Models

Keywords: Communities and Ecosystems, Marine Fish Ecology, Marine Fisheries Management and Statistics and Modeling

Ecosystem models are widely used in the Gulf of Mexico (GOM) to evaluate the ecological impacts of fishery management and restoration activities. These models require inputs on the seasonal spatial distribution of functional groups. We developed a comprehensive survey database (CSD) that includes 29 fishery-independent and 8 fishery-dependent datasets. The CSD includes encounter/non-encounter, latitude and longitude, depth and other environmental data, and some body size measurements that can be used to assign fish to juvenile and adult life stages. The CSD was used to generate probability of encounter maps for functional groups across the spatial domains of the GOM Atlantis model and the OSMOSE model of the West Florida Shelf, and to produce relationships between environmental parameters and the probability of encounter for an Ecospace model of the West Florida Shelf. For the

Atlantis and Ecospace models, a generalized additive model was used to predict probability of encounter as a function of environmental data. For the OSMOSE model, a geostatistical approach was used to account for the spatial autocorrelation in encounter probabilities. The statistical models produced distribution maps and functional relationships that were biologically plausible for many functional groups, which will improve the accuracy of the ecosystem models.

Slot: Thursday, August 24, 2017: 8:00 AM-11:20 AM

Scheduled Time: 8:20 AM

Presenting Author: Arnaud Gruss
RSMAS, University of Miami

Second author: Elizabeth Babcock
Third author: Holly Perryman

Egg and Larval DNA Barcoding to Support Gulf Reef-Fish Stock Assessments

Keywords: Communities and Ecosystems, Genetics, Marine Fish Ecology and Marine Fisheries Management

The planktonic eggs of some fish species (e.g., clupeids) can be readily identified using microscopy, whereas visual identification of most reef-fish eggs is usually unreliable, precluding estimation of spawning-stock size via the daily egg production method (DEPM). In such species, DNA barcoding of individual eggs is a more effective identification method. During 2015-2016, we combined cruises of opportunity with DNA barcoding to collect and identify fish eggs from 40 stations distributed throughout the Gulf of Mexico. One objective was to determine the extent to which the eggs of continental-shelf species occur in the deep sea and vice versa, as this is relevant to the design of fish-egg surveys for DEPM. The 40 stations were arranged into transects that ran either parallel or perpendicular to the shelf break. To date, the barcoded eggs include continental-shelf species (e.g., snappers, groupers, tilefishes), epipelagic species (e.g., tunas, dolphinfishes, halfbeaks), and mesopelagic species (e.g., dragonfishes, snake mackerels, pomfrets). Initial results indicate the eggs of continental-shelf and deep-sea fishes have somewhat exclusive spatial distributions, with demarcation occurring at the shelf break. This contrasts with the distributions of fish larvae, which may be days, weeks, or months old, and are often displaced long distances from adult habitats.

Slot: Thursday, August 24, 2017: 8:00 AM-11:20 AM

Scheduled Time: 8:40 AM

Presenting Author: Makenzie Burrows
University of South Florida

Second author: Jeremy S. Browning
Third author: Mya Breitbart

Fourth author: Ernst B. Peebles

Estimation of Biological Indicators for Assessing Recreational Fisheries

Keywords: Marine Fisheries Management, Population Dynamics and Statistics and Modeling

Of the hundreds of fish and shellfish species captured along Florida's Gulf coast, many are primarily exploited by sport fishers. The majority of these species have not undergone formal stock assessments to determine sustainability status. The main scientific roadblock stems from lack of reliable biological indicators for assessment. NOAA's marine recreational survey database provides estimates of total recreational fishing effort (number of person-trips) and species catch back to the 1980s, but it does not provide the estimates of the "effective fishing effort" that produced that catch, which is necessary for computing catch-per-unit-effort (CPUE), a key biological indicator of stock abundance and productivity. Analytical methods were developed to: (1) identify fishing trips that had non-zero probabilities of capturing a given target species; and, (2) standardize effort units among fishing gears. Probabilistic survey methods were employed to estimate CPUE and CPUE-at-length over space and time for important coastal gamefishes and reef fishes. This improves the basis for stock assessment of Florida Gulf sportfisheries resources.

Slot: Thursday, August 24, 2017: 8:00 AM-11:20 AM

Scheduled Time: 9:00 AM

Presenting Author: Steven G. Smith, Ph.D.
University of Miami

Second author: Jerald S. Ault, Ph.D.

Break 9:20 – 9:40

Monitoring Oil Spill Effects and Recovery in Large Deep-Sea Fishes

Keywords: Communities and Ecosystems, Contaminants and Toxicology, Fish Health and Marine Fish Ecology

Prior to the Deepwater Horizon (DwH) oil spill, knowledge was limited concerning the deep-sea communities of the northern Gulf of Mexico (GoM), particularly for the large demersal fishes that are not vulnerable to capture in trawls. Because the spill occurred at 1,500 meters, these communities were directly affected. Over seven years (2011-2017), we used novel and standardized surveys to assess the potential effects of DwH on the larger, more mobile fishes in the northern GoM at depths of 200 to 2,000 m from Louisiana to southwest Florida, including sites near the Macondo Wellhead and throughout DeSoto Canyon. During 15 research cruises, nearly 6,000 fishes from more than 100 species of large demersal teleosts, elasmobranchs, and hagfishes were used to discern changes in community structure over space and time and to investigate toxicological responses to DwH. GoM deep-sea fish communities are diverse, spatially heterogeneous, and are influenced by edaphic factors, sources of

productivity, and depth. Toxicological responses were regionally variable but were consistent within taxonomic groups and communities. Our data suggest community heterogeneity limits the use of spatial controls to assess oil spill effects and highlights the need for baseline data in other regions that are vulnerable to future spills.

Slot: Thursday, August 24, 2017: 8:00 AM-11:20 AM

Scheduled Time: 9:40 AM

Presenting Author: R. Dean Grubbs, Ph.D.
Florida State University

Second author: Charles F. Cotton

Third author: James Gelsleichter

An Ecosystem-Based Approach to Evaluating Impacts and Management of Invasive Lionfish in the Northern Gulf of Mexico

Keywords: Marine Fish Ecology, Marine Fisheries Management, Population Dynamics, Specific Species: *Lionfish* and Statistics and Modeling

Species invasions in marine ecosystems pose a threat to native fish communities and can disrupt the food webs that support valuable commercial and recreational fisheries. In the northern Gulf of Mexico, densities of the invasive Indo-Pacific Lionfish *Pterois volitans* are among the highest in their invaded range. In our study, a comprehensive field survey was paired with development of a spatially explicit food web model to estimate the impacts of invasive Lionfish on native reef fish communities. Severe declines in abundance of small reef fishes that make up the diet of Lionfish have been observed since the invasion. We use Ecopath with Ecosim to model the food web effects of Lionfish. We use the spatially explicit model Ecospace to simulate those impacts over a mosaic of habitat types in the region. The goal of this research is to define target harvest of Lionfish, develop localized mitigation strategies, and provide information for assessment and management of valuable commercial and recreational reef fish species.

Slot: Thursday, August 24, 2017: 8:00 AM-11:20 AM

Scheduled Time: 10:00 AM

Presenting Author: David Chagaris
University of Florida

Second author: William Patterson

Third author: Mike Allen, Professor

Hardbottom Mapping and Community Characterization of the West-Central Florida Gulf Coast

Keywords: Habitat and Water Quality, Marine Fish Ecology and Marine Fisheries Management

The distribution and biological composition of neritic habitats on the west Florida shelf including submerged aquatic vegetation and hardbottom are poorly understood. While these habitats serve as nursery and forage areas for many economically-important reef-fish species (e.g., gag, gray snapper, hogfish), benthic mapping and benthic community characterization baseline data are nonexistent for a majority of the West Florida continental shelf. Among other things, this information is essential for optimizing fishery survey designs, advancing ecosystem management capabilities, and for estimating stock abundances. Therefore, the main objectives of this study were to interpret existing satellite imagery of the shallow-water west Florida continental shelf off Clearwater and Sarasota near Tampa Bay, Florida into a benthic habitat map and characterize the hardbottom biological communities throughout the mapped space. Initial results indicate about 367 km² of hardbottom exists within the 1,265 m² mapped areas. Seventy-seven percent of the mapped hardbottom was off Clearwater. Quantitative analyses of the hardbottom communities will be presented. This work provides the first benthic habitat map and community characterization for the proposed study area. Over 100 archived usable satellite images covering most of the West Florida coast currently exist. We hope to expand this work to provide a more extensive map.

Slot: Thursday, August 24, 2017: 8:00 AM-11:20 AM

Scheduled Time: 10:20 AM

Presenting Author: Brian Walker
Nova Southeastern University

Second author: Cory Ames

Third author: Sean F. Keenan

Fourth author: Rene Baumstark

Ecosystem Responses to the Installation of Artificial Reefs: From Phytoplankton to Fishes

Keywords: Communities and Ecosystems, Habitat and Water Quality and Marine Fisheries Management

We are examining the effects of artificial reefs constructed with early restoration funding following the Deepwater Horizon Oil Spill on ecosystem productivity and nutrient cycling using a BACI design. Specifically, we address whether artificial reefs create biogeochemical hotspots increasing primary and secondary productivity including fish production. We examined fish community composition, pelagic and benthic primary production, and nutrient exchange across the sediment-water interface for a year prior to reef deployment and then following colonization of artificial reefs. Measurements of sediment-water exchanges of oxygen and nutrients were made at 9 locations. Light reaching sandy sediments support productive benthic microalgal communities, particularly during the summer. Reef-associated primary production, respiration and nutrient fluxes have increased as colonization by biofouling invertebrates has increased. Fishes recruited to artificial reefs within the first week post-deployment, and communities quickly became dominated with reef-associated species, such as snappers, triggerfish, and seabasses. Ongoing work is focused on examining changes in biogeochemical cycling, primary production, and secondary production as reef invertebrate fouling and fish communities continue to develop.

Slot: Thursday, August 24, 2017: 8:00 AM-11:20 AM

Scheduled Time: 10:40 AM

Presenting Author: William Patterson III
University of Florida

Second author: Florian Cesbron
Third author: Kendra Brooks
Fourth author: Jane Caffrey
Fifth author: Wade Jeffrey

Informing Fishery-Independent Reef Fish Surveys through Advanced Survey Techniques

Keywords: Communities and Ecosystems, Marine Fish Ecology and Statistics and Modeling

There exists an increased demand for reliable, inexpensive, non-extractive, fishery-independent methods to examine reef fish communities across the nGOM shelf. To date most survey efforts comprise methods that are not often calibrated relative to the catch/effort among gear types, and often these methods are extractive in nature. Recent advances in remotely operated vehicle and sonar technologies provide for catch-free fishery independent methods that can be deployed rapidly and economically over large areas (1,000s km²) of marine systems to estimate fish community composition, size distribution, and spatial relationships to habitats, such as reefs. We present the current status on developments of integrating two non-extractive methods to examine the distribution, abundance and size of reef fish associated with natural and artificial reef habitats in the northeastern Gulf of Mexico. We compare trends between remotely operated video and contemporaneous acoustic surveys to examine variation in the demographic variables of reef fish communities between habitats across a depth gradient. Additionally, we examine species-specific scattering spectra of dominant reef fish species to evaluate the potential of an acoustically-based discrimination approach to improve survey methodologies.

Slot: Thursday, August 24, 2017: 8:00 AM-11:20 AM

Scheduled Time: 11:00 AM

Presenting Author: Allison White

Florida International University
Second author: Kevin M. Boswell
Third author: William F. Patterson III