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Gulf of Mexico Oil Spill and Ecosystem Science Conference

February 1-4, 2016

Tampa, Florida

Online registration closes 01/24/2016

(Onsite registration will be available)

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2016 Ocean Sciences Meeting

February 21-26, 2016

New Orleans, Louisiana

Stop by the GoMRI booth #608



Photo Credit: C-IMAGE.

About the Gulf of Mexico Research Initiative

The Gulf of Mexico Research Initiative is a 10-year, \$500 million independent research program established by an agreement between BP and the Gulf of Mexico Alliance to study the effects of the Deepwater Horizon incident and the potential associated impact of this and similar incidents on the environment and public health.

Would you like to know more about the GoMRI-funded research?

Check out our Research page on the website:

<http://research.gulfresearchinitiative.org/research-awards/>

GoMRI Announces RFP-V Awardees

The Gulf of Mexico Research Initiative and the GoMRI Research Board are very pleased to announce the awardees from the RFP-V proposal process. RFP-V called for proposals from individual investigators or small collaborative teams whose research will be funded for GoMRI Years 6-8 (2016-2018). Twenty-two projects were selected for funding, totalling \$38 million over the next three years. GoMRI congratulates the awardees and we look forward to the science that comes from these awards in the coming years.

Woods Hole Oceanographic Institution

Understanding How the Complex Topography of the Deepwater Gulf of Mexico Influences Water-column Mixing Processes and the Vertical and Horizontal Distribution of Oil and Gas after a Blowout

Principal Investigator: Kurt Polzin

University of Georgia Research Foundation Inc.

Vertical Upwelling and Bottom-Boundary Layer Dispersal at a Natural Seep Site

Principal Investigator: Daniela Di Iorio

Johns Hopkins University

Transport and Fate of Oil in the Upper Ocean: Studying and Modeling Multi-Scale Physical Dispersal Mechanisms and Remediation Strategies Using Large Eddy Simulation

Principal Investigator: Charles Meneveau

University of Miami

Influence of River Induced Fronts on Hydrocarbon Transport

Principal Investigator: Vassiliki Kourafalou

University of Miami

Investigation of Oil Spill Transport in a Coupled Wind-Wave Current Environment Using Simulation and Laboratory Studies

Principal Investigator: William Drennan

...continued from previous page

University of Georgia Research Foundation Inc.

Oil-Marine Snow-Mineral Aggregate Interactions and Sedimentation during the 2010 Deepwater Horizon Oil Spill
Principal Investigator: Adrian Burd

Florida State University

The State-of-the-Art Unraveling of the Biotic and Abiotic Chemical Evolution of Macondo Oil: 2010-2018
Principal Investigator: Ryan Rodgers

Tulane University

Chemical Evolution and Plant-Microbe Degradation of Petroleum in Saline Marsh Plants and Soils
Principal Investigator: Sunshine Van Bael

Florida State University

A Systems Approach to Improve Predictions of Biodegradation and Ecosystem Recovery in Coastal Marine Sediments Impacted by Oil Spills
Principal Investigator: Markus Huettel

University of Houston

Role of Microbial Motility for Degradation of Dispersed Oil
Principal Investigator: Jacinta Conrad

Louisiana State University Agriculture Center

A Study of Horse Fly (Tabanidae) Populations and Their Food Web Dynamics as Indicators of the Effects of Environmental Stress on Coastal Marsh Health
Principal Investigator: Lane Foil

National Marine Mammal Foundation

Investigation of Mechanisms for Reproductive Failure in the Aftermath of the Deepwater Horizon Oil Spill to Understand Population Recovery Scenarios for Cetaceans
Principal Investigator: Cynthia Smith

Louisiana State University

Long-Term Impact, Recovery and Resilience: Wetland Plant-Microbial-Benthic Ecosystem Responses to the Deepwater Horizon Oil Spill and Mitigation Strategies Promoting Sustainability
Principal Investigator: Qianxin Lin

Texas A&M University

Deep-Sea Risk Assessment and Species Sensitivity to WAF, CEWAF and Dispersant
Principal Investigator: Anthony Knap

University of Miami

Three-Dimensional Gulf Circulation and Biogeochemical Processes Unveiled by State-of-the-Art Profiling Float Technology and Data Assimilative Ocean Models
Principal Investigator: Lynn Shay

Tulane University

The Design of Synergistic Dispersant and Herding Systems using Tubular Clay Structures and Gel Phase Materials
Principal Investigator: Vijay John

University of Central Florida

A Combined Analytical, Theoretical, and Synthetic Approach Based on Line Narrowing
Principal Investigator: Andres Campiglia

University of New Hampshire

Genomic Responses to the Deepwater Horizon Event and Development of High Throughput Biological Assays for Oil Spills
Principal Investigator: W. Kelley Thomas

University of Maryland

Molecular Engineering of Food-Grade Dispersants as Highly Efficient and Safe Materials for the Treatment of Oil Spills
Principal Investigator: Srinivasa Raghavan

Louisiana State University

Understanding Resilience Attributes for Children, Youth, and Communities in the Wake of the Deepwater Horizon Oil Spill
Principal Investigator: Tim Slack

Tulane University School of Public Health and Tropical Medicine

Toxicological Properties of Specific Aromatic Hydrocarbons Isolated from Fresh and Aged Crude Oil from the Deepwater Horizon Spill
Principal Investigator: Charles Miller

Nova Southeastern University Oceanographic Center

Avoiding Surprises: Understanding the Impact of the Deepwater Horizon Oil Spill on the Decision Making Behaviors of Fishers and How This Affects the Assessment and Management of Commercially Important Fish Species in the Gulf of Mexico Using an Agent-Based Model
Principal Investigator: Steven Saul

Return to Ixtoc and Mud & Blood:

A Summary of C-IMAGE's Summer Expeditions

Provided by: Ben Prueitt, C-IMAGE Program Assistant

When the planning for the second installment of C-IMAGE was underway in 2013, consortium PIs looked to expand the existing fish and sediment data and gain an encompassing view of the Gulf of Mexico, including the southern extent and the Bay of Campeche. Having a complete record of Gulf fish, sediment cores, and water samples would provide comparable baseline data across the Gulf of Mexico – from the Yucatan to the West Florida Shelf – in the instance of another oil well blowout. It also would allow for a comparison between two Gulf spills, separated by over three decades – the *Deepwater Horizon* (2010) well blow out and *Ixtoc I* (1979) spill.

The Center for Integrated Modeling and Analysis of Gulf Ecosystems (C-IMAGE), a GoMRI-funded consortium, studied the first of two regions critical towards achieving a comprehensive Gulf survey during their 2015 field season in the southern Gulf of Mexico. C-IMAGE coordinated and executed three major research cruises this summer, two in the bay of Campeche collecting *Ixtoc I* sediment cores, water samples, and fish tissues, and one in the northern Gulf continuing *Deepwater Horizon* studies of sediments and fish, known as the *Mud & Blood* expeditions. Additionally, consortium partners sampled artificial and natural reefs of the Texas coastline and utilized ROVs and visual surveys for abundance and diversity assessments along the Alabama coast.

Planning the Summer 2015 Cruises:

International collaboration was central to achieving the goals of these expeditions. To prepare for two cruises in the Bay of Campeche, the Universidad Nacional Autónoma de México (UNAM) became a C-IMAGE member to offer their local knowledge and a 164-ft vessel, *R/V Justo Sierra*, for sediment coring in the southern Gulf. Challenges were expected throughout the summer; most of them came while the research teams were on land. But the science persevered and made great progress in achieving C-IMAGE's goals.

Planning to take an American ship into Mexican waters for 16 days of fishing came with as much paperwork as one would expect. After clearance to sample within the PEMEX exclusion zone, a 1,165 km² restricted area in the southern Gulf, plans began to attain special operating permissions for the *R/V Weatherbird II*. Six months prior, a U.S. State Department application was submitted for the *R/V Weatherbird II* to enter into Mexican waters, followed by research visas for all cruise members, and finally clearance through Customs & Immigration days before the southern Gulf fish survey got underway.

All the forms were checked and double-checked and three months of coring and fishing was underway.

Fast Fact

The total distance traveled by C-IMAGE expeditions in 2015 was 11,151 km, roughly 27% of the earth's circumference (40,074 km) at the equator.

Out at Sea:

The theme of the first *Ixtoc* cruise was sediment coring aboard the *R/V Justo Sierra* in late-July. After a whirlwind Spring of scheduling flights, shipping coring supplies, complying with U.S. and Mexican Customs, obtaining letters of backing from UNAM for U.S. researchers, and planning a rendezvous with Mind Open Media reporter David Levin, an 11-day, 22 person, 8 institution, sediment coring cruise was set. This expedition planned to sample 50 locations (21 critical locations) ranging in depth from 14m to 3,200m, including sites less than 5 kilometers from the original *Ixtoc* blowout.

The ship left Tuxpan, Mexico on 29 July, several days delayed due to a core shipping delay. The research began immediately with coring just 50km offshore at the first station, SL26A-100. Dr. Patrick Schwing, cruise coordinator and co-Chief Scientist onboard instructed new cruise members on the coring and extruding procedure with help from translators for UNAM researchers.

"The real success story is how well the science party and the *Justo Sierra* crew functioned as a team," Schwing said in an expedition summary ([full summary here](#)). "I am grateful for all the hard hours that everyone worked, often waking up before their shift and sometimes working many hours after their shift until all the work was done on deck



Figure 1: Dr. Patrick Schwing, watched by researchers of the *R/V Justo Sierra*, processes the first core during the *Return to Ixtoc Expedition*. Photo Credit: Devon Firesinger.

and in the labs. By the second site, the entire science party had the deck and laboratory operations down to...well...a science,” Schwing continued.

Fast Fact

Golden Tilefish burrow holes in bottom sediments creating a home and show significantly higher oil exposure levels than other bottom fish (Snyder et al., 2015). Tilefish were caught in both the northern and southern Gulf this summer, making it possible for a direct comparison of pollutant exposure and possible recovery between the two regions.

The second of the *Ixtoc* cruises was a three week fishing effort aboard the *R/V Weatherbird II* from 10 September through 2 October. Onboard this cruise, 13 researchers from four institutions fished at 25 demersal longline stations in the southern Gulf. Each station spanned 5-miles of hooks and enabled our science party to catch fish living near the sea floor to establish baseline database for fisheries throughout the Bay of Campeche,

including the PEMEX exclusion zone. The *R/V Weatherbird II* left St. Petersburg, FL for Progreso, MX where paperwork delays halted the expedition for three days. But a call from Rep. David Jolly (D-FL) freed the ‘Bird (insert Lynyrd Skynyrd lyrics here) and the research team began their fishing with stops in Ciudad de Carmen and Tuxpan, MX.

Dr. Shannon O’Leary, a genomics researcher from Texas A&M University-Corpus Christi (TAMU-CC), was aboard the *Weatherbird* for the entirety of the trip. “We were all very curious to see what we would get on our first set [in the exclusion zone]. Theory is that if nobody has fished here for so long, we should have more fish, bigger fish and a greater diversity of fish. On the other hand, there is quite a bit of pollution from the well heads and the associated activities of building and maintaining the platforms,” O’Leary said.

This southern Gulf fish survey was followed by a 5 day transit across the Gulf of Mexico from Tuxpan, MX to St. Petersburg, FL collecting plankton, fish larvae, and water samples every 45 km. This long transect resulted in a rich dataset of water quality, plankton population densities and microplastic concentrations along the longest axis of the Gulf.

Between the *Justo Sierra* sediment cruise and southern Gulf fishing survey, the fifth annual *Mud & Blood* expedition studied the sediments and fish affected by the *Deepwater Horizon* and *Ixtoc I* oil spills. From 15-30 August, the days were filled with fishing and the nights with sediment coring. C-IMAGE researchers sampled sites from previous years to continue data sets from the northern Gulf. Notable findings aboard the *Mud & Blood* expedition were a record-sized 24.7kg Yellowedge Grouper and a rare Arrownose Dogfish, one of only three ever recorded in the Gulf of Mexico ([Full Article](#)).

The Analysis:

C-IMAGE spent 54 days at sea this summer aboard the *R/V Justo Sierra* and *R/V Weatherbird II*, sampling sediment

cores and fish at 70 and 58 locations, respectively, making it the busiest field season to date for C-IMAGE. Through the challenges faced this summer – delayed shipments, document processing, and a language barrier, C-IMAGE exceeded its ambitious goals for the trip of collecting these baseline samples across the Gulf and studying the 35-year history of *Ixtoc*.

All of the sediment cores collected during summer 2015 field season will be analyzed in the labs of C-IMAGE partners studying chemical and biological changes within the sediments. Studies will include redox conditions and trace elements (Mn, Fe, Cu, V), sedimentology and geochemistry (¹⁴C) (Eckerd College, Florida State University), microbial communities – including oil degrading bacteria (Georgia Tech), foraminifera (USF-College of Marine Science), and volatile organic compounds found in oil like BTEX and phenols (University of Calgary).

The fishing this summer yielded 715 fish from the southern Gulf, and 1,268 fish from the northern Gulf. Target species included Red Snapper, Golden Tilefish, Southern Hake, and Grouper species of which blood, bile, muscle tissue, liver, fin rays, eyes, and otoliths were collected for later analysis. Ongoing C-IMAGE studies are analyzing polycyclic aromatic hydrocarbons (PAH) (USF-College of Marine Science), a toxic derivative of oil, immune responses to oil exposure (USF-College of Marine Science), histological studies (UNAM), and genomic variability across northern and southern regions (TAMU-CC).

The collaboration of C-IMAGE partners studying the sediments and fish of oil spills will not only help understand past spills, but will also help prepare society in the event of another spill. This summer marked a first step towards advancing knowledge of the Gulf by returning to *Ixtoc I* and establishing baseline data for the region. C-IMAGE will continue sampling sediments and fishes from Mexico to Louisiana in summer 2016.

You can read more about C-IMAGE’s summer cruises, including [photo galleries](#) and blog posts, [here](#).



Figure 2: For 16 days, researchers from the Universidad Nacional Autónoma de México, USF-College of Marine Science, Florida State University, and Texas A&M-Corpus Christi surveyed fish in the Bay of Campeche. Their goal is to establish baseline data and analyze oil exposure and genetic variation in the southern Gulf of Mexico. Photo Credit: C-IMAGE Consortium.



Oil Impacts Jellyfish

Smithsonian Ocean Portal recently featured a story on how jellyfish are impacted by oil exposure and how their reaction to the stress of oil spill events made actually help contribute to the breakdown of oil in the water column. The

story features work by Dr. Brad Gemmel of the [DROPPS Consortium](#).

[Check out the article here!](#)

Education Spotlight

Deep-C: Using GoMRI science, Deep-C developed a multidisciplinary high school curriculum focused on geomorphology, geochemistry, ecology, physical oceanography, and modeling to help students make connections between theoretical science and real world applications. The curriculum is available on Deep-C's website [here](#).

ECOGIG: ECOGIG has launched the fall 2015 series of their Science at the Stadium program, with the inaugural event taking place on September 19th at the UGA vs. South Carolina football game. This year's series will feature an Ocean Discovery Zone, which will provide participants the opportunity to experience hands-on activities related to oil spill science and ocean ecosystems. Photos from the September 19th event can be found [here](#) and the schedule of events can be found [here](#).

DEEPEND: The DEEPEND consortium website includes an [education and outreach section](#) that features a breadth of materials geared towards several types of audiences, including kids, adults, the general public, and educators. The site also includes two blogs, one geared towards adults and one geared towards kids, which features games and trivia. DEEPEND also has a teacher-at-sea program, which gives teachers an opportunity to participate in cruises and gain hands on science experience, which they can then incorporate into their curriculum. The most recent teacher at sea was Alisha Stahl and her blog posts can be found [here](#). DEEPEND also features a "Creep into the Deep" program run in partnership with [Whaletimes, Inc.](#)

CWC: Coastal Waters Consortium has posted the schedule for their summer camps that will be taking place in the summer of 2016, along with descriptions of the camps that will be available and information on how to register. Please visit their [website](#) for more information!



Visitors check out ECOGIG's Ocean Discovery Zone at Science at the Stadium. Photo Credit: ECOGIG.

GoMRI Newsmakers

GoMRI would like to congratulate Dr. Allan Clarke and Dr. Jeffrey Chanton, both from Florida State University, on being selected as 2015 American Geophysical Union (AGU) Fellows. Both Dr. Clarke and Dr. Chanton are members of the GoMRI community; [Dr. Clarke](#) is co-PI on the RFP-I funded consortium Deep-C and [Dr. Chanton](#) has served as co-PI and investigator on many GoMRI funded awards over the years, including ECOGIG I and II, Deep-C, and C-IMAGE II.

[Dr. Dean Grubbs](#) from Florida State University, GoMRI-funded scientist with the Deep-C Consortium, was featured in Discovery's Shark Week this year in the episode titled "Alien Sharks: Close Encounters." More information about the episode, including links to download it, can be found [here](#).

Science Corner

Published science highlights from the GoMRI program

[Study: Early-Responder Microbial Groups Differed Over Time in Oiled Beach Sands](#)

L.M. Rodriguez-R, W.A. Overholt, C. Hagan, M. Huettel, J. E. Kostka, and K.T. Konstantinidis
The ISME Journal, 2015

[Study Shows Hypoxia and Dispersed Oil May Increase Fish Mortality](#)

S. Dasgupta, I.J. Huang, A.E. McElroy
Public Library of Science (PLOS) One, 2015, 10 (6)

[Study Suggests Biodegradation Strongly Influences Oil Spill Transport Predictions](#)

E.W. North, E.E. Adams, A.E. Thessen, Z. Schlag, R. He, S.A. Socolofsky, S.M. Masutani, S.D. Peckham
Environmental Research Letters, 2015, Vol. 10 (2)

[Studies Identify Oil Spill Effects in Deep Sea Fish](#)

J.H. Tarnecki and W.F. Patterson III
Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science, 2015, Vol. 7 (1), 135-147

[Modelling Study Quantifies Gas Bubbles Effects on Oil Plume Dynamics](#)

A. Fabregat, W. Dewar, T. Ozgokmen, A. Poje, N. Wienders
Ocean Modeling, 2015, Vol. 90, 16-28

[Model Comparison Study Confirms Subsea Dispersant Effectiveness](#)

S. Socolofsky, E. Adams, M. Boufadel, Z. Amen, O. Johansen, W. Konkkel, D. Lindo, M. Madsen, E. North, C. Paris, D. Rasmussen, M. Reed, P. Ronningen, L. Sim, T. Uhrenholdt, K. Anderson, C. Cooper, T. Nedwed
Marine Pollution Bulletin, 2015, 96 (1-2), 110-126

[Study Quantifies Photooxidation and Biodegradation of Surface Oil](#)

H. Bacosa, D. Erdner, Z. Liu
Marine Pollution Bulletin, 2015, 95 (1), 265-272

[Study: Eco-Friendly Oil Herders Show Promise for Effective Marine Spill Cleanup](#)

D. Gupta, B. Sarker, K. Thadikaran, V. John, C. Maldarelli, G. John
Science Advances, 2015, Vol. 1, No. 5

[Study Describes Transport Pathways During Estuary and Coastal Waters Exchange](#)

A. Valle-Levinson, K. Huguenard, L. Ross, J. Branyon, J. MacMahan, A. Reniers
Estuarine, Coastal and Shelf Science, 2015, Vol. 155, 137-147

To see all GoMRI publications, please visit the [GoMRI Publication Database](#).

Note from the Research Board Chair

Dr. Rita Colwell, University of Maryland and Johns Hopkins University

The GoMRI Research Board is pleased to announce the results of the [RFP-V](#) competition. The RFP process followed by the Gulf of Mexico Research Initiative involves strict peer review and is highly competitive. The GoMRI Research Board is enthusiastic about the excellent science expected to emerge from the awards over the next three years (see pages 1 and 2 for the complete award list).

Of the total number of proposals that underwent review, twenty-two were selected for funding. The twenty-two awards reflect the five research themes. The RFP-V set of awards includes several that address Theme 5, “impact of oil spills on public health including behavioral, socioeconomic, environmental risk assessment, community capacity and other population health considerations and issues.” The three awards focused on Theme 5 are:

Understanding Resilience Attributes for Children, Youth, and Communities in the Wake of the Deepwater Horizon Oil Spill,

Toxicological Properties of Specific Aromatic Hydrocarbons Isolated from Fresh and Aged Crude Oil from the Deepwater Horizon Oil Spill, and

Avoiding Surprises: Understanding the Impact of the Deepwater Horizon Oil Spill on the Decision Making Behaviors of Fishers and How This Affects the Assessment and Management of Commercially Important Fish Species in the Gulf of Mexico Using an Aged-Based Model.

As mentioned in a previous [Note from the Research Board](#), understanding impacts of oil spills on public health is very important in the GoMRI program and to the GoMRI legacy. We look forward to seeing results of these projects as the research proceeds.

GoMRI welcomes the new principal investigators of the twenty-two awards and is especially pleased to note that the programs will be led by PI's from fourteen institutions across the country. Please visit the GoMRI website to learn more about the [new projects and investigators](#) and view [the publications](#) and [data](#) that will result as their work gets underway. The GoMRI Research Board is proud of the science already achieved by current and past GoMRI program scientists and looks forward to the research to be done by the newly-funded RFP-V team of scientists over the next three years. The Research Board extends its congratulations to the all of the new awardees!

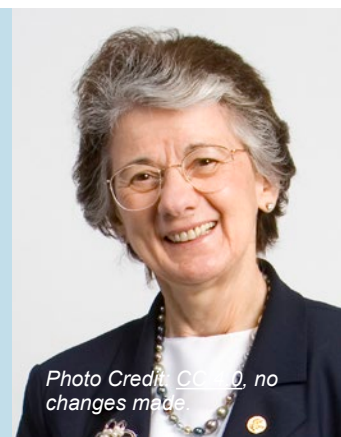


Photo Credit: CC BY, no changes made.



Photo Credit: LSU Media Relations.

Frequently Asked Questions by Dr. Chuck Wilson

Dr. Chuck Wilson, Chief Scientific Officer for the GoMRI

Question: GoMRI's [Second Legacy Goal](#) focuses on “engendering improved understanding, confidence, and trust of the public and other stakeholders.” Why is this important?

Answer: GoMRI is working towards improved understanding, confidence, and trust of the public and other stakeholders through a variety of mechanisms. The GoMRI Management Team and the research organizations funded by GoMRI have produced a variety of web based and other products to extend the science uncovered through GoMRI funding to the public and other stakeholders. Local seminars offered through the [Gulf Sea Grant program](#), [YouTube videos](#), classroom visits, and [newsletters](#) are just a few of the products that are

used to convey scientific findings to keep the public and other stakeholders abreast of recent research results. This is critical because the Gulf of Mexico community at large is still uncertain about the impact of oil spills on the environment.

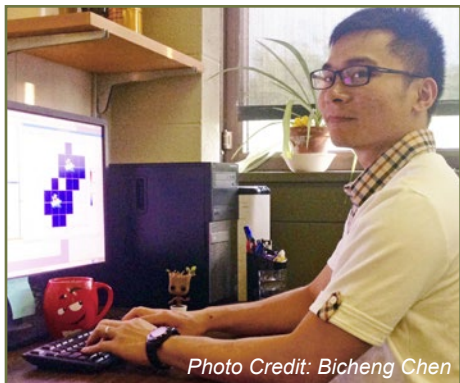
Question: GoMRI has established important partnerships to help extend the results from GoMRI funded science to the broader public. One of these partnerships is with the Gulf Sea Grant program, discussed in the Fall 2014 newsletter here. The other is with Smithsonian's Ocean Portal. Can you tell us more about this partnership?

Answer: Smithsonian's Ocean Portal (<http://ocean.si.edu/gulf-oil-spill>) is a general information website that covers a variety of topics about the world's oceans. A portion of that website is dedicated to oil spill science. GoMRI has partnered with Ocean Portal to feature stories and interviews highlighting the latest GoMRI science; this partnership has been extremely successful and their Oil Spill page is one of the most visited pages on their site.

GoMRI Scholars in Action

The Gulf of Mexico Research Initiative (GoMRI) is recognizing the graduate students whose vital research contribute to improving understanding about the damage, response, and recovery of the Deepwater Horizon oil spill. Candidates for this program must be graduate students who have participated in a GoMRI-funded project for at least one year, whose work is primarily funded by GoMRI, and who are working on a dissertation or thesis based on GoMRI-funded science.

Learn more about the scholars' research and career paths on the GoMRI website:



Bicheng Chen
Navigates the Whirlpool
of Oil Transport



Deb Adhikary
Sees How Burrowing Shrimp
Help Microbes Deal with Oil



Ceil Martinec
Digs the Seafloor



Jarrett Cruz
Bridges Disciplines to Track
Plankton's Response to Oil Spill



Bryan Hamilton
Hunts Oil
Using Microbes



Texas • Louisiana • Florida
Mississippi-Alabama

The [Gulf Sea Grant program](#) is continuing to offer oil spill science seminars; the most recent seminar took place on November 18th in Long Beach, MS and discussed seafood safety in the event of oil spills. Additional seminars are planned for later in the fall and in early 2016. Check out the [Gulf Sea Grant website](#) for more information on past presentations and for information on how to register for upcoming seminars. Some of the presentations can also be found on GoMRI's [YouTube Channel](#).

In addition to the seminars, the Gulf Sea Grant program has been working on several outreach publications. Most recently, they have released two fact sheets, one on Deepwater Horizon's impact on Gulf seafood and another highlighting historical information on fisheries landings and disasters in the Gulf of Mexico. These and all other Gulf Sea Grant publications and resources can be found [here](#).

GoMRI Researcher Interview with Dr. Debra Murie

Dr. Debra Murie from the University of Florida answered a few questions about her RFP-II project, *Spatial and Temporal Effects of the Deepwater Horizon Oil Spill on Growth and Productivity of Recreational and Commercial Fisheries in the Gulf of Mexico.*

The PIs on the project, in addition to Dr. Murie, are Dr. Daryl Parkyn and Dr. Robert Ahrens.

1. Thank you so much for talking with us! Tell us a bit about your research. What are the goals of your project?

Our overall goal is to model the potential spatial and temporal effects of the Deepwater Horizon oil spill and associated events (i.e., dispersants) on the growth and productivity of representative recreationally and commercially important fish species in the Gulf of Mexico. Representative fish species associated with estuarine (spotted seatrout, red drum, mullet, sheepshead), reef (red snapper), sand/mud (flounder), and pelagic habitats (king mackerel, greater amberjack) within and outside of the areas directly impacted by the Deepwater Horizon oil spill have been targeted for these analyses (Louisiana versus the west coast of Florida, respectively). Changes in growth and productivity of these fishes will be estimated by measuring the annual growth patterns captured in their ear stones (otoliths), which work as natural chronometers just like tree rings. The potential impact of the Deepwater Horizon oil spill at a fisheries production level is being modeled using stock assessments that take into account the potential changes in the growth of these fishes at specific ages. At an ecosystem level, we are using a time-series analysis of the annual growth increments from older red drum and red snapper, a process known as sclerochronology, in combination with ARIMA models in an intervention/impact analysis.

2. What is your background and how did you get involved in this kind of work?

My background is in fisheries ecology and I am an Associate Professor in the Program of Fisheries and Aquatic Sciences in the School of Forest Resources and Conservation at the University of Florida. I have been involved in marine ecology since my earlier years as an undergraduate, studying anything from sponges to grey whales, and the underwater world continues to fascinate me to this day. I am particularly interested in sustainable resource use, including recreational and commercial fisheries and conservation of threatened and endangered fish species.

3. What are some of the most significant or exciting findings so far in your work?

We are still processing and measuring otoliths for most of the target species because our study depends on a time



Dr. Debra Murie. Photo provided by Dr. Murie.

series ranging from 2005 to 2015 for the growth analysis, and the ability to measure previous annual increments in the otoliths lags by about 1 year. However, we have focused on spotted seatrout and red drum because these species use the estuaries extensively, especially when young. We have measured and aged over 20,000 individual fish to date. For seatrout, our model species, we have not observed any decrease in growth of fish that are 1 to 4 years of age before and after the oil spill. In fact, there appears to have been a marginal increase in the growth rate of spotted seatrout, although we still need to add one more year of data to our analysis. We think the increase in growth may be due to the release of the fish from density-dependent growth that could have occurred due to the mortality of various fishes observed immediately following the oil spill (i.e., reduced density of fish, so more food available to the remaining fish). Our analysis is continuing on with all of our target species.

4. You mention using sclerochronology in performing your time-series analysis, which ranges from 2005-2015, pre- and post-spill. Can you talk more about how this process works and how you are using it in your study? Are you able to “see” growth patterns in otoliths from before the spill, even if the samples were collected after the spill, using this technique?

For sclerochronology, we are actually using a much older time series for the fish, for example the red drum we are using range in age from 12 to 37 years. We are measuring the growth increment for each year of the fish's life and then we “assign” each increment to a specific calendar

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year based on going backwards from the year of capture of the fish. When you have dozens of these older fish with their growth increments associated with specific calendar years, then you can see whether 2010 was associated with a smaller than average growth increment. This is also allowing us to examine, for example, if Hurricane Katrina in 2005 (or other major environmental events) impacted the growth of the fish more or less than the Deepwater Horizon oil spill.

5. Is there are particular species and/or habitat from your target species that may have been impacted more than the others?

We predicted that estuarine environments would be the most susceptible because the oil was physically present in those environments to a large degree. Based on that, we also predicted that seatrout, in particular, would be impacted through significant loss in what it usually feeds on, which is shrimp and other fishes mostly. Seatrout are also known through tagging studies to stay very close to their “home” estuary and seagrass beds, so their growth can be specific to an estuary. To date, we haven’t seen this decrease in growth rate. From some of our other complementary studies, however, we have seen more sublethal effects in red snapper fecundity, or egg production, off the coast of Louisiana. We are currently measuring red snapper otoliths for growth increments, so it will be very interesting if we see any decrease in growth of the fish in the post-spill years.

6. Can you tell us more about your collaborations with your fellow GoMRI researchers and/or state agencies?

Our project absolutely could not have been done without the collaboration of the Louisiana Department of Wildlife and Fisheries and the Florida Fish and Wildlife Conservation Commission’s Fish and Wildlife Research Institute. These agencies have long-term, ongoing monitoring programs for the species that we are studying, and therefore they were able to provide us with a time series of biological information that was necessary for our study. These agencies collect location and fishing information, and a suite of biological information, on individual fish of our target species, including the collection of their otoliths. The greatest deficit in understanding the effects of the Deepwater Horizon oil spill, or any other potential disaster, rests with having data prior to the event for comparison. Based on our experience, it is critical to continue these ongoing monitoring programs in the state and federal agencies in order to assess the potential impacts of any future environmental disasters.

7. If funding were not an issue, what would you add to your project?

More funding and more time are always issues with research because as we go along in the planned research

we observe other important avenues that have to be left unexplored. However, if we could add a component to our project then we would have added a study on the inter-relationships among the growth that we are measuring in the otoliths of the fish, the location of these fish within a potential impacted versus non-impacted area, and any changes in their trophic pathways. Fish can only grow by taking in energy through consuming prey, so that connection is very important.



C-IMAGE has been spotlighting members of their team in brief videos, which have been posted to their [YouTube Channel](#).
LADC-GEMM was recently featured by the University of Louisiana at Lafayette, one of LADC-GEMM’s participating institutions, on the work the group is doing to understand the impacts of the Deepwater Horizon oil spill on whale populations. [Check out the video here](#).

Keep up with the Consortia Blog Roll and Social Media!

Some of the Consortia have updated their blogs. Check them out!

C-IMAGE has been updating their [blog](#) regularly over the summer and fall, featuring their Mud and Blood cruises (see page 3 for a summary of these cruises).

CONCORDE: [Concordia Blog](#)
DROPPS: [A Day in the Life of a DROPPster](#)

In addition to their blogs, many Consortia are active on other social media outlets, including Twitter, Facebook, and Instagram!

ADDOMEx: [Facebook](#), [Twitter](#), [Instagram](#)
CARTHE: [Facebook](#), [Twitter](#)
C-IMAGE: [Facebook](#), [Twitter](#)
CONCORDE: [Facebook](#), [Twitter](#), [Instagram](#)
CWC: [Facebook](#), [Instagram](#)
DEEPEND: [Facebook](#), [Twitter](#), [Instagram](#)
Deep-C: [Facebook](#), [Twitter](#)
DROPPS: [Facebook](#), [Twitter](#)
ECOGIG: [Facebook](#)

GoMRI Inspires CITIZEN SCIENTISTS

GoMRI is helping to inspire members of the general public to become citizen scientists. These are just a few stories of people who are interested in oil spill science and have developed their own projects, or volunteered to help with projects, that are helping to expand the research GoMRI is doing to better understand oil spills.

In the Pacific Northwest, seven-year-old Alek was concerned about what would happen to the endangered Southern Resident Killer Whales in the event of an oil spill in the region. To better understand if an oil spill would have an impact on the whales' habitat, he developed a large-scale drift card project. With guidance from his science advisory committee, that included GoMRI scientists Tamay Özgökmen and Piers Chapman, Alek developed and launched 400 drift cards in September 2014. An impressive 181 drift cards were sent back to him, picked up by people who came across them on beaches all the way to Alaska! Alek compiled his data and published a report and two videos detailing the outcomes of his research. You can visit his website [here](#) and find links to his videos and other information on the GoMRI website [here](#).

In Singapore, a group of fourth graders were learning about ocean science and pollution. In their research, they discovered *Bob the Drifter* from CARTHE and decided they wanted to build *their very own Proto-Bob*. With help from Laura Bracken, CARTHE's Outreach Manager, who Skyped with the students and helped answer their questions, the students developed and tested their drifter. You can see their videos [here](#). They also shared their work and findings with the rest of the students at their school.

In 2013, Deep-C launched their *Gulf Oil Observers (GOO) project*, to help train high school students to be citizen scientists. The project brought in students from the community to learn about oil spill science and lab techniques, encouraging them to participate in field studies when they visited local beaches. The Project GOO blog can be found [here](#).

It is exciting to see GoMRI science inspiring the community to be interested in ocean and oil spill science and engaging them in ways such that they can help advance the science. To highlight these and other new and exciting ways the community is participating in citizen science activities, GoMRI's Education Website has recently added [a citizen science tab](#), where stories related to citizen science will be collated.

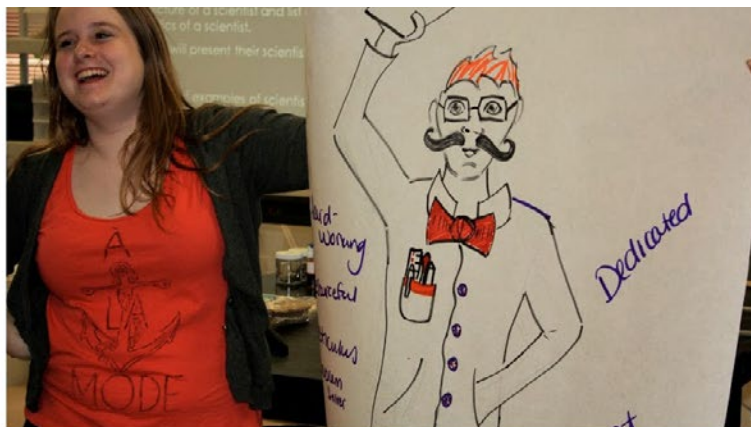


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Deep-C Project GOO Blog.