

*Conference Program / Abstracts*

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# **CNREP 2016**

Challenges of Natural Resource Economics & Policy



5<sup>th</sup> National Forum on Socioeconomic Research in Coastal Systems

**March 20-22**

**New Orleans**

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## Welcome!

Thank you for joining us for *CNREP 2016: Challenges of Natural Resource Economics and Policy: The Fifth National Forum on Socioeconomic Research in Coastal Systems*. This triennial forum was initiated by the Louisiana State University (LSU) Center for Natural Resource Economic Policy (CNREP) in 2004, with subsequent meetings held in 2007, 2010 and 2013.

We've seen a steady increase in the number of abstracts submitted to our forum over time, and this year's event will be our largest by far. We've added a fifth concurrent session to accommodate the large amount of quality content. The 2016 forum will have more than 225 attendees, including 160 presenters and panelists representing 63 public and private institutions located in 29 U.S. states and five countries. We are encouraged by this strong response and we sincerely thank you for your interest and participation.

Since its inception, the goal of the triennial CNREP forum has been to marshal the social sciences towards the most timely and relevant socioeconomic challenges of coastal resource management and policy. A sampling of some of the questions to be addressed at this year's forum includes:

- *What role will ecosystem services play in federal policy?*
- *What are the latest advancements in natural resource valuation?*
- *What changes are slated for the National Flood Insurance Program?*
- *What is the status of state-level efforts to develop model water policy?*
- *What opportunities and challenges lay ahead for the restoration economy?*
- *What is the latest research on the costs and benefits of coastal restoration?*
- *What is the latest economic research on commercial and recreational fisheries?*
- *What are the economic consequences and policy alternatives of climate change?*
- *What sources exist for financing coastal restoration at the state and federal level?*
- *What public health and economic impacts have been associated with the 2010 oil spill?*
- *What are the latest advancements in measuring coastal resilience and mitigating coastal risks?*
- *What do we know, and need to know, about the socioeconomic impacts of restoration projects?*

As usual, we have a robust agenda in an exciting venue with thought-provoking keynote speakers, interesting discussion panels, and numerous dedicated sessions. And thanks to our generous sponsors and partners, the CNREP 2016 forum will be yet another amenity-rich event - with several opportunities for professional networking and socializing. Our sincere hope is that you will find the forum to be a rewarding experience and will come away with a better understanding of the important economic and policy challenges of our day.

Once again, we welcome you to New Orleans, and we extend to you our best wishes for a productive and enjoyable conference.

Sincerely,



Rex H. Caffey  
CNREP 2016 Conference Chairman

## Program Committee

**Rex H. Caffey, Ph.D.**, Professor and Director, Center for Natural Resource Economics & Policy, Department of Agricultural Economics & Agribusiness, LSU Agricultural Center and Louisiana Sea Grant

**Melissa D. Castleberry**, Web Coordinator, Louisiana Sea Grant College Program

**Marty Chavers**, Accountant, Louisiana Sea Grant College Program

**Melissa Daigle, J.D.**, Research Associate, Louisiana Sea Grant Law and Policy Program, Center for Natural Resource Economics & Policy.

**Mark Davis, J.D.**, Director, Tulane Institute of Water Resources Law and Policy

**Matthew Fannin, Ph.D.**, Professor, Center for Natural Resource Economics & Policy, Department of Agricultural Economics and Agribusiness, LSU AgCenter, Director, Louisiana Center for Rural Initiatives

**Jack Isaacs, Ph.D.**, Economist, Louisiana Department of Wildlife and Fisheries

**Roy Kron**, Director of Communications, Louisiana Sea Grant College Program

**Kathryn E. Lea**, Program Development Manager, Louisiana Sea Grant College Program

**Krishna Paudel, Ph.D.**, Professor, Center for Natural Resource Economics & Policy, Department of Agricultural Economics and Agribusiness, LSU AgCenter.

**Shaun Tanger, Ph.D.** Assistant Professor, Center for Natural Resource Economics & Policy, Department of Agricultural Economics and Agribusiness, Louisiana State University Agricultural Center.

**Maryam Taberastani, Ph.D.**, Economist, Louisiana Department of Wildlife and Fisheries

**John V. Westra, Ph.D.**, Professor, Center for Natural Resource Economics & Policy, Department of Agricultural Economics and Agribusiness, LSU AgCenter.

**James G. Wilkins, J.D.**, Director, Louisiana Sea Grant Law and Policy Program, Center for Natural Resource Economics & Policy.

## About the Center

The Center for Natural Resource Economics & Policy (CNREP) originated in 1999 with a small working group of faculty in the LSU Department of Agricultural Economics. The center was formally recognized in 2003 by the LSU Board of Supervisors and the Louisiana Board of Regents. The Center serves as a cooperative for environmental economists and legal scholars engaged in research and extension programs that contribute to the management and sustainability of natural resources. Center cooperators maintain active projects in six primary focus areas, including the bioeconomics of energy use, wetland valuation and economic linkages, economic management of fisheries, human dimensions of wildlife habitat conservation, economics of forest management and product development, and socioeconomics of land and water policy. The mission of CNREP is to foster the interaction of socioeconomic professionals to address natural resource and environmental challenges in the northern Gulf of Mexico region and the greater United States. To learn more about CNREP visit: [www.cnrep.lsu.edu](http://www.cnrep.lsu.edu)

## Premier Partners for CNREP 2016

Louisiana State University Agricultural Center

[www.lsuagcenter.com](http://www.lsuagcenter.com)

Louisiana Sea Grant College Program

[www.laseagrant.org](http://www.laseagrant.org)

Gulf of Mexico Research Initiative

<http://gulfresearchinitiative.org>

Bureau of Ocean Energy Management

[www.boem.gov/](http://www.boem.gov)

Coastal Wetlands Planning, Protection and Restoration Act

<http://lacoast.gov/new/default.aspx>

U.S. National Oceanic and Atmospheric Administration

[www.noaa.gov](http://www.noaa.gov)

Tulane Institute of Water Resources Law & Policy

[www.tulanewater.org/](http://www.tulanewater.org)

## Sponsors

Harte Research Institute at Texas A&M University-Corpus Christi

[www.harteresearchinstitute.org](http://www.harteresearchinstitute.org)

Northern Gulf Institute

[www.northerngulf institute.org](http://www.northerngulf institute.org)

Ramboll Environ

[www.ramboll-environ.com](http://www.ramboll-environ.com)

## Exhibitors

Journal of Ocean and Coastal Economics

<http://cbe.mis.edu/joce>

The Water Institute of the Gulf

<http://thewaterinstitute.org>

Moffatt & Nichol

[www.moffattnichol.com](http://www.moffattnichol.com)

## Supporters

Center for the Blue Economy

<http://centerfortheblueeconomy.org>

Tierra Resources

<http://tierraresourcesllc.com>

ICF International

[www.icfi.com](http://www.icfi.com)

## Special Thanks

**It is with great appreciation that we recognize the following individuals for their support, guidance and assistance in preparing for this conference:**

King Alexander, President and Chancellor, Louisiana State University

William B. Richardson, LSU Vice President for Agriculture, Dean, LSU College of Agriculture

Robert Twilley, Executive Director, Louisiana Sea Grant College Program

Rogers Leonard, Associate Vice Chancellor, LSU Agricultural Center

Phillip Elzer, Assistant Vice Chancellor for Research, LSU Agricultural Center

Mike Salassi, Professor and Head, LSU Department of Agricultural Economics & Agribusiness

Kelly Robertson, Business Manager, Louisiana Sea Grant College Program

Marla Jones, Administrative Program Specialist, LSU Department of Agricultural Economics & Agribusiness

Judith P. Johnson, Coordinator, Louisiana Sea Grant College Program

Huizen Niu, GIS Director, LSU Department of Agricultural Economics & Agribusiness

### **CNREP Graduate Students and Louisiana Sea Grant Law & Policy Program Legal Interns:**

Trina Biswas

Farhad Hossain Masum

J. Luke Boutwell

Hunter Odom

Molly Cisneros

Surendra Osti

Vikash Dangal

Seydina Ousmane Sene

Joy Das

John Penton

Alejandra Brevé Ferrari

Cody Plummer

Rome Gonsoulin

Bijay K. Pokhrel

Sarah Kagoya

Joby Richard

Stephanie Lott

Hua Wang

## Keynote Speakers

### **Gernot Wagner**

"Climate Shock: It's Not Over 'til the Fat Tail Zings"

Monday, March 21, 2016 8:30 am

Dr. Gernot Wagner is the lead senior economist at the Environmental Defense Fund, an Adjunct Associate Professor of International and Public Affairs at the Columbia School of International and Public Affairs, and a research associate at the Harvard Kennedy School. Wagner has a joint bachelor's magna cum laude with highest honors in environmental science, public policy and economics, and a master's and Ph.D. in political economy and government from Harvard, as well as a master's in economics from Stanford. Wagner teaches energy economics as an Adjunct Associate Professor at Columbia's School of International and Public Affairs. He served on the editorial board of the Financial Times as a Peter Martin Fellow, where he covered economics, energy, and the environment. He worked for the Boston Consulting Group, focused on energy and climate. His recent book, *Climate Shock* - a top 15 Financial Times McKinsey Business Book of the Year - explores the likely economic repercussions of a hotter planet, drawing and expanding from work previously unavailable to general audiences.

[www.ClimateShock.org](http://www.ClimateShock.org)

### **Richard Campanella**

"A Historical Geography of New Orleans, 1700s-2000s"

Monday, March 21, 2016 12:00 pm

Prof. Richard Campanella, a geographer with the Tulane School of Architecture, is the author of nine books on the geography and history of New Orleans, including *Bienville's Dilemma*, *Delta Urbanism* and *Geographies of New Orleans*. His research, which integrates mapping and spatial analyses with the social sciences and humanities, has been praised in the New York Review of Books, Journal of Southern History, Urban History, Places, Louisiana History, Journal of the Abraham Lincoln Association and Bloomsbury Review. The only two-time winner of the Louisiana Endowment for the Humanities Book of the Year Award, Campanella has also received the Louisiana Literary Award, the Williams Prize for Louisiana History, the Mortar Board Award for Excellence in Teaching, the Monroe Fellowship and the Hannah Arendt Prize for Scholarship in the Public Interest. He writes monthly columns for the *Times-Picayune*, *Preservation in Print Magazine*, and the quarterly *Louisiana Cultural Vistas*.

[www.richcampanella.com](http://www.richcampanella.com)

### **Sarah Ryker**

"Use of Ecosystem Services in Federal Decision-Making"

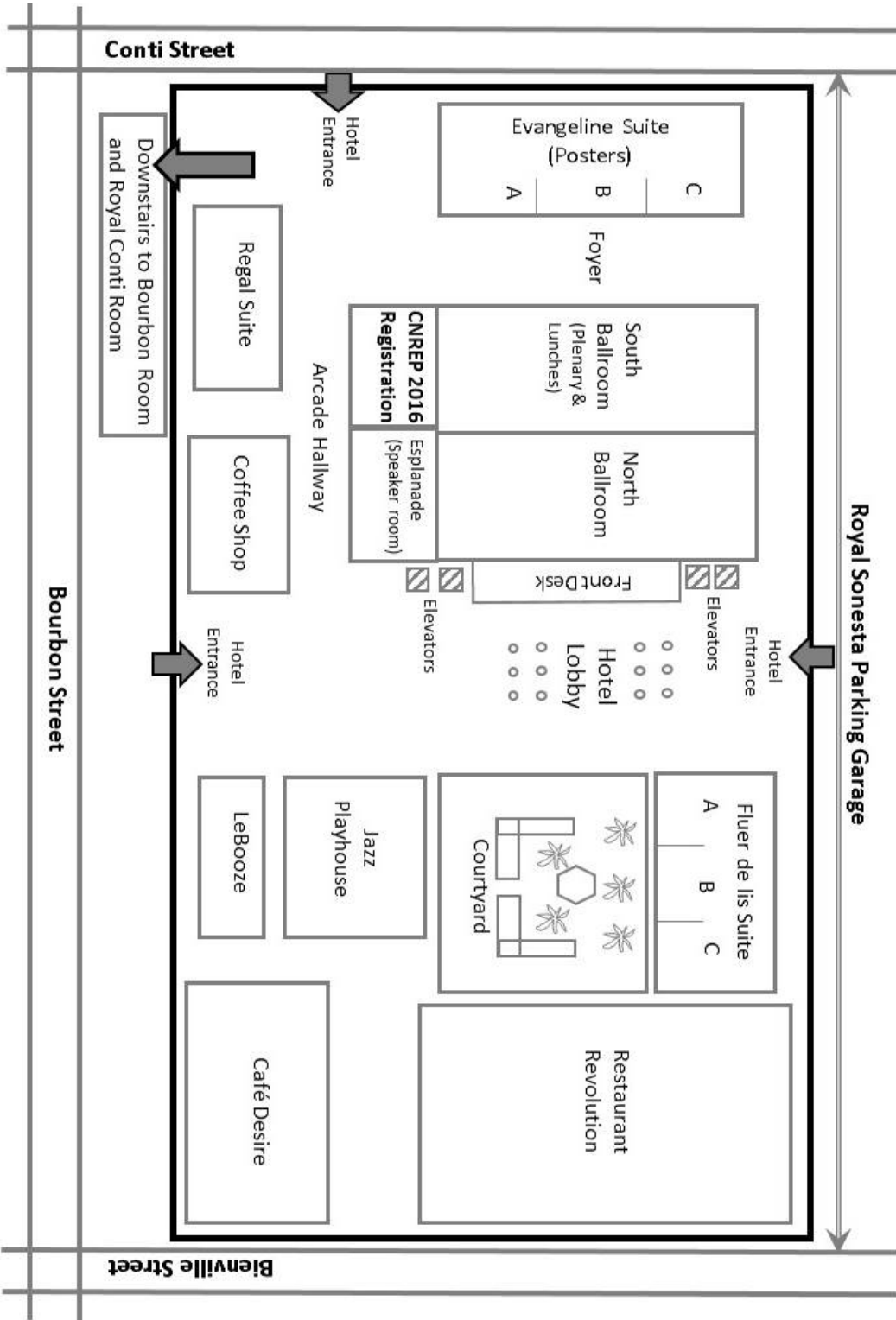
Monday, March 22, 2016 12:00 pm

Dr. Sarah J. Ryker is USGS Deputy Associate Director for Climate and Land Use Change. She is responsible for science and policy leadership, and management oversight, of the USGS Climate Research and Development Program, Land Change Science Program, Land Remote Sensing Program, National Climate Change and Wildlife Science Center, and Land Carbon Assessment of Biological Carbon Sequestration. Dr. Ryker returned to the USGS in 2011 from the White House Office of Science and Technology Policy's research center, where she led a team focused on energy and environmental research and policy. More recently, she served as Deputy Associate Director for Ecosystem Services, White House Council on Environmental Quality. In this capacity, she coauthored a CEQ policy guidance pertaining to the use of ecosystem services in federal decision-making.

[www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m-16-01.pdf](http://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m-16-01.pdf)

# Meeting Space

(Royal Sonesta Hotel - First Floor)





## CNREP 2016 Conference Agenda

<b>Sunday, March 20, 2016</b>	
<b>1:00 pm to 5:30 pm</b> Arcade	<b>Registration Desk Open</b>
<b>1:00 pm to 5:30 pm</b> Esplanade	<b>Speaker Resource Room Open</b>
<b>3:00 pm to 5:30 pm</b> Evangeline A & B	<b>Poster/Exhibit Set-Up</b>
<b>6:30 pm to 9:00 pm</b> Bourbon Balcony Suite Room 2110	<p><b>CNREP 2016 Opening Reception and Conference Social</b></p> <p>Be sure to join us on Sunday evening, March 20<sup>th</sup> for the CNREP 2016 Opening Reception and Conference Social. This event will be an opportunity to socialize with other participants while enjoying a variety of hors d'oeuvres and beverages. The reception will take place in the Royal Sonesta's premier balcony suite overlooking Bourbon Street. This reception is sponsored by the LSU Center for Natural Resource Economics &amp; Policy.</p>
<b>Monday, March 21, 2016</b>	
<b>7:00 am to 5:30 pm</b> Arcade	<b>Registration Desk Open</b>
<b>7:00 am to 5:30 pm</b> Esplanade	<b>Speaker Resource Room Open</b>
<b>7:00 am to 12:00 pm</b> Evangeline A & B	<b>Poster/Display Set-Up</b>
<b>7:00 am to 8:30 am</b> Foyer	<b>Breakfast Buffet</b>
<b>8:30 am to 10:00 am</b> South Ballroom	<p><b>CNREP 2016 Plenary Session</b></p> <p><b>8:30 Welcome and Opening Announcements</b>  Rex Caffey, Director, LSU CNREP, Professor, LSU AgCenter and LA Sea Grant  Michael Salassi, Department Head and Professor, LSU Dept. of Agricultural Economics &amp; Agribusiness  William Richardson, LSU Vice President for Agriculture, Dean, College of Agriculture</p> <p><b>9:00 Plenary Presentation</b></p> <p style="text-align: center;"><b>Climate Shock: It's Not Over 'til the Fat Tail Zings</b>  Dr. Gernot Wagner, Senior Economist, Environmental Defense Fund</p>
<b>10:00 am to 10:30 am</b> Foyer	<b>Coffee Break</b>

<p>Monday, March 21, 2016  <b>10:30 am to 12:00 noon</b>  Regal Suite</p> <p><b>Moderator:</b>  Charles Colgan  Middlebury Inst. of  International Studies at  Monterrey</p>	<p><b><i>Panel Discussion:</i></b>  <b><i>Economics of Sea Level Rise Adaptation</i></b></p> <p><b>Panelists:</b></p> <p><b>Philip King</b>  Associate Professor and Chair, Department of Economics, San Francisco State University</p> <p><b>Jack Kartez</b>  New England Environmental Finance Center, University of Southern Maine</p> <p><b>Maya K. Buchanan</b>  Woodrow Wilson School, Princeton Environmental Institute, Princeton University</p> <p><b>James London</b>  Professor Emeritus, Clemson University and London &amp; Associates</p>
<p>Monday, March 21, 2016  <b>10:30 am to 12:00 noon</b>  Fleur de Lis A</p> <p><b>Moderator:</b>  Burton Singer  Gulf of Mexico  Research Initiative  (GoMRI)</p>	<p><b><i>Human Health and Socioeconomic Assessments of the Deepwater Horizon Oil Spill</i></b></p> <p><b>Tracking Health Impacts of the Deepwater Horizon Oil Spill</b>  Matt Lee, Tim Slack and Troy C. Blanchard (Louisiana State University)</p> <p><b>The Interaction of Fisher Behavior and Fish Population Dynamics in the Gulf of Mexico: What Can an Agent-based Model Inform us about this Relationship and its effect on Stock Assessment?</b>  Steven Saul (NOVA Southeastern)</p> <p><b>Integrating Oceans and Human Health into Gulf of Mexico Research Initiatives</b>  Helena Solo-Gabriel (University of Miami)</p> <p><b>Examining the Impact of the Deepwater Horizon Spill on Community Health, Social and Economic Outcomes</b>  Shanthi Nataraj (RAND)</p>
<p>Monday, March 21, 2016  <b>10:30 am to 12:00 noon</b>  Fleur de Lis B &amp; C</p> <p><b>Moderator:</b>  Jack Isaacs  Louisiana Department of  Wildlife and Fisheries</p>	<p><b><i>Commercial Fisheries Marketing and Management</i></b></p> <p><b>Direct Marketing of Louisiana Seafood</b>  Thomas Hymel, LSU AgCenter and Louisiana Sea Grant College Program</p> <p><b>Farmers Markets and CSFs: Assessing the Viability of Two Direct Marketing Options for the Georgia Fishing Industry</b>  Tracy Yandle (Emory University), Gina Shamshak (Goucher College), Jennifer Sweeney Tookes (Georgia Southern University)</p> <p><b>Examining Changes in Connection and Competition Among Ports Through Shared Fishing Grounds</b>  Sharon Benjamin, Min-Yang Lee and Geret DePiper (NOAA, National Marine Fisheries Service Center)</p> <p><b>Entry, Exit, and Continuous Participation in Louisiana's Fisheries among Licensed Commercial Fishermen</b>  Jack Isaacs (Louisiana Department of Wildlife and Fisheries)</p>
<p>Monday, March 21, 2016  <b>10:30 am to 12:00 noon</b>  Bourbon Room</p> <p><b>Moderator:</b>  Shaun Tanger  CNREP, Department of</p>	<p><b><i>Climate Challenges and Forestry</i></b></p> <p><b>Climate Change Education in Forestry Extension: A Mississippi Case Study</b>  James Henderson, Stephen Dicke, Jason Gordon, Glenn Hughes, John Kushla, Brady Self, Courtney Siegert  John Willis (Mississippi State University)</p>

<p>Agricultural Economics, Louisiana State University</p>	<p><b>Willingness to Pay for Potential Standing Timber Insurance</b> Ian Munn and Keith Coble (Mississippi State University), Yiling Deng (Georgia State University) and Haibo Yao (Northern Michigan University).</p> <p><b>Southern Foresters' Perceptions of Climate Change: Understanding Viewpoints and Opportunities for Extension Programming</b> Leslie Boby, William Hubbard (Southern Regional Extension Forestry)</p>
<p>Monday, March 21, 2016 <b>10:30 am to 12:00 noon</b> Room TBA</p> <p><b>Moderator:</b> Pam Jenkins University of New Orleans</p>	<p><b><i>Social Perspectives on Coastal Vulnerability</i></b></p> <p><b>Climate Refugees in the Lower 48: Nonstructural Adaptation for Vulnerable Communities in the Gulf Coast</b> Robert R.M. Verchick, Shawn "Pepper" Bowen, Nowal Jamhour (Loyola University, New Orleans School of Law), Carmen Gonzalez (Seattle University School of Law), Alice Kaswan (University of San Francisco School of Law), Yee Huang (Center for Progressive Reform)</p> <p><b>View from the Ground: Nonstructural Risk reduction Strategies and Everyday Life</b> Pam Jenkins (University of New Orleans)</p> <p><b>Louisiana Coastal Tribe Resettlement: Through the Eyes of the Younger Generation</b> Dominick and Damian Naquin (Isle de Jean Charles Band of Biloxi-Chitimacha-Choctaw)</p> <p><b>Life Can only be Understood Backwards, but It Must be Lived Forwards</b> Carl Brasseaux and Donald W. Davis (Louisiana Sea Grant College Program)</p>
<p>Monday, March 21, 2016 <b>12:00 pm to 1:30 pm</b> South Ballroom</p>	<p><b>Lunch</b></p> <p><b>Welcome</b> King Alexander, President and Chancellor, Louisiana State University</p> <p>Keynote Presentation <b>A Historical Geography of New Orleans, 1700s-2000s</b> Richard Campanella, Tulane University</p>
<p>Monday, March 21, 2016 <b>1:30 pm to 3:00 pm</b> Regal Suite</p> <p><b>Moderator:</b> Mark Davis Tulane Institute on Water Resources Law and Policy</p>	<p><b><i>Panel Discussion:</i></b> <b><i>Federal Perspectives on Coastal Restoration Financing</i></b></p> <p><b>Panelists:</b></p> <p><b>Paul Olsen</b> 57<sup>th</sup> Commander, Norfolk District, U.S. Army Corps of Engineers.</p> <p><b>Mark Wingate</b> Deputy District Engineer for Project Management, New Orleans District, U.S. Army Corps of Engineers.</p> <p><b>Justin R. Ehrenwerth</b> Executive Director of the Gulf Coast Ecosystem Restoration Council</p>
<p>Monday, March 21, 2016 <b>1:30 pm to 3:00 pm</b> Fleur de Lis A</p> <p><b>Moderator:</b> Craig Landry University of Georgia</p>	<p><b><i>Climate Change and the Economics of Shoreline Management and Adaptation</i></b></p> <p><b>Shoreline Defense against Climate Change and Capitalized Impact of Beach Nourishment: Evidence from the Coastal Housing Market in North Carolina</b> Sathya Gopalakrishnan and Yun Qiu (Ohio State University)</p> <p><b>The Value of Coastal Protection: Evidence from the Oregon Coast</b> Steven J. Dundas (Oregon State University)</p>

	<p><b>Assessing the Impact of Littoral Rights and the Public Trust Doctrine on the Valuation of Coastal Amenities Within Florida Residential Property Markets</b>, Paul Hindsley (Eckerd College) and O.A. Morgan (Appalachian State University)</p> <p><b>Economic Values of Coastal Erosion Management: Joint Estimation of Use and Passive Use Values with Recreation and Contingent Valuation Data</b>, Craig Landry (University of Georgia) and John Whitehead (Appalachian State University)</p>
<p>Monday, March 21, 2016  <b>1:30 pm to 3:00 pm</b>  Fleur de Lis B &amp; C</p> <p><b>Moderator:</b>  Amy Henderson  St. Mary's College of Maryland</p>	<p><b><i>Valuation of Ecosystem Services: Revealed Preferences I</i></b></p> <p><b>Did the Housing Bust Reduce a Housing Market's Response to a Natural Amenity?</b>  Warren Kriesel (University of Georgia)</p> <p><b>Coastal Water Clarity and Housing Values in Suffolk County, New York</b>  Anthony Dvaskas and Mark Nepf (Stony Brook University) and Liz Smith (Nature Conservancy)</p> <p><b>Variability in Relative Water Quality Measures: Implications for Stability of Hedonic Price Estimates</b>  Amy Henderson and Matt Flyr (St. Mary's College of Maryland)</p>
<p>Monday, March 21, 2016  <b>1:30 pm to 3:00 pm</b>  Bourbon Room</p> <p><b>Moderator:</b>  John Douglas Daigle  Louisiana Hypoxia  Working Group</p>	<p><b><i>Economics and Policy Assessments of Hypoxia</i></b></p> <p><b>Economic Benefits of Reducing Algae at Great Lakes Beaches</b>  Frank Lupi (Michigan State University)</p> <p><b>Illinois Agriculture Conservation Practices and Gulf hypoxia: Connection or Disconnect?</b>  Craig Miller (Illinois Natural History Survey, University of Illinois)</p> <p><b>Hypoxia: Land Grant Universities Collaborative Response</b>  John Westra (CNREP, Louisiana State University)</p> <p><b>Shrinking the Gulf of Mexico Hypoxic Zone: Assessing the Options and Cost Estimates</b>  John Douglas Daigle, Louisiana Hypoxia Working Group</p>
<p>Monday, March 21, 2016  <b>1:30 pm to 3:00 pm</b>  Royal Conti Room</p> <p><b>Moderator:</b>  Lisa Schiavinato  North Carolina Coastal  Resources Law, Planning, and  Policy Center, North Carolina  Sea Grant</p>	<p><b><i>Legal Dynamics of Coastal Management</i></b></p> <p><b>The Evolution Louisiana's Coastal Zone Boundary Politics versus Science</b>  James Wilkins and Melissa Daigle (Louisiana Sea Grant Law &amp; Policy Program, Louisiana State University)</p> <p><b>The Role of Living Shorelines in Adaptation Planning</b>  Niki Pace (University of Mississippi, Mississippi-Alabama Sea Grant)</p> <p><b>The Closure of Marine Sanctuaries: Is it legal and is it wise?</b>  Terra Bowling (National Sea Grant Law Center, University of Mississippi)</p> <p><b>Planning for the Future of North Carolina's Outer Banks: Overcoming Barriers to Resilience in a Multiple Decision-Maker Environment</b>  Lisa Schiavinato, North Carolina Coastal Resources Law, Planning, and Policy Center, North Carolina Sea Grant</p>
<p><b>3:00 pm to 3:30 pm</b>  Foyer</p>	<p><b>Coffee Break</b></p>

<p>Monday, March 21, 2016  <b>3:30 pm to 5:00 pm</b>  Regal Suite</p> <p><b>Moderator:</b>  Dean Boyer  Tulane Institute on Water  Resources Law and Policy</p>	<p><b><i>Panel Discussion:</i></b>  <b><i>State Perspectives on Coastal Restoration Financing</i></b>  <b>A panel discussion with:</b></p> <p><b>Mark Davis</b>  Executive Director, Tulane Institute on Water Resources Law and Policy</p> <p><b>Paul Olsen</b>  57<sup>th</sup> Commander, Norfolk District, U.S. Army Corps of Engineers.</p> <p><b>Steve Procopio</b>  Policy Director, Public Affairs Research Council of Louisiana</p> <p><b>R. King Milling</b>  Chairman of the Board, America's Wetland Foundation</p>
<p>Monday, March 21, 2016  <b>3:30 pm to 5:00 pm</b>  Fleur de Lis A</p> <p><b>Moderator:</b>  Michael Jepson  NOAA Fisheries  Southeast Regional Office</p>	<p><b><i>Climate Change and Coastal Community Risk Assessment</i></b></p> <p><b>The Role of Subjective Risk Perceptions in Shaping Coastal Development and Adaptation</b>  Nicholas R. Magliocca (University of Maryland), Margaret Walls, Virginia D. McConnell (Resources for the Future)</p> <p><b>Determining Risk Perception and Impacts of Predicted Sea-level Rise (SLR) to Enhance Local Hazard Mitigation Planning through Knowledge Integration and Visualization Tools</b>  Matthew Bethel, Rebekah Jones (Louisiana Sea Grant College Program), Wei Wu, Patrick Biber, Hailong Huang (University of Southern Mississippi), Tara Lambeth (University of New Orleans)</p> <p><b>Changing Ocean, Changing Economics: Impact of Rising Temperatures on the Catchability and Profitability of American Lobster Fishery</b>  Jenny Sun and Fu-Sung Chiang (Gulf of Maine Research Institute)</p> <p><b>Building Climate Change into Social Indicators for US Coastal Communities</b>  Michael Jepson, Lisa Colburn Changhua Weng (NOAA Fisheries)</p>
<p>Monday, March 21, 2016  <b>3:30 pm to 5:00 pm</b>  Fleur de Lis B &amp; C</p> <p><b>Moderator:</b>  Craig Landry  University of Georgia</p>	<p><b><i>Valuation of Ecosystem Services: Stated Preferences I</i></b></p> <p><b>The Non-Market Value of the Outer Coast of Washington State: An Attribute Approach</b>  Vernon Leeworthy, Danielle Schwarzmann (presenting) (NOAA Office of National Marine Sanctuaries, Conservation Science Division), Theresa L Goedeke, Sarah Gonyo, Laurie Bauer (NOAA National Centers for Coastal Ocean Science and Center for Coastal Monitoring and Assessment)</p> <p><b>Does Environmental Preference Elicitation Depend on the Weather?</b>  Daniel Brent (Louisiana State University), Lata Gangadharan, Allison Lassiter, Anke Leroux, Paul Raschky (Monash University)</p> <p><b>Valuing Improvements to the Environmental Performance of Salmon Aquaculture on the West Coast of Canada from the Adoption of more Sustainable Technologies</b>  Kimberly Irwin, Duncan Knowler (presenting), Ryan Trenholm, Roberto Martinez-Espineira (Simon Fraser University)</p> <p><b>Making Subtle Values of Marine Ecosystem Services Visible</b>  Lina Isacs and Cecilia Håkansson (Royal Institute of Technology, Stockholm), Susanne Baden (University of Gothenburg) and Hanna Wetterstrand (Stockholm University)</p>

Monday, March 21, 2016  
**3:30 pm to 5:00pm**  
Bourbon Room

**Moderator:**  
Daniel Petrolia  
Mississippi State University

***Shellfish Pursuits I***

**Is There a Market for Branded Gulf of Mexico Oysters?**

Lauriane Yehouenou and Daniel Petrolia (Mississippi State University) and William Walton (Auburn University)

**Combining Contingent Valuation and Behavior Data to Estimate the Willingness to Pay for a Seafood Traceability Program: The Case of Gulf of Mexico Oysters**

John Whitehead, Ash Morgan (Appalachian State University) and Bill Huth (University of West Florida)

**A Guide to Shellfish Restoration & Permitting Programs**

Niki Pace (University of Mississippi, Mississippi-Alabama Sea Grant) Stephanie Showalter Otts, Terra Bowling, Catherine Janasie (National Sea Grant Law Center), Chris Boyd (Troy University)

**Case Studies on Alternative Oyster Culture: Success Stories and Lessons Learned**

Melissa Daigle (Louisiana Sea Grant Law & Policy Program)

<p>Monday, March 21, 2016  <b>3:30 pm to 5:00 pm</b>          Royal Conti Room</p> <p><b>Moderator:</b>          John Westra          CNREP, Department of          Agricultural Economics,          Louisiana State University</p>	<p><b>Lightning Round</b>          Three minute presentations:</p> <ul style="list-style-type: none"> <li>• <b>The Economic Cost of Water Quality Degradation at Milwaukee Beaches</b>          Jane Harrison (North Carolina Sea Grant)</li> <li>• <b>Ecosystem Services Valuation of the Indiana Coastal Zone</b>          Margaret Schneemann (Illinois-Indiana Sea Grant, Purdue University)</li> <li>• <b>Healthy Communities and Climate Adaptation: Volunteers as a Resource</b>          Yunuke Nyanamba (Bemidji State University)</li> <li>• <b>Dirt and Dollars: Novel Valuation Methods in Ecosystem Level Sediment Transport</b>          Moly Cisneros (CNREP/LSU AgCenter)</li> <li>• <b>How Far Away is the GOM?</b>          Mark G. Shirley (LSU AgCenter and Louisiana Sea Grant)</li> <li>• <b>Measuring the Scarcity of Shrimp and Oil using Empirical Mode Decomposition</b>          Andrew, Balthrop (New Orleans, LA)</li> <li>• <b>Sea Grant Programs of the Gulf of Mexico Oil Spill Science and Outreach: Communicating Science about the Deepwater Horizon Oil Spill</b>          Emily Maung-Douglass, (Louisiana Sea Grant)</li> <li>• <b>Following the Fish: Mapping the Flow of Commercial Catch in New England</b>          Sharon Benjamin (NOAA, NMFS, Northeast Fisheries Science Center)</li> <li>• <b>You Bought What?!</b>          David Kerner (The Tauri Group, LLC)</li> <li>• <b>How to Build Resilience in a Coastal Community</b>          Scott Thomas (Stetson Engineers Inc.)</li> <li>• <b>Louisiana Water Policy Challenges</b>          Cody Plummer (CNREP/LSU AgCenter)</li> <li>• <b>Sociocultural Considerations of Coastal Restoration</b>          Christopher Boone (Bemidji State University)</li> <li>• <b>Sustaining Ecosystem Services through Coastal Restoration Initiatives</b>          Jordan Morgan (Bemidji State University)</li> <li>• <b>Building Upstream Ambassadors for Coastal Restoration</b>          Carla Norris-Raynbird (Bemidji State University)</li> <li>• <b>To Pay or Not to Pay?: Can Upfront Acquisition of Potentially Impacted Oyster Lease Acreage make Proposed Sediment Diversions more Effective in the Long Run</b>          Jason Shackelford (Ramboll-Environ)</li> </ul>
<p>Monday, March 21, 2016  <b>5:00 pm to 6:30 pm</b>          Evangeline A &amp; B</p>	<p><b>Poster Viewing/Social</b>          Enjoy a complimentary beverage while viewing the CNREP 2016 posters during the manned poster session.</p>
<p>Monday, March 21, 2016  <b>6:30 pm to 8:30 pm</b>          Fleur de Lis Suite</p>	<p><b>CNREP 2016 Dinner-Social</b>          The Royal Sonesta Hotel banquet facilities have been reserved for the CNREP 2016 Dinner-Social to be held on Monday night, March 25th, from 6:30 to 8:30pm. The banquet will feature an expansive seafood buffet. Tickets for the banquet are \$40 per person while space exists (seating is limited to 100).</p>

## Tuesday, March 22, 2016

<b>7:00 am to 3:00 pm</b> Arcade	<b>Registration Desk Open</b>
<b>7:00 am to 3:00 pm</b> Esplanade	<b>Speaker Resource Room Open</b>
<b>7:00 am to 8:30 am</b> Foyer	<b>Continental Breakfast</b>
<p>Tuesday, March 22, 2016  <b>8:30 am to 10:00 am</b>            Regal Suite</p> <p><b>Moderator:</b>            Jason Shackelford            Environmental Manager            Ramboll Environ</p>	<p><b><i>Panel Discussion:</i></b>  <b><i>Integrated Planning for Coastal Restoration: A Net Ecosystem Services Approach</i></b></p> <p><b>Panelists:</b></p> <p><b>Valuing Ecosystems Services</b>            Mark Rockel PhD            Economist, Ramboll Environ</p> <p><b>Floodplain Dynamics</b>            Felix Kristanovich PhD, PE, CFM            Water Resources Engineer, Ramboll Environ</p> <p><b>Bringing Nature into the Discussion</b>            Greg Reub            Ecologist, Ramboll Environ</p> <p><b>Incorporating Uncertainty in a Dashboard Approach</b>            Gretchen Greene PhD            Economist, Ramboll Environ</p> <p><b>Effective Stakeholder Engagement and Developing a Policy Response</b>            Bea Covington            Economist, Ramboll Environ</p>
<p>Tuesday, March 22, 2016  <b>8:30 am to 10:00 am</b>            Fleur de Lis A</p> <p><b>Moderator:</b>            Federico Garcia            ICF International</p>	<p><b><i>Response and Mitigation of Natural Disasters</i></b></p> <p><b>Economic and Social Implications of Natural and Man-Made Disasters in Coastal Louisiana and Improvements in Hurricane and Storm Risk Damage Risk Reduction System in the last 50 years</b>            Malay Ghose-Hajra (University of New Orleans)</p> <p><b>Understanding Noncompliance With Evacuation Warnings Concerning Coastal Storms: Engaging Narratives to Illuminate Decision-making Processes</b>            Sharon Moran (State University of New York)</p> <p><b>Climate Change Adaptation: Benefit-Cost Analysis of Coastal Flooding Hazard Mitigation</b>            Will Cooper, Federico Garcia (presenting), David Ryder (ICF International) and Ben Witherell (New Jersey Department of Environmental Protection).</p>
<p>Tuesday, March 22, 2016  <b>8:30 am to 10:00 am</b>            Fleur de Lis B &amp; C</p> <p><b>Moderator:</b>            George Parsons            University of Delaware</p>	<p><b><i>Valuation of Ecosystem Services: Revealed Preferences II</i></b></p> <p><b>Beach Erosion, Beach Site Quality, and Recreation Demand: Application of Mixed Logit and Kuhn-Tucker Generalized Corner Solution Models</b>            Ashley Barfield and Craig E. Landry (University of Georgia)</p>



	<p><b>Measuring the Effects of Offshore Wind Projects on Beach Use and Tourism on the East Coast of the United States</b> George Parsons, Jenna Toussaint and Jeremy Firestone (University of Delaware)</p> <p><b>Actual vs. Hypothetical Stated Values for Recreational Fishing Permits: Experimental Evidence of Fish Tales</b> Steinback, Scott, Kristy Wallmo, Sabrina Lovell and Eric Thunberg (NOAA Fisheries)</p> <p><b>The Dilemma of Derelict Gear</b> Andrew M. Scheld, Donna M. Bilkovic and Kirk J. Havens (Virginia Institute of Marine Science)</p>
<p>Tuesday, March 22, 2016 <b>8:30 am to 10:00 am</b> Bourbon Room</p> <p><b>Moderator:</b> Andrew Ropicki Texas A&amp;M University Texas Sea Grant</p>	<p><b><i>Recreational Fisheries Economics</i></b></p> <p><b>Estimation of the Demand for Surf/Marsh Fishing in Louisiana: An Application of the Kuhn-Tucker Model</b> Hua Wang, Krishna Paudel and Rex Caffey (LSU AgCenter/CNREP)</p> <p><b>Profiling the Importance of Fishing Trips of Saltwater Recreational Anglers</b> Yeong Nain Chi (University of Maryland Eastern Shore), Ayeisha A. Brinson and Kristy Wallmo (NOAA Fisheries)</p> <p><b>Spatial Dynamics of Recreational Fish and Fisheries to Inform Restoration Strategies: A Case Study with Red Drum in the Gulf of Mexico</b> Ed Camp, Kai Lorenzen and Robert Ahrens (University of Florida)</p> <p><b>Potential Impacts of Proposed Modifications to the Gulf of Mexico Red Snapper IFQ Program</b> Ropicki, Andrew (Texas A&amp;M University), Daniel Willard (Environmental Defense Fund) and Sherry Larkin (University of Florida)</p>
<p>Tuesday, March 22, 2016 <b>8:30 am to 10:00 am</b> Royal Conti Room</p> <p><b>Moderator:</b> Kathryn E. Lea Louisiana Sea Grant College Program</p>	<p><b><i>Coastal Communication and Curriculum Development</i></b></p> <p><b>A Formative Evaluation of GoMRI Outreach Using Social Network Analysis</b> Chris Ellis (NOAA Office for Coastal Management), Stephen Sempier and LaDon Swann (Mississippi-Alabama Sea Grant Consortium)</p> <p><b>The Rhetoric of Restoration: Constructing Naturalness in the Cook County Forest Preserves</b> Nicole Evans (University of Illinois)</p> <p><b>Information Exchange between Resource Managers and Vietnamese American Fishing Communities on the Gulf of Mexico</b>, Matthew Freeman, David Hoffman, Brian Shoup, Joseph Witt (Mississippi State University) and Rebecca Schewe (Syracuse University)</p> <p><b>Taste, Preferences and the Value of Ocean Guardian: A National Marine Sanctuary Education Program</b> Danielle Schwarzmann (NOAA Office of National Marine Sanctuaries) and Seaberry Nachbar NOAA Office of National Marine Sanctuaries</p> <p><b>Graduate Certificates in Coastal Engineering and Sciences to Create Global Expertise, Promote Technological Innovation, and Enhance Economic Vitality in Louisiana Coast</b> Emir José Macari and Malay Ghose-Hajra (University of New Orleans)</p>
<p><b>10:00am to 10:30am</b> Foyer, Evangeline A &amp; B</p>	<p><b>Coffee Break and Poster/Exhibit Removal</b></p>

<p>Tuesday, March 22, 2016  <b>10:30 am to 12:00 noon</b>  Regal Suite</p> <p><b>Moderator:</b>  Melissa Daigle  Louisiana Sea Grant Law &amp; Policy Program</p>	<p><b><i>Panel: Implications of National Flood Insurance Program (NFIP)</i></b></p> <p><b>Economic and Policy Implications to Recent Changes to the NFIP</b>  Melissa Daigle (Louisiana Sea Grant Law &amp; Policy Program)</p> <p><b>Community-level Flood Mitigation Effects on Household-level NFIP Participation and Claims</b>  Eugene Frimpong and Daniel Petrolia (Mississippi State University)</p> <p><b>Post NFIP Reform Evolution and the Future of Flood Insurance</b>  Pat Skinner (Louisiana State University, LSU AgCenter)</p> <p><b>The Program for Public Information: Maximizing CRS Points for Communities</b>  Niki Pace (Mississippi-Alabama Sea Grant Legal Program, University of Mississippi School of Law) and Melissa Daigle (Louisiana Sea Grant Law &amp; Policy Program)</p>
<p>Tuesday, March 22, 2016  <b>10:30 am to 12:00 noon</b>  Fleur de Lis A</p> <p><b>Moderator:</b>  James Wilkins  CNREP, Louisiana Sea Grant Law &amp; Policy Program</p>	<p><b><i>Economic and Legal Issues with Water</i></b></p> <p><b>Code Talkers: A Report From the Frontlines of Louisiana Water Law</b>  Mark Davis and Christopher Dalbom (Tulane Institute on Water Resources Law and Policy) and James Wilkins (Louisiana Sea Grant Law &amp; Policy Program)</p> <p><b>Protecting Louisiana's Aquatic Ecosystems Amidst Increasing Needs</b>  James Wilkins (CNREP and Louisiana Sea Grant Law &amp; Policy Program)</p> <p><b>Dredging the Legal Channels of "Changing Course"</b>  Mike Heier and Harry Vorhoff (Louisiana Attorney General Office, Lands and Natural Resources section)</p> <p><b>Economic Impacts of Salt Water Intrusion in Mississippi River Valley Alluvial Aquifer and Possible Remedy</b>  Krishna Paudel, Doleswar Bhandari and Matt Fannin (CNREP, Louisiana State University) and Frank Tsai (Department of Civil and Environmental Engineering, Louisiana State University)</p> <p><b>Farm Management Practices Survey: Opportunities to Address Resource Concerns and Encourage Nutrient Stewardship</b>  Naveen Adusumilli (CNREP and LSU AgCenter), Ernest Girouard, Rogers Leonard (LSU AgCenter)</p>
<p>Tuesday, March 22, 2016  <b>10:30 am to 12:00 noon</b>  Fleur de Lis B &amp; C</p> <p><b>Moderator:</b>  Georgina M. Sanchez  North Carolina State University</p>	<p><b><i>Valuation of Ecosystem Services: Stated Preferences II</i></b></p> <p><b>Valuing Coastal Natural Capital in a Bioeconomic Framework</b>  Craig Bond and Aaron Strong (presenting) (Rand Corporation)</p> <p><b>The Future of Urban Growth and Water Demand Across the United States' Southeastern Atlantic Coast</b>  Georgina M. Sanchez and Ross Meentemeyer (North Carolina State University), Jordan W. Smith (Utah State University) and Adam Terando (United States Geological Survey)</p> <p><b>Estimating Lost Recreational Use Value of Visitors to Northwest Florida from the Deepwater Horizon Oil Spill using Revealed and Stated Preference Data</b>  John Whitehead (Appalachian State University), Tim Haab (Ohio State University), Sherry Larkin, Sergio Alvarez (University of Florida), John B. Loomis (Colorado State University), Andrew Ropicki (Texas A&amp;M University).</p> <p><b>Estimating the Value to the Public of a Buildout of the Gulf of Mexico Coastal Ocean Observing System (GCOOS)</b>  Daniel R. Petrolia (Mississippi State University), Rex H. Caffey (Louisiana State University), and J. Matthew Fannin (Louisiana State University)</p>
<p>Tuesday, March 22, 2016  <b>10:30 am to 12:00 noon</b>  Bourbon Room</p>	<p><b><i>Costs and Benefits of Coastal Restoration</i></b></p> <p><b>Estimating the Storm Protection Value of the Beach/Dune System: A Geospatial Approach</b>  Alex Braud and Norman Levine (College of Charleston, SC Sea Grant Consortium)</p>

<p><b>Moderator:</b> J. Luke Boutwell CNREP, Department of Agricultural Economics Louisiana State University</p>	<p><b>Valuing Ecosystem Services from Coastal Wetlands: Benefits and Costs of Protection from Storm Surge</b> Margaret Walls (Resources for the Future) and Celso Ferreira (George Mason University)</p> <p><b>Using the Expected Damage Function Approach to Valuing Wetlands as Storm Buffers in Louisiana</b> J. Luke Boutwell, John Westra, Rex Caffey (CNREP, Louisiana State University)</p> <p><b>Why the Mississippi River Delta will not be Restored in our Lifetime</b> Eugene R. Turner (Louisiana State University)</p>
<p>Tuesday, March 22, 2016 <b>10:30 am to 12:00 noon</b> Royal Conti Room</p> <p><b>Moderator:</b> David Yoskowitz Harte Research Institute, Texas A&amp;M University</p>	<p><b><i>Economic Assessments of the Blue-Green Economy</i></b></p> <p><b>Status and Challenges of Wetlands in Carbon Markets</b> Sarah Mack (Tierra Resources LLC), Robert R. Lane and John Day (Louisiana State University)</p> <p><b>Emerging Environmental: Creating Economic Opportunity by Addressing Environmental Challenges</b> Robin Barnes (Greater New Orleans, Inc.)</p> <p><b>Building the Gulf: Recommendations for Ensuring Restoration Benefits for Communities and Environment</b> Jeffrey Buchanan, Mary Babic (Oxfam America), Patrick Barnes (BFA Environmental), Andrew Blejwas (Nature Conservancy), John Hosey (Corps Network)</p> <p><b>The Ocean Enterprise Study: IOOS-Based Economic activity</b> Carl Gouldman (U.S. Integrated Ocean Observing System, NOAA/National Ocean Service)</p> <p><b>A Socio-Economic Observing System for our Coasts</b> David Yoskowitz (Harte Research Institute, Texas A&amp;M University)</p>
<p>Tuesday, March 22, 2016 <b>12:00 pm to 1:30 pm</b> South Ballroom</p>	<p><b>Lunch</b></p> <p>Keynote Speaker <b>Use of Ecosystem Services in Federal Decision-Making</b> Sarah Ryker, USGS and White House CEQ</p>
<p>Tuesday, March 22, 2016 <b>1:30 pm to 3:00 pm</b> Regal Suite</p> <p><b>Moderator:</b> Scott Thomas Stetson Engineers Inc.</p>	<p><b><i>Panel: Measuring Coastal Resilience</i></b> <b><i>How Can we use Resilience Assessment to Promote Resilient Policies?</i></b></p> <p><b>What is Resilience and What Contributes to Resilience in a System?</b> Scott Thomas (Stetson Engineers Inc.) and David Kerner (The Tauri Group)</p> <p><b>The Resilience Attributes Framework</b> David Kerner (The Tauri Group) and Scott Thomas (Stetson Engineers Inc.)</p> <p><b>Coastal Resilience Index</b> Tracie Sempier (University of Southern Mississippi)</p> <p><b>Ports Resilience Index</b> Lauren Land (LSU and Louisiana Sea Grant)</p>
<p>Tuesday, March 22, 2016 <b>1:30 pm to 3:00 pm</b> Fleur de Lis A</p> <p><b>Moderator:</b> Matthew Fannin</p>	<p><b><i>Economic Impacts of Coastal Business Operations</i></b></p> <p><b>Sustainable Development of Long Island's Coastal Industries</b> Sheng Li, Richard Vogel and Nanda Viswanathan (State University of New York)</p>

<p>CNREP, Louisiana State University</p>	<p><b>Cost-Earnings and Economic Impacts of Independent Marine Bait and Tackle Retail Stores in the Gulf Coast Region</b> Clifford Hutt, Sabrina Lovell and Scott Steinback (NOAA Fisheries; Office of Science and Technology)</p> <p><b>A Trends Analysis of Economic Impacts and Dependency at a Trophy Fishery, 1995-2015</b> Charles R. Parker, K. M. Hunt, S. C. Grado, M. A. Freeman, J. E. Henderson (Mississippi State University)</p> <p><b>Using Trade Data Between Counties to Define new Functional Coastal Regions</b> Matthew Fannin (CNREP, Louisiana State University)</p>
<p>Tuesday, March 22, 2016 <b>1:30 pm to 3:00 pm</b> Fleur de Lis B &amp; C</p> <p><b>Moderator:</b> Scott Hemmerling Water Institute of the Gulf</p>	<p><b><i>Socioeconomic Assessments of the Louisiana Coastal Master Plan</i></b></p> <p><b>Economic Evaluation of Coastal Land Lost in Louisiana</b> Stephen Barnes and Stephanie Virgets (Economics and Policy Research Group, Louisiana State University) Craig Bond, Nicholas Burger, Kate Anania, Aaron Strong, Sarah Weiland (RAND Corporation)</p> <p><b>Connection to the Coast: Linking Commercial Fishing to Coastal Communities</b> Stephen Barnes, Stephanie Virgets and Dek Terrel (Economics and Policy Research Group, Louisiana State University)</p> <p><b>A Place of Constant Change: Mapping Historical Resilience in Coastal Louisiana from 1950 to 2010</b> Scott Hemmerling, Water Institute of the Gulf</p> <p><b>Towards Near Term Impact Assessments of River Diversion Projects</b> Rex H. Caffey (CNREP, Louisiana State University, Louisiana Sea Grant)</p>
<p>Tuesday, March 22, 2016 <b>1:30 pm to 3:00 pm</b> Bourbon Room</p> <p>Moderator: Maryam Tabarestani Louisiana Department of Wildlife and Fisheries</p>	<p><b><i>Shellfish Pursuits II</i></b></p> <p><b>Gulf of Mexico Inshore Recreational Shrimping Survey, 2014</b> Maryam Tabarestani, Jack Isaacs* (Louisiana Department of Wildlife and Fisheries) and Alex Miller (Trace Register)</p> <p><b>An Analysis of the Influence of U.S. Imports by Products on the Gulf of Mexico Dockside Price</b> Maryam Tabarestani (Louisiana Department of Wildlife and Fisheries), Walter Keithly and Wes Harrison (CNREP, Louisiana State University)</p> <p><b>A Dynamic Demand System for U.S. Oysters by Source and the Influence of Exogenous Shocks, 1984-2014</b> Maryam Tabarestani (Louisiana Department of Wildlife and Fisheries), Walter Keithly and Wes Harrison (CNREP, Louisiana State University)</p>
<p>Tuesday, March 22, 2016 <b>1:30 pm to 3:00 pm</b> Royal Conti Room</p> <p><b>Moderator:</b> Diego Valderrama University of Florida</p>	<p><b><i>Marketing, Trade and Management of Aquaculture and Fishery Resources I</i></b> <b>Multistate Working Group Project W-3004</b></p> <p><b>The Economic Impact of Diseases on Aquaculture's Ability to Feed a Growing World Population</b> Terry Hanson (Auburn University)</p> <p><b>Landings, Discards, and Fleet Movement across Time and Space in Multispecies Fisheries: An Application to the Gulf of Mexico Reef Fish Fishery</b> Rajesh Singh and Quinn Weninger* (Iowa State University)</p> <p><b>Economic Recovery Paths of Recreational and Commercial Fishing Sectors from Natural and Technological Disasters</b> Ben Posadas (Mississippi State University)</p> <p><b>Estimating Target Densities and Costs Associated with Manual Removal of Invasive Lionfish Stocks in the Western Atlantic</b> Diego Valderrama (University of Florida)</p>
<p><b>3:00pm to 3:30pm</b> Foyer</p>	<p><b>Coffee Break</b></p>

<p>Tuesday, March 22, 2016  <b>3:30 pm to 5:00 pm</b>  Regal Suite</p> <p><b>Moderator:</b>  Bruce Lambert  Institute of Trade and  Transportation Studies</p>	<p><b><i>Challenges of Coastal Navigation and Commerce</i></b></p> <p><b>Socioeconomic Evaluation of Alternatives to Manage Shipping and Other Uses of the Channel Islands National Marine Sanctuary (CINMS) Region</b>  Theresa L. Goedeke, Sarah Gonyo (presenting), K. Eric Wolfe, Matt Poti, Dan Dorfman and Matt Gorstein (NOAA's National Center for Coastal Ocean Science)</p> <p><b>Measuring the Resilience of Coastal Transportation Assets Using Indicator and Various Data Sources</b>  Ram Barankin, Paul Kirshen, Robert Bowen (University of Massachusetts Boston)</p> <p><b>Changing Course: Geologic Potential for Lower Mississippi River Avulsion</b>  Chris Mclindon (Stone Energy)</p> <p><b>Changing Course: Economic Implications of Lower Mississippi River Avulsion</b>  Bruce Lambert (Institute of Trade and Transportation Studies) and Lynn Kennedy (Department of Agricultural Economics, Louisiana State University)</p>
<p>Tuesday, March 22, 2016  <b>3:30 pm to 5:00 pm</b>  Fleur de Lis A</p> <p><b>Moderator:</b>  Deborah Williams  Louisiana State University  CNREP</p>	<p><b><i>International Perspectives</i></b></p> <p><b>Unintended Consequences of Enforcement in a Cooperative Institution: Experimental Evidence from Tanzania</b>  Spencer MacColl (The World Bank), Paul Onyango (University of Dar Es Salaam), Matthew Reimer (University of Alaska Anchorage) and Yaniv Stopnitzky (presenting) (University of San Francisco)</p> <p><b>The Impact of ISO on Environmental Performance: An Empirical Study of Chinese Manufacturing Industry</b>  Yuan Liao and Madhu Khanna (University of Illinois at Urbana-Champaign)</p> <p><b>Do Assignment and Organizational Capacity of NGOs Matter for Climate Change Adaptation Benefits?</b>  Mohammad Nazmul Ahsan (Ministry of Water Resources, Government of the Peoples' Republic of Bangladesh) and Shinji Kaneko (Hiroshima University)</p>
<p>Tuesday, March 22, 2016  <b>3:30 pm to 5:00 pm</b>  Fleur de Lis B &amp; C</p> <p><b>Moderator:</b>  Joy Das  CNREP, Louisiana State  University</p>	<p><b><i>Agriculture and Forestry</i></b></p> <p><b>Cotton Premium Rate Heterogeneities and Implications under Climate Change</b>  Celestine Siameh, Jesse Tack, Ardian Harri, Barry Barnett (Mississippi State University)</p> <p><b>Factors Affecting the Choice of Irrigation Technologies by U.S. Cotton Producers</b>  Bijay K. Pokhrel and Krishna P. Paudel (CNREP, Louisiana State University) and Eduardo Segarra (Texas Tech University)</p> <p><b>Forest Products Trade in India: An Analysis on Regulatory Quality</b>  Joy Das (CNREP/Louisiana State University)</p> <p><b>Factors that Influence Sales of Forestry-Related Specialty License Plates in Southern United States</b>  Farhad Masum, Shaun M. Tanger, Michael Blazier (Louisiana State University) A. Gordon Holley (Louisiana Tech)</p>
<p>Tuesday, March 22, 2016  <b>3:30 pm to 5:00 pm</b>  Royal Conti Room  <b>Moderator:</b>  Diego Valderrama  University of Florida</p>	<p><b><i>Marketing, Trade and Management of Aquaculture and Fishery Resources II</i></b>  <b>Multistate Working Group Project W-3004</b></p> <p><b>Multistate Working Group Project W-3004</b></p>
<p>Tuesday, March 22, 2016  <b>6:30 pm to 9:00 pm</b>  Bourbon Balcony Suite  Room 2110</p>	<p><b>CNREP 2016 Closing Reception</b></p>

## POSTERS

### **Factors Affecting Landowners' Participation in Income-generating Activities - A Double-Hurdle Approach**

Hua Wang and Walter Keithly, LSU CNREP, Department of Agricultural Economics & Agribusiness

### **Resilience Assessment of an Isolated Military Outpost in Austere Conditions**

Scott Thomas, Stetson Engineers Inc. & Desert Research Institute

### **Impacts of Sediment Diversion Efforts: Property Rights from Erosion, Alluvion, and Dereliction and Potential Tort Recovery by Commercial Fishermen from the State**

Hunter Odom, Louisiana Sea Grant Law and Policy Program

### **Public Investment or the Economy? Understanding the Resilience of the Local Government Finances Following the 2005 Hurricane Season**

Trina Biswas, Vikash Dangal, Matthew Fannin, and Isaac Sitienei, Department of Agricultural Economics and Agribusiness, Louisiana State University, LSU AgCenter

### **Unpaving Paradise: Modeling Who Gets to Enjoy and When**

Deborah Williams and Matthew Fannin, Department of Agricultural Economics and Agribusiness, Louisiana State University, LSU AgCenter

### **Extent and Use of H-2A and H-2B Labor in Louisiana Crawfish and Alligator Production**

Surendra Osti and Jeffrey Gillespie, Department of Agricultural Economics and Agribusiness, Louisiana State University, LSU AgCenter

### **Economic Analysis of Alternative Agricultural Green House Gas Offset Market Designs**

Layla Shiva and Bruce A. McCarl, Department of Agricultural Economics, Texas A&M University

### **Ecosystem Services Valuation of the Indiana Coastal Zone**

Margaret Schneemann, Chicago Metropolitan Agency for Planning, Illinois-Indiana Sea Grant and Leslie Dorworth, College of Engineering, Mathematics and Sciences, Illinois-Indiana Sea Grant, Purdue University Calumet

### **Modelling Optimal Debris Management Procedures: Case Study of Local Governments in Coastal Louisiana**

Alejandra Brevé Ferrari and J. Matthew Fannin, Department of Agricultural Economics and Agribusiness, Louisiana State University, LSU AgCenter

### **Evaluating Disaster Recovery Programs**

Stephen Barnes, Economics and Policy Research Group, Louisiana State University

### **Willingness to Pay and Willingness to Accept Values for Irrigation Water**

Tej Gautam and Krishna Paudel, Department of Agricultural Economics and Agribusiness, Louisiana State University, LSU AgCenter

### **Results of a Survey of Commercial Fishermen Who Harvested Oysters in Louisiana**

Maryam Tabarestani and Jack C. Isaacs (Louisiana Department of Wildlife and Fisheries)

### **Coastal SEES Collaborative Research project: Integrating stakeholder objectives with natural system models to promote sustainable natural resource policy**

Chris Hayes, National Sea Grant College Program, Lisa Wainger, University of Maryland center for Environmental Science

### **Sea Level Rise Impacts on Socio-Ecological Systems in Rural Coastal Regions of the SE US: Implications for Resilience and Adaptation**

Lindsey S. Smart, Abinash Bhattachan, Matthew Jurjonas, Priscilla Morris, Alex Moody, Georgina Sanchez, Paul Tallie, Ryan Emanuel, Erin Seekamp, North Carolina State University

### **Awareness and Adoption of Soil and Water Conservation Technologies in a Developing Country: A Case of Nabajuzi Watershed in South Western Uganda**

Sarah Kagoya and Krishna P. Paudel, Department of Agricultural Economics and Agribusiness, Louisiana State University, LSU AgCenter; Daniel L. Nadhomí, Department of Geography, Geo-Informatics and Climatic Sciences, Makerere University, Kampala, Uganda

### **Effects of Climate Change on Rice Yield and Rice Market in Vietnam**

Trang Le, Department of Agricultural Economics and Rural Sociology, Auburn University

### **The Brunt of Oil demand and US-Dollar Exchange Rate: Evidence from Net-Oil Importing Countries in Sub-Saharan Africa.**

Seydina Ousmane Sene and Krishna Paudel, Department of Agricultural Economics and Agribusiness, Louisiana State University

**Factors that Influence Sales of Forestry-Related Specialty License Plates in Southern United States**  
Farhad Masum, Shaun M. Tanger, Michael Blazier (Louisiana State University) A. Gordon Holley (Louisiana Tech)

**Sustainability on the edge of risk and resources: insights from waterfront homeowners' mental models of sustainable coastlines**

Stephen Scyphers, Tarik C. Gouhier, Jonathan H. Grabowski (Northeastern University, Marine Science Center), Steven A. Gray (Michigan State University, Department of Community Sustainability), Lauren I. Josephs (The Nature Conservancy, Global Marine Initiative)

**Sea Grant Programs of the Gulf of Mexico Oil Spill Science and Outreach: Communicating Science about the Deepwater Horizon Oil Spill**

Maung-Douglass, Emily S. (Louisiana Sea Grant), L.J. Graham (Mississippi-Alabama Sea Grant), C.M.S. Hale (Texas Sea Grant), S. Sempier (Mississippi-Alabama Sea Grant), M. Wilson (UF IFAS/Florida Sea Grant).

**The Mississippi River: The heart of the region's transportation system**

Bruce Lambert, Institute for Trade and Transportation Studies, New Orleans Board of Trade

**Building community resilience to a changing Louisiana coastline through restoration of key ecosystem components: Multi-method approach**

Monica Barra, Scott Hemmerling, Tim Carruthers (Water Institute of the Gulf).

**The Chippewa 10% Project: Analyzing Ecosystem Services and Economic Impacts from Increased Perennial Cover in an Agricultural Watershed**

John Westra (LSU CNREP), Robin Moore, Andy Marcum, Steve Ewest, Terry VanDerPol, George Boody (Land Stewardship Project), Kylene Olson, Paul Wymar, Jennifer Hoffman (Chippewa River Watershed Project), Abdullah Jaradat, Jon Starr (USDA Agricultural Research Service), Brad Heins (University of Minnesota), Bruce Freske (US Fish and Wildlife Service), Rich Olsen (MN Department of Natural Resources).

## Abstracts

**Adusumilli, Naveen  
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Louisiana State University Agricultural  
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### **Farm Management Practices Survey: Opportunities to address Resource Concerns and Encourage Nutrient Stewardship**

Nutrient pollution to the waterways is ranked among the top environmental challenges in the United States. Although it is well established that agricultural Best Management Practices (BMPs) protect water quality, researchers need information on BMPs installed by farmers. Such information enables to quantify the effect of BMPs on water quality and educate farmers on the most suitable portfolio of BMPs to enhance water quality protection. Lack of data surrounding management practices currently adopted on the farm creates significant obstacles for developing incentives for on-farm investments in water quality management. A survey of crop producers and animal operations in Louisiana is administered to document the management practices and the beliefs about the relationship between farming practices and water quality. The implications of on-farm adoption of BMPs on natural resource concerns are also assessed with the help of conservation practices physical effects database of Natural Resource Conservation Service. The survey results show that at least two thirds of the respondents believe that farming practices affect water quality and have at least three recommended nutrient management practice currently on their farm. The results also show that several of the BMPs currently adopted on the farm address more than one natural resource concern and provide benefits to water quality and improve the bottom line of farms. Allowing farmers to capitalize on the economic benefits of their management practices can be a vital part of adopting more intensive management practices that are both economically and environmentally sustainable.

**Ahsan, Mohammad Nazmul** Ministry  
of Water Resources, Government of the  
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### **Do assignment and Organizational Capacity of NGOs Matter for Climate Change Adaptation Benefits?**

Global climate change is a local issue seriously affecting the environment and community worldwide. Developing countries like Bangladesh are expected to suffer most due to the adverse impacts of the climate change. A dramatic increase in the interest and concern relating to the impacts of "Climate Change (CC)" in Bangladesh is readily apparent. The consequential high level of visibility of this issue within the government, civil society and the international community has led to numerous initiatives, suggestions and promises of increased donor aid. This confluence of increasing visibility and massive increment in funding possibilities creates a number of significant institutional challenges. A clearly defined institutional framework, together with the appropriate supporting organizational capacities, are both urgent and necessary in order to strengthen the organizational structure of Bangladesh and the international aid community to align and integrate their efforts. Achieving success in responding to the challenges of climate change will rely, to a greater or lesser extent, on the nature and quality of the organizational capacity that emerge or are put in place. In this way the objectives laid out in this study can be achieved. The general objective of the study is to identify the best organizational attributes that can complement and contribute to the governmental and intergovernmental processes currently shaping climate change adaptation in Bangladesh. It is necessary for efficient resource allocation that means, funding to the efficient organizations and capacity building. Primary and secondary data were collected through extensive literature review and surveys carried out in 10 organizations and face to face interviews involving 300 beneficiaries (30 from each organization). Indigenous technology (IT) adoption was also checked with its impact on CC adaptation, as many think tanks suggest IT as an effective tool to CC adaptation. These beneficiaries and organization are selected from RVCC project (first household's level CC adaptation project in Bangladesh). Study includes observation for eight years (2002-2009) and analysis is developed within a panel data. All the data processed by using a variety of statistical and econometric packages and checked for all necessary tests. Two different models were employed to capture the significant variables in both cases of income and food intake. The preferred model (each case) among the different models is the one that passes all the diagnostic tests (Unit root test for Stationarity, White test for Heteroscedasticity, DW stat for autocorrelation, VIF for Multicollinearity and Normality test). The findings show that the organizational strength to implement CC adaptation programs lies on some specific organizational capacity attributes (i.e. number of adaptation events and objective of organization focus on climate change) and the weakest link in other organizational capacity attributes (i.e. budget allocation). Other capacity attributes show negative significant relationship. Significant relationship between organizational capacities on climate change adaptation project performance to the level of organizational capacities found in varying degrees of income and food security. Most of the organizational attributes are significant in income model but few in food intake



model. Number of adaptation activities (with indigenous technology dissemination) implemented by NGOs and objectives related to climate change play significant positive role for best implementation of adaptation project focusing on income and food intake. These organizational attributes should be given emphasis to select NGOs for particular cases. Climate change is local- specific. So, this result may not be applicable to all countries. It may be applicable to similar situations in developing countries. Along with that when appropriate organizational capacity attributes are more precisely selected by NGOs, there are more chances to build their capacity in order to implement climate change adaptation project and beneficiaries can get the best benefits from climate change adaptation.

**Balthrop, Andrew**  
New Orleans, LA

### **Measuring the Scarcity of Shrimp and Oil using Empirical Mode Decomposition**

Natural resource scarcity is a concern, both among economists, and society at large. Yet measuring scarcity is problematic. A common approach to quantifying scarcity has been to examine trends in long-run resource prices. Unfortunately, univariate time series analysis can be sensitive to model specification and to the time frame examined. Empirical Mode Decomposition offers an alternative. The method decomposes non-stationary, non-linear processes into a handful of intrinsic mode functions based on the local characteristic time scale of the data. These mode functions have economic correspondences: high-frequency modes characterize short-term supply and demand imbalances; medium frequency modes resultant from significant economic shocks are also apparent. Importantly, the ultra-low frequency and residual trends give us a nonparametric, empirically rigorous characterization of the real long-term price path, which can be interpreted as an indicator of scarcity. Using monthly time series data on commodity prices from the IMF, I analyze (and summarize) the trends of more than 50 renewable and nonrenewable commodity prices. For illustrative purposes, the paper focuses the discussion on the price of trajectories of shrimp and oil, two commodities of particular importance to the economy of the Gulf Coast.

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### **Measuring the Resilience of Coastal Transportation Assets Using Indicators and Various Data Sources**

Coastal areas all over the world are experiencing the effects of climate change. In particular, sea level rise, high storm surges, and intensive precipitation, are causing floods in these areas, resulting in excessive damage. Various academic studies and governmental projects have focused on measuring the vulnerability and the resilience of different systems, such as ecosystems, social systems and infrastructure, to climate change effects, such as frequent floods. The current study is part of a project that its purpose is to assess the vulnerability and resilience of the coastal transportation system of Massachusetts to climate change. Transportation systems are traditionally defined by the different assets they include (e.g., the roads, railroads, train station, airports, and so on), as well as the connections among them. Assessing the vulnerability and resilience of transportation systems includes a primary step of defining the criticality of the different assets, i.e., defining what are the most important assets. This step allows reducing the number of assets under the study to be manageable. Assessing vulnerabilities, in general, can be divided into three main components: assessing exposure (i.e., whether the asset will be exposed to the climate stressor), assessing sensitivity (i.e., once a given asset has been exposed to a climate stressor, what will be the magnitude of impact), and adaptive capacity (i.e., how fast will the system be able to accommodate the impacts and shift back to a normal state or what is the significance of the impact). The current study examines the Buzzards Bay area in Massachusetts, as a pilot for a framework that may be used to study the vulnerability and resilience of transportation systems in other parts of Massachusetts. This coastal area has been a subject to flooding in the past due to climate stressors. The transportation system in this area includes, inter-alia, roads, railroads, train stations, and ports. In particular, the current study focuses on the sensitivity and adaptive capacity components of vulnerability, using an indicators-based approach. According to the latter, the qualitative variables (i.e., sensitivity and adaptive capacity) are measured through different physical and socio-economic indicators, i.e., measurable attributes that are relevant to the examined asset. The area, in this case, is divided into different segments, and the indicators are measured over space and time. A part of the current study is finding new data sources (such as Remote Sensing tools) in order to measure the different indicators along with traditional data sources (such as census and other governmental data and stakeholder-based knowledge). Finally, the indicators are aggregated to a single value to assess the vulnerability and resilience of each asset or spatial unit. Consequently, policy-maker can recognize the more vulnerable parts of the system and direct adaptation efforts toward those, in order to increase their resilience to climate change.

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### **Beach Erosion, Beach Site Quality, and Recreation Demand: Application of Mixed Logit and Kuhn-Tucker Generalized Corner Solution Models**

North Carolina's beaches are imperiled by a number of forces including coastal erosion, sea level rise, storm events of increasing frequency and severity, and oceanfront development. Three primary solutions to these problems have been proposed: beach replenishment, coastal retreat, and shoreline armoring. Each of these management approaches induces changes in the quality of coastal resources, affecting the distribution of beach and dune sediments, presence and location of hardened structures, and configuration of buildings and infrastructure. These changes, in turn, affect the economic value of coastal recreation. The accurate assessment of such welfare impacts is, naturally, a critical component of the benefit-cost-analysis of these alternative proposals. To permit such analyses, we analyze revealed preference beach site choice data for a random sample of North Carolina households (data collection funded by East Carolina University and NC Sea Grant in 2013). Through the use of the NC Department of Environmental Quality's Geographic Information Systems [GIS] files, we create a site-attribute matrix for NC beaches that includes information regarding travel costs and beach length, width, amenities, and accessibility. We employ both Mixed Logit and Kuhn-Tucker Generalized Corner solution models in our analysis of recreation demand and the influence of site characteristics (many of which can be influenced by coastal policy and erosion management) on site choice and intensity of beach recreation.

**Barnes, Robin**  
Greater New Orleans, Inc.

### **Emerging Environmental: Creating Economic Opportunity by Addressing Environmental Challenges.**

From the nearly coastal City of New Orleans, to the more inland and suburban areas around Baton Rouge, the realization of coastal and urban water impacts has infiltrated public policy, discourse and decision making. Fueling this new level of interest and activity is undoubtedly the considerable resources in play as a result of the 2010 Deepwater Horizon Oil Spill: with approximately \$7 billion in related fines, penalties and settlement monies flowing into the state over the next 15 years, various institutions and interests are aligning to maximize these restoration dollars. Yet, as The Data Center's "Coastal Index 2015," illustrates, a one-time influx of funds doesn't necessarily create a self-sustaining economic cluster—a holistic ecosystem of social, political and economic forces must be in place to truly maximize such an opportunity. In Louisiana's case, such a framework has already begun to develop via the creation of the State's Comprehensive Master Plan for a Sustainable Coast, a 50 year, \$50 billion plan for restoring Louisiana's systemic coastal land loss. Additionally, the New Orleans region has engaged diverse political, social and economic leadership around the Greater New Orleans Urban Water Plan: a blueprint for living with water in the metro region.

Yet, recognizing that there is still considerable work to grow the water sector and connect these resources to innovators and profit-making ventures, GNO, Inc. is working to align Southeast Louisiana's considerable research, education and business acceleration assets with the goal of building a Super Regional Economic Cluster focused on Emerging Environmental drivers such as Energy, Waste and Water. The Dutch, for instance, derive 4-5% of their GDP from water management, 40% of which is from exporting considerable technology and services. An aspirational goal for Louisiana would be to leverage, connect and enhance our water management assets to be competitive with the Netherlands—producing similar economic benefits for the state and country over the next 30 years.

Along with these water management assets, the region has the opportunity to leverage coastal opportunities to drive workforce. As recommended in GNO, Inc.'s Analysis of Coastal Restoration Workforce Assets, Challenges, and Opportunities in South Louisiana, coastal restoration could connect with local communities to maximize opportunities for residents and returning citizens and meet the projected demand for a skilled coastal workforce as design and construction projects within the Coastal Master Plan begin to ramp up. The oral presentation will explore these concepts of water assets, untraditional workforce opportunities for community, and the collaboration of key stakeholders to drive an economic cluster for the Southeastern Louisiana Super Region.

**Barnes, Stephen  
Stephanie Virgets**

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### **Economic Evaluation of Coastal Land Lost in Louisiana**

From 1932 to 2010, Louisiana lost approximately 1,880 square miles of land, and another 1,750 square miles are at risk of being lost by 2060. Through the land loss process, wetland habitat becomes open water, the shoreline retreats, and dry inland areas subside. This process impacts infrastructure and economic activity connected to coastal Louisiana in the absence of private and public actions to guard against it. The economic impact of coastal land loss will be felt most severely in Louisiana, but these impacts will reverberate through the rest of the country and the world. This

**Craig Bond  
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research presents the findings from a joint project conducted by Louisiana State University and the RAND Corporation on the economic consequences of land loss to Louisiana and the rest of the nation, focusing on physical capital stock and economic activity at risk due to land loss in a future without action to protect and restore Louisiana's coast.

Coastal land loss directly affects some areas, but also increases storm damage to areas further inland, and this study considers both. Some land that currently holds valuable capital stock, such as homes and businesses, will be inundated over time and will diminish in value. In addition to assets directly threatened by a shifting coastline, Louisiana is losing its valuable coastal wetlands, which provide a natural buffer between storm surges and inland areas. As Louisiana's shoreline migrates inward and the remaining landscape degrades, more developed areas further inland will face greater risk of damage due to the loss of storm protection services currently provided by that land.

The analysis in this report includes estimates of damage to physical capital stocks, including residential and non-residential structures and network infrastructure, such as roads, rail, waterways, and oil and gas transportation systems. We also estimate how land loss could affect economic activity, such as business operations or employment, and how these disruptions extend to commodity and trade flows linking coastal Louisiana to the rest of the country. Finally, land loss may have important effects on ecosystem services, and although we do not calculate specific damages we classify the major categories and describe the regional economic activity in sectors directly related to ecosystem services, including fisheries and recreation.

The report provides informed, practical baseline estimates of the economic effects associated with a changing coastline in Louisiana by calculating the direct and indirect costs of projected coastal land loss in a future without action. It also provides a set of methods and data that can be used in future work to investigate the potential benefits of specific protection and restoration plans.

**Barnes, Stephen**  
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#### **Connection to the Coast: Linking Commercial Fishing to Coastal Communities**

This project consists of summarizing historical data related to Louisiana commercial fishing activity with a focus on the location of land-based operations, areas fished and the link between the two. The specific goals of this project are to summarize the geographic distribution of land-based operations of commercial fishing license holders, the geographic distribution of land-based operations of seafood dealers, the geographic distribution of areas fished, and the link between land-based operations and area fished for commercial fishing license holders. The data generated through this project provide historical context that can be used to investigate how commercial fishing activity has changed over time or study how this activity may adapt to future change. These summaries tend to show significant variation across species group and geography in the distances travelled by commercial fishing license holders and provide new insights on the distribution of activity across land and water as well as the connections between land and water. We also summarize specific species groups and fishing areas with a focus on historical trends and the influence of the following potentially disruptive events: Hurricanes Katrina, Rita, Gustav, Ike, and Isaac, the 2010 Deepwater Horizon oil spill, and Mississippi River high water events in 2008 and 2011. Particular focus was given to these four themes: Barataria Bay, Breton Sound, Shrimp, and Oysters.

**Stephanie Virgets**  
**Dek Terrell**  
Louisiana State University

**Barnes, Stephen**  
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#### **Evaluating Disaster Recovery Programs**

This research project provides an initial review and evaluation of long-term recovery programs following hurricanes Katrina and Rita in 2005. The review includes three housing rebuilding programs and an economic development focused program. The housing programs— Homeowner Assistance, Small Rental Property and Low Income Housing Tax Credit Piggyback—are the largest components of the Louisiana Road Home Program, funded by the Community Development Block Grant Disaster Recovery (CDBG-DR) program while the Business Recovery Grant and Loan program is one of the largest programs targeted specifically at economic recovery. While more research is needed to determine the full economic benefit of these programs, initial findings suggest that these three housing programs were targeted toward the areas in most need of assistance and that they were effective in helping to bring people back home to areas that had been devastated by Katrina and Rita. Moreover, the Business Recovery Grant and Loan program was successful in helping critical sectors recover more generally. This research concludes with insights for evaluation of recovery programs more generally and a broader discussion of best practices in recovery program design following large-scale disruptive events.

**Barra, Monica**  
**Scott Hemmerling**  
**Tim Carruthers**  
Water Institute of the Gulf

### **Building community resilience to a changing Louisiana coastline through restoration of key ecosystem components: Multi-method approach**

Understanding the capacity of ecosystems to provide protection services is of utmost importance for numerous coastal Louisiana communities that are not amenable to structural flood protection. In addition to providing sustainable and environmentally sound protection value, many coastal ecosystems provide cultural and economic values to coastal communities that contribute to maintaining the unique social fabric of the coast. This is exhibited in the region's unique 'working coast' wherein livelihoods are deeply tied to resources economies such as commercial shrimping and fishing, and oil and gas extraction. Despite these connections, it is a challenge to integrate scientific and community knowledge about ecosystems services together, as these groups rarely come into regular conversation with one another and often situate their understanding of the value of coastal ecosystems and landscapes in different technical and colloquial languages. In an attempt to bring these groups and their respective environmental knowledge together to develop a deeper understanding of the connections between social-cultural values and ecosystems services, the Water Institute of the Gulf is currently conducting a series of workshops among scientists, managers, and the public to synthesize the extent and diversity of services that coastal ecosystems can provide for communities.

This poster presents the findings of a workshop among social and natural scientists focusing on cross-disciplinary understandings of ecosystem services. This workshop, hosted in October 2015, was the first step towards gathering data to develop a common understanding amongst research scientists, managers and the public for more informed decision making around the prospects of integrating ecosystem services into discussions of coastal protection and community resilience. It utilizes the work of several conceptual diagrams to initiate and cultivate expert technical knowledge of social and natural scientists to synthesize understandings of community and ecosystem vulnerability and resilience. Our poster will also present details of our upcoming community mapping workshops to be held in two coastal communities in spring 2016. Using qualitative and participatory GIS based methods, these workshops will focus on: 1) mapping landscape values among groups across ecosystems; 2) what landscapes or places people feel are under threat from environmental change and should be saved and; 3) discussing the prospects of how ecosystem based adaptation and restoration can benefit their communities in terms of flood protection and cultural and economic sustainability. Data from these workshops will be used to create a series of reports, maps, and booklets that outline a framework for ecosystem based restoration.

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### **Examining Changes in Connection and Competition Among Ports Through Shared Fishing Grounds**

Distant ports and fishing communities may be connected at sea by shared fishing grounds. We describe the extent to which ports in the Northeast United States have utilized similar areas of the ocean in the Atlantic Sea Scallop fishery from 1996-2014. During this time period, the spatially delineated regulations have become increasingly important in the scallop fishery. We combine a novel method of mapping commercial fishing activity with three alternative measures (Czekanowski, Jaccardized Czekanowski, and Euclidian Distance) that capture the spatial overlap between pairs of ports. Fishing vessel logbooks typically report a single fishing location; however, fishing vessels will often fish at many sites. Our mapping method includes a statistical model of the distance between logbook reported fishing locations and observer reported fishing locations. We use the results of the statistical model to build a comprehensive, high-resolution dataset of fishing activity for commercial fisheries in the Northeast US. The scallop fishery is currently managed with a combination of input controls (Days-at-Sea) and rotational closures, areas of the ocean with high concentrations of small scallops, which remain closed until they grow larger. Notably, in 2001-2003 and 2008-2010 most of the productive areas in north (Georges Bank) were closed. In 2006, most of the productive areas in the south (Mid-Atlantic) were closed. Preliminary results suggest that the overlap indices reflect effects of the regulatory and environmental changes to fishing grounds on port-level competition for landed catch. For example, we find a striking increase in overlap between Atlantic City, NJ and the other major ports in 2008 and 2009. We interpret this as evidence that fishing vessels based in these major ports relocated their fishing activity to the Mid-Atlantic when the northern areas were closed. Geographers and regional scientists have long recognized that "near things are more related than distant things." Our preliminary results suggest that shared fishing grounds are a mechanism through which even distant things can be closely related. The indicators provide a method of quantifying overlap in fishing activity that could be used to better understand implications of regulatory and environmental change in regional fishing economies. While we use overlap metrics to characterize the overlap scallop fishery across ports, our data and methods can be extended to other margins, such as fishing gear or vessel size in any of the managed fisheries in the Northeast US.

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### **Determining risk perception and impacts of predicted sea-level rise (SLR) to enhance local hazard mitigation planning through knowledge integration and visualization tools**

Marshes are essential buffer zones between land and water in estuaries and coastal zones, they are disappearing rapidly, and those that remain are often in poor health. The most dramatic coastal marsh losses in the U.S. are in the northern Gulf of Mexico. These disappearing marshes serve as a vital habitat for a diverse and unique range of flora and fauna, a cushion between coastal waterfront-dependent communities and the open waters of the Gulf, and an integral resource for the economic and social viability of these communities. Therefore, coastal community leaders, government officials, and natural resource managers must be able to accurately assess and predict a given coastal landscape's sustainability and/or vulnerability, especially as this coastal habitat continues to undergo rapid and dramatic changes associated with natural and anthropogenic activities such as accelerated relative Sea Level Rise (SLR).

A multi-disciplinary research team has been conducting a Sea Grant funded project to use a regional approach to refine the NOAA SLR Visualization Tool for local implementation in areas experiencing two different driving mechanisms of coastal wetland habitat change (subsidence versus erosion). This collaborative research aims to determine the different ways in which two different stakeholder groups (traditional ecosystem users and resource managers) evaluate risk and plan mitigation strategies associated with coastal habitat change due to predicted SLR resulting from climate change. To achieve this goal, the research team is determining:

(1) a method for producing localized vulnerability/sustainability maps based on predicted inundation and redistribution of coastal wetlands under accelerated SLR for two regionally representative systems; the first is an ecosystem-dependent coastal Louisiana indigenous Native American community, and the second is a Mississippi natural coastal preserve. Results from physical information derived from data and modeling of subsidence, erosion, engineered restoration and coastal protection features, historical land loss, and future land prediction under SLR that are complemented with traditional ecological knowledge (TEK) offered by the collaborating local ecosystem users will be integrated for these assessments; and (2) how and whether the results of such an approach can provide more useful information for assessing localized impacts of SLR and associated risk that may later be applied across the Gulf Coast by Sea Grant and the NOAA Coastal Services Center among others. We are currently finalizing work for this research project, and intend to present the results in achieving the project objectives that includes: analyses of scientific field data collected related to marsh vegetation biomass characteristics, analyses of TEK data collected, and mapping products developed.

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### **Public Investment or the Economy? Understanding the Resilience of the Local Government Finances Following the 2005 Hurricane Season**

The 2005 hurricane season created a considerable impact on the assets of local governments. Thousands of people lost their jobs and were forced to relocate, roads and bridges washed away, courthouse school roofs blown off, and many other infrastructure and assets were severely damaged by the double-strike of Hurricane Katrina in August 2005 and Hurricane Rita in September 2005. The destruction created by these storms had the potential to put a large proportion of South Louisiana local governments under long-term fiscal stress. To bring parish governments out of financial distress, two federal government programs made substantial investments in local government infrastructure following hurricanes Katrina and Rita: the Community Development Block Grant Program (CDBG) administered federally by Housing and Urban Development (HUD) and the Public Assistance (PA) Program, a program administered through the Federal Emergency Management Agency (FEMA). Also, many parish governments took on new debt to re-invest in depreciated assets and invested in more resilient infrastructure. These investments helped parish governments across South Louisiana to improve their solvency conditions and rebuild critical infrastructure following the Hurricane season.

In this paper, a panel analysis has been done to examine the effect of different variables on the fiscal health and performance of 37 South Louisiana parishes between 2005 and 2013 following the hurricane season. Fiscal health and performance of each parish succeeding PA and CDBG Program is measured by five different variables – debt per capita, debt to asset ratio, return on assets, net revenue per capita, and debt to marketable asset ratio. Factors that takes into account some major economic shocks like the recession, oil and gas industry expansion, and state government expansion and contraction that occurred during that period has been included in the model. Variables like GDP per capita, oil price, funds per thousand population, and federal investment per capita has been included in the model to estimate their impact on the fiscal health of the local parish government. The paper further includes variables that capture the fiscal health status of each local government before 2005 hurricane season. These variables estimate how the initial fiscal health conditions of each parish can influence current economic condition. Moreover, to capture the delayed effect of the

explanatory variables, lagged values are included in the model. Same analysis were done, and results were compared after dividing parishes into two categories based the amount of financial assistance they received to recover the damages created by the hurricanes. According to the findings of the study, initial fiscal health conditions i.e. the financial situation of each parish government in 2004 can significantly influence the fiscal health and performance of parish governments following the hurricane season. Furthermore, both lagged and current GDP per capita were found to be a significant predictor of fiscal health and performance of each parish.

**Boby, Leslie**  
**William Hubbard**  
Southern Regional Extension Forestry

### **Southern Foresters' Perceptions of Climate Change: Understanding Viewpoints and Opportunities for Extension Programming.**

General affects from climate change (CC), and from specific intense weather events are already having a noticeable impact on the productivity, health and resiliency of southern U.S. forests. The majority of southern forests are owned by private landowners who manage their forests with guidance from professional foresters. These forestry professionals provide advice, direction and management strategies, therefore, their perceptions, knowledge and concerns about CC has implications for the advice they might provide.

In 2013, we conducted a needs assessment survey of southern foresters to determine their perceptions of CC, personal observations with regard to weather and climate, as well as their interest in different topics for continuing education. We found that 61% of southern foresters accept the occurrence of cc, however, only 15% of all foresters agree that it is mostly caused by humans. Thirty-one percent of foresters selected that they felt that there was not enough evidence to determine if cc was occurring or not or they were unsure, while only 6% stated that cc was not occurring. Interestingly, those foresters who accept that cc is occurring were more likely to be concerned about specific climate challenges, effectively, their responses suggested that they had experienced more events that were not "normal." Foresters' level of acceptance of cc were also linked to demographic variables: age (younger foresters were more accepting than older foresters); political affiliation (liberals/moderates were more accepting than conservatives); gender (women were more accepting than men); and state of residence (Oklahoma and Texas had the highest level of acceptance and Alabama and Mississippi the lowest levels). The survey was conducted not long after a significant drought in 2012 in Texas and Oklahoma, while conversely, Alabama and Mississippi, which have experienced little climate warming trends, had the lowest numbers of foresters who agreed that the climate was changing. This information suggests that "seeing" cc, or an extreme weather event are linked to higher acceptance of cc.

Overall, foresters had little knowledge about climate science and forest resiliency, but were interested in learning more. Based on survey results, Extension programs are being developed to meet foresters' educational needs on this topic. Additionally, we are segmenting audience needs and delivery based on their acceptance of cc and interest in climate science/change information, and willingness to learn more about resiliency. Our efforts are focused on improved forest management through resiliency recommendations for all audiences, while more receptive groups have access to education programs that favor climate science, climate variability and information on resilient forestry tools. Despite different opinions as to the existence or cause of cc, most foresters can agree that there has always been climate variability and intense weather events which affect their forests, therefore most will agree on the need for sound forest management. Therefore, our goal is to provide foresters the most up to date research-based information on how to improve their forests' resiliency, especially under changing climatic conditions.

**Bond, Craig**  
**Aaron Strong**  
RAND Corporation

### **Valuing Coastal Natural Capital in a Bioeconomic Framework**

Natural capital is a key input into human well-being. Environmental stocks, and the ecosystem services that they enable and provide, provide both direct benefits (and potentially costs) to consumers and producers and intermediate services that contribute to other forms of natural capital, which in turn may provide other direct and indirect benefits. Direct benefits have been termed "final ecosystem goods and services" or "ecological endpoints" in the literature, and are defined as entering directly into the net benefit function of firms and consumers. Those goods and services that act as inputs into additional goods are derivatives valued through their relation with the underlying final goods or endpoints. Of course, many forms of natural capital may serve multiple roles. For example, the land and trees that form a national park may provide recreational benefits (an endpoint) and provide habitat for wildlife populations (with habitat as an input that supports valuable populations).

Along the Gulf Coast of the United States, barrier islands, marshes, and swamps (hereafter "wetlands") are forms of natural capital that are viewed as both valuable and vulnerable. Louisiana

alone contains forty percent of the nations' wetlands, which provide direct benefits through storm protection and intermediate benefits to the fishing industry by providing breeding grounds for a large percentage of valuable species. However, over 1,900 square miles of land has been lost since the 1930's, with subsidence and relative sea level rise expected to further contribute to loss into the future.

A key question for policy-makers in the face of this threat is the value of the lost wetlands, both now and into the future. This paper presents a method and model that can be used to consistently value a system of interacting natural capital stocks; namely, wetlands and a fishery. The fishery is assumed to provide final/endpoint benefits to the fishing industry using a variation on the common model of a renewable resource. Wetland stocks are assumed to provide final/endpoint benefits in the form of storm protection to coastal residents, as well as habitat-augmenting or diminishing intermediate services to the fishery. As such, wetlands can be considered a "dual ecological commodity", using the terminology introduced by Boyd and Krupnick (2013). The method, extended to a two-dimensional case from Fenichel and Abbott (2014), provides a means of estimating values for this interacting system of natural capital in a theoretically-consistent manner that does not depend on the assumption of optimal behavior (nor the solution to a dynamic programming problem). We show how the model can be used to provide insight into the sources of value for the dual ecological commodity, the importance of capital gains and losses in estimating the value of a marginal unit of capital stock, and how estimates of both natural wealth and welfare gains/losses can be calculated. We also present two examples of how policy changes can affect both the valuation of the capital stocks and the net present value of following a particular behavioral rule over the course of the planning horizon.

**Boone, Christopher**  
Bemidji State University

#### **Sociocultural considerations of coastal restoration**

To greater and lesser degree, culture derives from the natural world around us. Having lived on east and west coasts and now in Northern Minnesota at the headwaters of the Mississippi, I have observed a somewhat less direct relationship between natural resources and culture. Here in Louisiana, the interdependency of culture and natural resources is pronounced. This is what drew me to volunteer with Common Ground Relief – the opportunity to experience the strength of relationship between natural resources and culture....and to better understand what the degradation and potential loss of natural resources means to the sustainability of culture. From food, to music, to community celebrations, I will share what I have learned about the historical bond between the resource rich Louisiana coast and the unique culture that has flourished because of it. From my 'outsider' perspective I will speak to why coastal restoration in Louisiana is important to our national heritage...and must be valued by everyone 'upstream'.

**Boutwell, J. Luke**  
**John Westra,**  
**Rex Caffey**  
Center for Natural Resource Economics  
and Policy, LSU AgCenter

#### **Using the Expected Damage Function Approach to Valuing Wetlands as Storm Buffers in Louisiana**

Communities along the US coast are highly vulnerable to coastal storms. Trends in population growth, climatic events and land use are likely to exacerbate future damages. Coastal management entities are faced with decisions about how to manage resources in a manner that improves environmental quality and provides the maximum benefit for coastal populations. This is particularly true in Louisiana, where coastal storms are common, land loss is rapid and the state's ambitious Coastal Master Plan allocates billions of dollars to coastal restoration projects. Many of these projects are intended to mitigate hurricane damages by using wetlands as storm buffers. The physical science literature shows that wetlands do provide situational protection from storm surge. However, little economic analysis has explored the effect of wetlands on economic losses. This analysis uses hurricane simulation data to estimate parish-level damages based on observed damages from coastal storms making landfall in Louisiana from 1997-2008. Using a method called the Expected Damage Function Approach, a model describing these damages as a function of wetland area, socio-economic conditions and storm intensity allows the estimation of the value of wetlands for their protective ecosystem services under various contexts and future scenarios. These results describe the cost of wetland loss in Louisiana as well as the benefits provided by wetlands in terms of climate risk mitigation. These results are discussed as they relate to the theoretical concept of economic value and how they can be used to aid management activities. The implications of these findings are significant for coastal restoration decisions in a changing environment.

**Bowling, Terra**  
National Sea Grant Law Center  
University of Mississippi

#### **The Closure of Marine Sanctuaries: Is it legal and is it wise?**

Biscayne National Park, located in southeast Florida, has seen a precipitous decline of fish stocks and habitat, diminished in large part due to overfishing and heavy boat traffic. To counter these impacts,

the National Park Service's new management plan for the park includes a "no fishing" marine reserve and expands "no motor" zones, restricting the public's use of the park. The new plan has been controversial, with some recreational users and commercial fishing groups claiming that the new plan will negatively impact the local economy and put undue pressure on other nearby natural resources. This presentation will first provide an overview of the legal tools available to establish marine protected areas like Biscayne Bay, including the authority of federal agencies to limit and close fisheries and limit boat use in these areas. The talk will also highlight how adopting and implementing such habitat management policies, while beneficial to the marine environment, may impact local coastal communities, including their economies.

**Brasseaux, Carl A.**  
**Donald W. Davis**  
LSU Sea Grant College Program

### **Life can only be understood backwards, but it must be lived forwards**

Drawing upon nearly 100 years of collective research experiences in the various geographic provinces of the upper Gulf Coast, we hope to share some of our findings and concerns. We matriculated through institutions of higher education during a period when research was predicated on the ability to use academic libraries, work in courthouses, and run the rural back roads in search of knowledgeable indigenous informants. We appreciated the physical and human sides of the landscape and learned to walk in lockstep with our eyes on both sides of the geographic equation. Our academic trajectories were different, but our interests, methodologies, and goals were essentially the same: Seek out, thoroughly investigate, and fully digest the oldest extant records, while coaxing complementary information from such then non-traditional sources as interviews, material culture, lithographs, and early photography. Every bit of unearthed minutia became tesserae in the complex mosaics that coalesced to form our interpretive visions of the assembled data. We never drew conclusions until the last smidgeon of data was drawn from the final available resource.

Much has changed since our graduate school glory days and our long years in the academic trenches, thanks in large part to a paradigm shift in approaches to research problems. For an emerging generation weaned on digital technology, the library has been replaced by online resources. Young researchers' increasingly absolute preoccupation with websites has resulted in a shocking neglect of invaluable, so-called traditional resources that researchers cannot access wirelessly from the comfort of their household easy chairs (pajamas and fuzzy slippers optional). In this environment, the seductive subliminal message of digital technology's siren song is inescapable: if data is not online, it either does not exist or is too unimportant to bother unearthing. There is, consequently, an emerging misconception among Gulf Coast scholars that there are no valuable resources predating the 1950s (where the backward trail of available online historical materials generally ends). We believe that the time has come to reconnect a generation of scholars with the rich, under-utilized informational legacy that our predecessors have bequeathed to us. We hope to initiate this process by providing a sampler of materials (both in so-called "traditional" form or only recently digitized) that are routinely overlooked by modern researchers. Representative examples include resources found in Paris, Seville, Quebec, Washington, Chicago, New Haven, Berkeley, New Iberia, Lafayette, Baton Rouge, and New Orleans.

**Braud, Alex**  
**Norman Levine**  
College of Charleston  
SC Sea Grant Consortium

### **Estimating the Storm Protection Value of the Beach/Dune System: A Geospatial Approach**

A combination of anecdotes and post-imagery during the aftermath of Hurricane Sandy demonstrated the variety in scale of impacts incurred by coastal communities dependent on the type of coastal protection provided. Particularly, natural or recently constructed dunes suggested better protection in terms of property damage than other types of coastal protection or lack thereof. At a point where storm severity is predicted to increase, coastal development is on the rise, and beach nourishment challenges are growing, the protection values of the dune/beach system on reducing property damage is of growing importance. This study attempts to measure the value of the beach/dune system in storm protection and how it varies among different dune characteristics. Utilizing HAZUS-MH, the Federal Emergency Management Agency standardized GIS-based software that measures potential losses from hurricane winds and floods, a damage avoidance cost method will be performed by simulation with and without the established dune structure. Due to the geospatial manner of the study, a regression based equation can be calculated to enable a functional benefit transfer model. This information will allow decision makers to better analyze the need to maintain or establish coastal dunes as well as recognize potential opportunities a community can pursue in building resilience.



**Brent, Daniel**  
Department of Economics,  
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**Lata Gangadharan**  
**Allison Lassiter**  
**Anke Leroux**  
**Paul Raschky**  
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**Buchanan, Jeffrey**  
**Mary Babic**  
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**Patrick Barnes**  
BFA Environmental

**Andrew Blejwas**  
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**John Hosey**  
Corps Network

**Buchanan, Maya**  
Rutgers University

**Caffey, Rex**  
CNREP, Louisiana State University

### **Does environmental preference elicitation depend on the weather?**

This study evaluates if valuation of environmental services associated with local water management varies with weather. Given the evidence that preferences are state dependent, it is theoretically consistent that recent weather events may affect survey responses if weather is relevant to the task at hand and if the recent weather affects beliefs about future weather. We examine three hypotheses: that survey respondents will change their valuation of benefits over time; that both typical weather variation and extreme events will lead to changes; that these changes are not distributed equally over the population. By examining two waves of household survey data that were conducted over a two year period in Australia we explore changes in stated consumer preferences both across and within households. We examine the relationship to normal, seasonal temperature abnormalities, and the shock of a flash flood. Results indicate that preferences are relatively stable through temperature changes and flooding and that the observed variability in weather is not sufficient to induce a state change. The results are promising for practitioners that must elicit preferences for weather-related attributes or risk assessment, yet cannot control the weather. This will be an important strain of research in coastal areas in order to properly disentangle short run events from long run trends when conducting nonmarket valuation.

### **Building the Gulf: Recommendations for Ensuring Restoration Benefits for Communities and Environment**

As the Gulf Coast region begins an historic investment in repairing its coast, it faces a significant new opportunity: it can tap into the local workforce as it prepares the next generation of environmental stewards and restoration professionals. This report examines recent examples in the Gulf, best practices and challenges for integrating workforce development into ecosystem restoration highlighting opportunities to tackle the Gulf Coast's largest ecological challenges while building new ladders of economic opportunity for local workers. Specifically, the report focuses on defining challenges and best practices for collaboration of actors involved in ecosystem restoration: federal, state and local agencies, along with private sector contractors, educational institutions, and workforce and community agencies. By developing partnerships, leveraging funding, and integrating initiatives, these actors can prepare local workers for new careers planning, constructing, and administering restoration projects. By tackling both environmental and economic objectives, stakeholders can build more resilient and prosperous communities. The report reviews recent state and federal level policies and the necessary partnerships and collaboration are needed to move these policies towards implementation.

The findings were developed from an October 2014, Oxfam America, The Nature Conservancy, BFA Environmental and the Corps Network hosted expert convening at a workshop in Gulfport, MS, to identify challenges and opportunities in integrating workforce development into future ecosystem restoration projects. The meeting pulled together experts from the above referenced sectors across all five Gulf Coast states. In discussions and presentations, they examined a series of case studies of current ecosystem restoration training efforts, as well as hurdles in working together to build workforce development into future projects. In the end, this interdisciplinary group identified a set of best practices and key learnings. Additionally the report includes case studies analyzing labor needs including necessary skills and background of six recent representative ecosystem restoration projects across an array of resource restoration types and phases including hydrological restoration, living shore construction, oyster reef construction and monitoring, and marsh creation construction and design. The goal of this report is to provide stakeholders with an overview of promising models and key steps for incorporating local training and hiring into restoration. Among the key findings: Avoid setting economic and environmental goals in opposition; Work with employers and workforce agencies to identify in-demand restoration careers; Leverage additional sources of funding for preparing workers in restoration skills; Develop a hands-on curriculum with industry approved credentials and pathways to living wage jobs; Work with community partners to identify those most in need of economic opportunity, and go where they are to help overcome barriers; and Form coalitions and partnerships across sectors, to track outcomes, and ensure efforts build off one another.

### **Panelist - Economics of Sea Level Rise Adaptation**

#### **Evolving Economics: Towards near term impact assessments of river diversion projects**

The scientific assessment of river diversions in coastal restoration has historically focused on technical considerations of hydrology, geomorphology, structural engineering, and ecological response. To date, economic analysis has been limited to programmatic justification and relative

cost-efficacy comparisons between competing projects. Accordingly, baseline socioeconomic data has been collected and analyzed over fairly large spatial and temporal scales (e.g. basin-wide, coast-wide; decadal, 20y, 50y). As programmatic emphasis transitions into engineering and design; however, the resolution and analysis of socioeconomic data must increase to address more detailed questions related to project feasibility, efficiency, and the trade-offs in ecosystem services for varying operational regimes. This presentation examines the history and evolution of economics in support of, and in response to, Louisiana's coastal restoration efforts over the past three decades. Specific focus centers on the outcome of diversion socioeconomic workshops sponsored by NOAA in July 2014 and October 2015 - at which participants discussed the merits and mechanics of commissioning near-term (1-5y) socioeconomic analyses to complement to long-term projections of diversion-based net benefits and costs. Implemented at sub-basin scale, and for specific sectors, near-term impact analyses can help to address distributional and transition effects (positive and negative) to private property and commercial operations. The presentation concludes with a conceptual overview of the biophysical linkages needed to inform such assessments, and the various economic methods through which impacts might be examined under various contexts (e.g. NEPA compliance, mitigation, dispute resolution, compensation).

**Camp, Ed**  
**Kai Lorenzen**  
**Robert Ahrens**

Program of Fisheries and Aquatic  
Sciences, School of Forest Resources  
and Conservation, University of Florida

### **Spatial dynamics of recreational fish and fisheries to inform restoration strategies: a case study with red drum in the Gulf of Mexico**

Recreational fisheries are complex socioecological systems that provide direct connections between Gulf biological resources and the economies, health and well-being of coastal communities. These systems can be strongly impacted across spatial and temporal scales by environmental disturbances such as oil spills or hurricanes. Proposed and ongoing restoration must be implemented in spatially explicit contexts (e.g. specific state shorelines, regions or habitats), but success of these programs often depends on relevant Gulf-wide processes (e.g. population dynamics of Gulf fish stocks). Poorly understood spatial linkages between broader processes and local dynamics may hamper efficient restoration of recreational fisheries. Here we evaluate how two key processes with spatial dynamics—fish larvae recruitment to juvenile states and angler spatial or “home” ranges—may affect the efficacy of management actions aimed at restoring recreational fisheries important to coastal communities. To accomplish this, we use the Gulf of Mexico red drum fishery as a case study. This species was selected due to its ubiquitous popularity throughout the Gulf, and also because red drum act as key trophic linkages across spatial scales, recruiting as juveniles to marsh habitats and aggregating as adults to spawn in offshore waters. We developed a spatially explicit, bioeconomic model of a red drum recreational fishery and used this model to simulate an environmental disturbance that was assumed to negatively affect local red drum recruitment and subsequent demand for red drum recreational fishing in along a subsection of the coastal area modeled. We then evaluated what effect alternative assumptions regarding spatial dynamics of red drum larval recruitment and red drum angler effort dynamics might have upon the efficacy of restoration actions intended to ameliorate local disturbance-related declines in market activity within the associated human coastal community. Our results suggest that the more spatially diffusive recruitment patterns, would, *ceteris paribus*, lead to faster recovery of the coastal community market activity, whereas greater “home ranges” of anglers would elicit more severe market activity impacts. This proof-of-concept work has important implications for future fisheries research and restoration actions. First, the temporal immediacy and duration of necessary restoration is partially a function of spatial patterns of larval diffusion and recruitment, which are likely to vary by species but have rarely been described. Secondly, the spatial ranges characterizing angling populations targeting a particular species are important for gauging the necessary intensity of restoration actions. While angler spatial ranges are largely discoverable given available information of marine recreational fisheries, they have rarely been assessed. Incorporating this information will promote better evaluations of specific restoration strategies aimed at supporting coastal communities after episodic environmental disturbances.

**Chi, Yeong Nain**  
Department of Natural Sciences  
School of Agricultural and Natural  
Sciences, University of Maryland  
Eastern Shore

**Ayeisha A. Brinson**  
Office of Science and Technology  
NOAA Fisheries

**Kristy Wallmo**  
Office of Science and Technology  
NOAA Fisheries

### **Profiling the Importance of Fishing Trips of Saltwater Recreational Anglers**

Using data collected from the 2013 National Saltwater Angler Survey, this study examined respondents' answers to fifteen statements regarding the importance why people fish to discern patterns from individuals' preferences, and to classify groups exhibiting common patterns of responses. These statements were condensed into five dimensions using the principal components analysis. Empirical results based on the two-stage cluster analysis identified three groups of respondents. Statistical tests were conducted to identify significant differences among the clusters. A series of t-test, Chi-squared test, one-way ANOVA, and MANOVA were employed that can detect the gender and region differences on fishing motivation factors and groups. Results of this study provide insight into the understanding of fishing motivations among saltwater recreational anglers for saltwater recreational fishing planning and management purposes.

**Cisneros, Molly**  
Center for Natural Resource Economics  
& Policy  
Louisiana State University

### **Dirt and Dollars: Novel valuation methods in ecosystem level sediment transport**

Sediment management on the lower Mississippi River has recently become a key part of Louisiana's effort to restore its rapidly deteriorating coastline. With reductions in sediment load due to upstream dams and river channelization leading to changes in the deposition patterns, the Mississippi River delta is currently experiencing a NUMBER net loss of land. This land is economically as well as environmentally valuable. In past studies, the sediment that builds it has been assigned value based on delta-specific roles, or the amount charged by industry for extraction and placement. In this study, Mississippi river sediment is valued by integrating physical data of sediment loads and movement with economic non-market valuation methods. Traditionally, mass-balance analysis in a system is used in the physical sciences. We used sediment budgets at various basin scales and the historic net transport of alluvial sediments were used to economically value Mississippi River based on 1) value of the sediment before transport; 2) value of the sediment after transport; and, 3) time spent in transport. This allows the sediment's full life cycle to be considered, rather than just the role it plays once deposited in the delta. As this question, to the best of our knowledge, has not yet been answered in such a way, the exact methods to evaluate the data are still being determined. However, the importance of this study is huge, as the findings can be used to address lingering questions regarding the financial value of sediment resources leaving the system. This estimate will be crucial in developing management plans along the entire river valley, specifically the diversion plans and Louisiana Master Plan currently in development.

**Colgan, Charles S.**  
Center for the Blue Economy  
Middlebury Institute of International  
Studies at Monterey

### **The Economics of Sea Level Rise Adaptation: Defining a Research Agenda**

Sea level rise has been occurring and is projected to accelerate with climate change. The risks of sea level rise for coastal communities and the nation have been made clear through storms such as Katrina and Sandy, and some communities such as in South Florida have begun to make serious financial commitments to developing adaptive responses to sea level rise. But beyond those areas where the risks are most plainly seen (and even in those areas to some extent) there remains widespread uncertainty about what can and should be done to adapt to the sea level rise already very likely to occur in the ocean-atmosphere system let alone that which could occur if global efforts at mitigating climate change.

Much of this uncertainty surrounds the economics of sea level rise adaptation, and there is relatively little research on this topic to help communities and coastal residents resolve the uncertainties and make plans to take effective action. Among the issues requiring attention: (a) how will changes in ecosystems from sea level rise be reflected in the values of ecosystem service (b) how to finance adaptive measures in both the public and private sectors when payoffs may be too distant for traditional benefit-cost analysis to be helpful; (c) what are the vulnerabilities of local and regional economies to short and long term disruptions from damages to shoreline property and infrastructure and how can these vulnerabilities be addressed? (d) How can future projections of sea level rise and risks be matched to future evolutions of local and regional economies? (e) What role should insurance (public and private) play in shaping incentives for adaptation? This panel will initiate a discussion designed to define a research agenda for economists to address the emerging issues of sea level rise adaptation. The panel will be asked to identify major research questions, theoretical perspectives, and empirical/methodological approaches and will engage the audience in the formation of the agenda.

**Cooper, Will**  
**Federico Garcia**  
**David Ryder**  
ICF International

### **Climate Change Adaptation: Benefit-Cost Analysis of Coastal Flooding Hazard Mitigation**

The damage caused by Hurricane Sandy had far reaching repercussions up and down the East Coast of the United States. Vast coastal flooding accompanied the storm, inundating homes, businesses, and utility and emergency facilities. Since the storm, projects to mitigate similar future floods have been scrutinized. Such projects not only need to keep out flood waters, but also be designed to withstand the effect that climate change might have on rising sea levels and increased flood risk. In this study, we develop an economic model to assess the costs and benefits of a berm (sea wall) to mitigate the effects of flooding from a large storm. Where possible, we use the FEMA Benefit-Cost Analysis toolkit to develop estimates of avoided damages and loss of function based on flood depth. We account for the lifecycle costs of the project, which include those for the upfront construction of the berm, ongoing maintenance, land acquisition, and wetland and recreation zone construction. Benefits of the project include avoided fatalities, avoided residential and commercial damages, avoided utility and municipal damages, recreational and health benefits, avoided debris removal expenses as well as avoided loss of function of key transportation and commercial infrastructure located in the area. Our estimate of the beneficial effects of the berm includes ecosystem services from wetlands and health benefits to the surrounding community from a park and nature system

**Ben Witherell**  
New Jersey Department of  
Environmental Protection

constructed along the berm. To account for the effects of climate change, and verify that the project will maintain its effectiveness over the long term, we allow the risk of flooding to increase over time. Over our 50-year time horizon, we double the risk of both 100- and 500-year flood events to account for the effects of sea level rise on coastal flooding. According to our findings, the present value of the benefits exceeds the present value of the costs, which lends support to the project.

**Daigle, John Douglas**  
Louisiana Hypoxia Working Group

### **Shrinking the Gulf of Mexico Hypoxic Zone: Assessing the Options and Cost Estimates**

The Mississippi River/Gulf of Mexico Watershed Nutrient Task Force has revised the central goal of the national "Action Plan for Reducing and Controlling Hypoxia in the Northern Gulf of Mexico" (2008), moving the date for achieving an average annual aerial extent of 5000 square kilometers (1950 square miles) for the annual area of low oxygen in the Gulf from 2015 to 2035. The Task Force committed to an "Interim Target" of achieving a reduction of 20% in nutrient loading to the Gulf from the Mississippi/Atchafalaya River system by 2025. A number of recent papers have attempted to arrive at cost estimates for achieving the 5000 square kilometer goal - Kling et al (2014), McClellan et al (2015), and Whittaker et al (2015). Each paper works from some common and different assumptions and modeling parameters, generally incorporating standard agricultural management practices for which more data exists. An additional frame of reference comes from another paper, that other recent paper, Santi et al (2014) concluded that current conservation practices in the Mississippi River Basin have reduced total nitrogen (TN) loading to the Gulf by 17%. This presentation will summarize these papers and what they tell us about what reducing the Gulf hypoxic zone might ultimately cost, attempting to factor in other assessments of ecosystem services in the basin and Gulf and potential contributions from wetland protection and restoration, floodplain reconnection, and other methods not directly related to agricultural management.

**Daigle, Melissa**  
Louisiana Sea Grant Law & Policy Program

### **Economic and Policy Implications to Recent Changes to the National Flood Insurance Program**

The Biggert-Waters Act was signed into law on July 6, 2012, and implemented sweeping reform to the pricing of flood insurance policies under the National Flood Insurance Program. These reforms were intended to help slow the ever-growing debt of the NFIP, but were met with great resistance across heavily-impacted communities. As backlash grew, legislators looked for a way to undo some of the impacts faced by residents. The Homeowner Flood Insurance Affordability Act of 2014 went into effect April 1, 2015. While this Act removed policy rate increases for some property owners, it did not undo all of the changes made by Biggert-Waters. Additionally, rate increases will continue to be a concern for communities, as the program is still facing a large amount of debt as, in many areas, flood risks continue to increase. This panel will examine the economic and policy implications of changes to the NFIP and how those changes are impacting coastal communities across the Gulf. Additionally, the panel will examine potential ways a community can address past and future rate increases to minimize impact on their residents.

**Daigle, Melissa**  
Louisiana Sea Grant Law & Policy Program

### **Case Studies on Alternative Oyster Culture: Success Stories and Lessons Learned**

In 2012, the Mississippi-Alabama Sea Grant Legal Program and the Louisiana Sea Grant Law & Policy Program began a regional project to examine the feasibility of using the value of ecosystem services by oyster farming to offset regulatory fees. The project team provided an inventory of submerged lands leasing programs in each of the five Gulf states. This presentation will discuss the policies examined, including the general regulatory framework for the Gulf and when agencies may deviate from the set fees, as well as look at case studies from other locations across the country.

**Das, Joy**  
Department of Agricultural Economics,  
Louisiana State University

### **Forest Products Trade in India: An Analysis on Regulatory Quality**

The study examines a panel of trade flows during 2009-2013, exploring the influence of regulatory quality on the pattern of forest products imports by India from 143 partner countries. Coastal trade plays a major role in India's economy. The Indian Ocean surrounds India on three sides. The west coast is bordered by Arabian Sea and the east coast is bordered by Bay of Bengal. There are about 13 major ports and 185 minor ports along 4,660 miles long coastline in India. The study applies a pooled regression model followed by Generalized Least Squared (GLS) technique and a more robust Feasible Generalized Least Squared (FGLS) method of estimation with regulatory quality, distance between the partner country and India, total forest area of partner country, GDP and population indicators to assess the impact of regulatory quality and other trade-related factors on imports of forest products by India. The results support the notion that imports of forest products depend on regulatory quality, the distance between the trading countries, forest cover, the size of the economy

and other factors considered in the model. The study also considers the impact of regional variability on forest products imports by India. Quantitatively, results suggest that regulatory quality of partner country has positive effects on imports of forest products by India. Distance has a negative effect on import volume, whereas forest area of partner country and GDP of partner country have positive effects on forest products imports by India. Thus, it confirms that while improvement in regulatory quality of partner countries contribute to improved imports, improvements in the GDP of partner country and increase in the total forest area are equally important in facilitating the growth of forest products imports by India. This improvement implies policy emphasis on the governance, economy and environment of the trading countries and, are important to support the furtherance of the volume of trade flows across countries.

**Davis, Mark**

**Christopher Dalbom**

Tulane Institute on Water Resources  
Law and Policy

**James Wilkins**

Louisiana Sea Grant Law & Policy  
Program, Louisiana State University

#### **Code Talkers: A Report From the Frontlines of Louisiana Water Law**

Rising seas, collapsing coasts, and ever-evolving demands on water resources for energy development, coastal restoration, healthy coastal ecosystems, increasing human consumption, and a myriad of other uses are forcing Louisiana to reassess its relationship with water and to revisit the legal and policy architecture of water management. Through the efforts of such entities as the Louisiana Water Resources Commission (LWRC), the Coastal Protection and Restoration Authority, the New Orleans Sewerage and Water Board, and the Louisiana State Law Institute (LSLI), great strides have been made in understanding and explaining the vital role that water plays in the ecologic, cultural and economic vitality of the State and the nation. Bold plans and programs have been developed to sustainably promote that vitality, but those plans and programs all depend on the availability and management of water resources whose legal status is nebulous at best. The need to clarify the legal status of water and its uses has been recognized in recent reports by the LWRC (2012 and 2013) and the Louisiana State Law Institute (LSLI) (2014). Most recently, the Louisiana State Senate called for the LSLI to develop a "water code" for Louisiana (SR 171 (2014)). The authors are part of that effort. While this code project will build on the experience of other states and model water codes, it will be ground-breaking in its efforts to integrate science and clear public interest and public trust principles (as required by Louisiana's constitution). This will make the project of paramount importance to the future of Louisiana as well as being a model for other states to learn from.

**Davis, Mark**

**Dean Boyer**

Tulane Institute on Water Resources  
Law and Policy

#### **A Matter of National Concern: Securing Federal Funding for Coastal Louisiana**

Federal contributions in Louisiana's coastal zone have chiefly come in the form of levee construction and shipping channel dredging/maintenance. Through the Coastal Wetlands Planning, Protection and Restoration Act, federal funds are made available for wetlands restoration projects, provided that the state is responsible for 15% of the cost of a given project. Other federal projects can require cost shares of 35% while the practicalities of competing for federal funds can require cost shares as high as 50%. One way or another though, additional federal investment is likely to be essential to the future sustainability of coastal Louisiana and its communities. As sea levels rise, infrastructure critical not only to the state but the nation as a whole will be put at risk. Infrastructure in coastal Louisiana supplies 90% of the nation's outer continental oil and gas, 20% of the nation's waterborne commerce, and 26% of the continental U.S. seafood by tonnage. The transportation, energy, and military infrastructure of the region are not only of national concern but potentially matters of national security. The continued viability of this and other infrastructure in south Louisiana is in the national interest and will require federal funding to preserve. This paper will look at potential avenues for federal investment and ways to leverage the state's existing funds (and political capital) to receive meaningful and consistent federal funding.

**Davis, Mark**

**Dean Boyer**

Tulane Institute on Water Resources  
Law and Policy

#### **Blood From the Turnip: Exploring Potential Sources of State Revenue for Coastal Restoration**

Louisiana has set forth an ambitious plan for coastal restoration and protection, exemplified by the state's Coastal Master Plan. Money from mineral and oil revenues, the Deepwater Horizon settlement, and interagency transfers will help the state implement many of the projects necessary for long term sustainability. Currently, however, the state does not have enough to accomplish all the projects and programs necessary for the long-term viability of the region. The state must explore any and all potential funding streams, including increased mineral revenues, groundwater severance fees, taxes, public-private partnerships and other creative solutions. This paper will examine potential sources of funds as well as the practical and political hurdles that will need to be cleared to ensure that money is in place for the essential work of saving south Louisiana.

**Davis, Mark**  
**Harry Vorhoff**  
**Dean Boyer**  
Tulane Institute on Water Resources  
Law and Policy

### **Financing the Future: Turning Coastal Restoration and Protection Plans into Realities.**

In Louisiana, support has coalesced around a “multiple lines of defense” strategy to protect and preserve the coastal regions of the state. This strategy integrates wetland restoration with structural and nonstructural flood protection. The State of Louisiana has a Coastal Master Plan that helps address some, but not all, aspects of this strategy. The state has established \$50 billion dollars as the minimum funding required to achieve just the projects in the Master Plan, but that excludes several responsibilities vital to the sustainability of Louisiana’s coast. Local projects like the Greater New Orleans Urban Water Plan fall outside the scope of the plan, as do federal endeavors like levee maintenance and channel dredging. The full costs of implementing the multiple lines of defense strategy for coastal protection will likely exceed \$100 billion and require coordination with, and contributions from, local, state, and federal governments. In our paper, we will examine the total cost of preserving a sustainable coast and the funds currently identified for the undertaking.

**Dundas, Steven J.**  
Oregon State University  
Department of Applied Economics

### **The Value of Coastal Protection: Evidence from the Oregon Coast**

Eroding shorelines, climate change, and sea-level rise pose existential threats to coastal communities and private property. A policy question emerging in this area is how to adapt to the increases in these risks observed in recent years. Along the Oregon coast, damages from erosion and flooding are frequent but vary spatially due to a number of factors, including development level and topographic and bathymetric features. The policy debate there ranges between a “hold-the-line” strategy by investing in shoreline protection structures (e.g. rip-rap revetments) or a managed retreat. This research seeks to identify and estimate the value of protection for coastal properties in Oregon. I utilize housing transaction data and a unique spatial dataset that provides rich variation between areas where shoreline protection structures exist (~ 5 percent of the coast), where individuals are allowed to seek building permits for such structures, and where individuals can do nothing. This variation arises from Oregon law that only allows for the possibility of shoreline protection structures in areas where development existed prior to January 1, 1977. I examine price differences between the three groups of homes with various matching and regression estimators to identify the price premium for both protection from coastal hazards and the potential for protection. Considering the high cost of coastal armoring, this paper will provide empirical evidence of the value of these structures in order to better inform benefit-cost analyses and the broader policy debate on adaptation to climate change in coastal communities.

**Dvaskas, Anthony**  
**Mark Nepf**  
School of Marine and Atmospheric  
Sciences, Stony Brook University

### **Coastal Water Clarity and Housing Values in Suffolk County, New York**

Eliciting values associated with natural resources has become increasingly important as decision makers seek to include values for ecosystem services and their associated benefits into project planning and prioritization. In Suffolk County, New York, with a population of approximately 1.5 million people, over 75% of the homes have septic tanks or cesspools and some portion of these septic tanks and cesspools are believed to be contributing to nitrogen loading into coastal waters. This nitrogen loading leads to multiple effects in coastal embayments, including algal blooms, decreases in water clarity, hypoxia, and mortality of shellfish and benthic organisms. Construction of sewer systems and improved wastewater treatment approaches have been proposed to address this issue, all of which have a cost to municipalities and residential homeowners.

**Liz Smith**  
Nature Conservancy

To estimate the monetary value of one potential benefit stream from these investments, the potential increase in housing values for parcels located near “cleaner” water, the current research employed a hedonic analysis of single family homes in Suffolk County. Previous hedonic analyses have evaluated the role of water quality in housing values in Cape Cod, Chesapeake Bay, Florida, and Lake Erie, with results generally indicating that higher water quality in coastal areas could result in higher real estate values, with the effect diminishing with increasing distance from the shoreline (Ara 2006, Leggett 2000, Poor 2007, Walsh 2011). To answer this question for Suffolk County, we compiled a dataset of residential home sales occurring between 2002 and 2013 in combination with adjacent water quality monitoring data (and appropriate controls for other factors that could impact housing prices). Preliminary results indicate a positive relationship between water clarity (as measured by Secchi depth) and housing values in some Suffolk County communities. This effect appears to sharply decline with distance from the water. We will discuss the findings in detail as well as the role of the current study as part of a broader effort of valuing Long Island’s coastal waters.

**Ellis, Chris**  
NOAA Office for Coastal Management

### **A formative evaluation of GoMRI Outreach Using Social Network Analysis**

Social network analysis (SNA) is a tool for measuring and visualizing relationships and communication. Commonly, by means of survey data, it maps the connections among individuals to

**Stephen Sempier**

**LaDon Swann**  
Mississippi-Alabama Sea Grant  
Consortium

show how information flows, and illustrates which actors within a communication network are most essential for connectivity and information flow. A graphic representation of these social links (sociogram) reveals important attributes of the network, such as the leaders and connectors, cliques or subgroups of communication, those who may be on the periphery of the communication network, or isolated and disconnected from the network. This analytic tool will afford the the ability to understand the extent of communication across states, within specific areas of expertise, and between agencies and organizations. This SNA was conducted in the spring of 2014 through a partnership between the Mississippi-Alabama Sea Grant Consortium and NOAA's Office for Coastal Management. Study findings were used to help Gulf States understand how oil spill science is being shared and assisted in developing a strategy to improve approaches to sharing oil spill science. Secondly, the survey results were used to develop and implement a new outreach program to share emerging oil spill research discoveries. Findings are also being used to further evaluate the effectiveness of the outreach program by means of a second social network analysis to offer a time-series view of how this communication network has changed over a multi-year period. The four Sea Grant college programs in the Gulf of Mexico will implement the new outreach program, which is being funded through the Gulf of Mexico Research Initiative (GoMRI). GoMRI is investing \$500 million in oil spill science over a 10-year period.

**Evans, Nicole**  
Natural Resources and Environmental  
Sciences, University of Illinois

### **The Rhetoric of Restoration: Constructing Naturalness in the Cook County Forest Preserves**

This study compared individuals' experiences restoring an urban forest preserve district with how they communicated about restoration. The goal was to identify some opportunities for enhanced communication. Because effective communication lends itself to successful restoration projects, this research is relevant for restoration projects everywhere, including coastal restoration where massive organizational and individual stakeholder cooperation is vital to achieving a healthy coast. To conduct this research, I used participant observation of staff and volunteers, active interviews during restoration activities, and off-site interviews with select individuals. I also collected content from websites and social media maintained by the organization and its affiliated volunteer groups. I used Nvivo10 to analyze and compare these sets of data. I found that while the actual practice of restoration is filled with gray areas, trial-and-error, and ever-evolving policies, restoration is communicated in often dichotomous and absolute language. Within the organization I studied, many opinions on the goals and techniques of restoration exist, including on appropriate restoration goals, seed sources, and species removal. Despite these differences, restoration was often communicated as two-sided. In the words of one practitioner, "We're gardening for God." Social movement theories suggest that polarizing language is often used as a deliberate tactic to garner support for a cause, but my research has led me to believe that it is injurious to the cause of restoration. Divisive speech deepens the divide between practitioners and the public, making communication a one-sided attempt to convince the public of specious absolutes. Among practitioners, differences of opinion can come to be seen as dangerous rather than as opportunities for enhanced learning. Being a relatively nascent science rife with unpredictability, I suspect that these are challenges that other restoration projects face as they communicate and garner support for their projects. I'd like to eventually explore whether these findings can be extended to other restoration projects. Keywords: Restoration, Environmental Communication, Sociology

**Ferrari, Alejandra Brevé**  
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Department of Agricultural Economics,  
Louisiana State University

### **Modelling Optimal Debris Management Procedures: Case Study of Local Governments in Coastal Louisiana**

This study assesses the resiliency of local governments in Louisiana when shocked stochastically by natural disasters addressing specifically optimal debris management procedures. We evaluate post disaster scenarios based on historical expense data in which local governments have to decide on either outsourcing their debris removal cleanup or using their own force account equipment and labor. A basic premise of public economic analysis is that local governments seek to efficiently allocate resources. When the external transaction costs are higher than the internal transaction costs, we expect the firm to self-procure. If the internal transaction costs are higher than the external transaction costs then the firm will outsource. In the case of federally declared disasters some of the costs incurred could meet with the federal threshold covered but the opposite could also be the case. In the recent Sandy Recovery Improvement Act of 2013 (SRIA) (P.L. 113-2), FEMA is allowed to provide an incentive through the Debris Management Pilot Program to state, tribal, or local governments that have a debris management plan in place accepted by FEMA prior to the declaration of a major disaster or emergency. When a recipient or sub recipient has a plan determined acceptable by FEMA, there is a possibility for the cost share adjustment to increase if all debris is removed in the first 90 days after the declaration. Building a disaster management plan or more specifically a debris management plan involves dealing with very dynamic scenarios. We will use systematic thinking in order to evaluate past debris management actions and to better visualize

all the interdependent factors that are involved in order to select the most optimal path. Coastal communities, businesses, farmers, fisheries, and local governments across Louisiana have struggled to recover financially from hurricanes Ivan, Katrina, Rita, Gustav, Ike and Isaac, the April 2010 Deepwater Horizon oil spill, and the 2011 Mississippi River flooding. Studies predict that powerful storms may occur more frequently this century, while rising sea level from global warming is putting coasts at greater risk. Local governments must be better prepared to finance a larger percentage of their own cleanup and recovery costs that climate change induced natural disasters create taking into account that they might not receive all the assistance needed from the federal government.

**Freeman, Matthew**

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**Joseph Witt**

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Mississippi State University

**Information Exchange between Resource Managers and Vietnamese American Fishing Communities on the Gulf of Mexico**

Collaborative fisheries management requires input and involvement from stakeholders, and so engaging stakeholders often requires understanding and addressing their diversity. Fishing communities along the Gulf of Mexico include diverse racial and ethnic groups, including a large number of Vietnamese Americans involved in all aspects of the seafood industry. Recent disasters, including hurricanes and the BP Macondo oil spill, have highlighted the necessity of effective and efficient information exchange between state and federal agencies and the Vietnamese American fishing community on the Gulf Coast. A lack of information on Vietnamese American fishers also exists in terms of reliable socioeconomic data and their management and governance priorities.

This component of a larger research project focuses on identifying avenues and barriers for communication between Vietnamese American fishers and state and federal fisheries-related agencies in Louisiana, Mississippi, and Alabama. In doing so, we discuss using a combination of 1) interviews with representatives of relevant state and federal agencies, 2) interviews with community organizations and key informants, and 3) focus groups with Vietnamese Americans in different aspects of the fishing industry. A comparison of strategies and needs for information exchange will be discussed across the three states. Collection of this type of data will be used in identifying potential strategies to improve engagement of Vietnamese American stakeholders in the region and be crucial to understand the current and future consequences of management choices for diverse stakeholders.

**Frimpong, Eugene**

**Daniel Petrolia**

Department of Agricultural Economics,  
Mississippi  
State University

**Community-level Flood Mitigation Effects on Household-level NFIP Participation and Claims**

The Community Rating System (CRS) was introduced by the Federal Insurance Administration (FIA) as a way of engaging communities to undertake additional flood mitigation actions beyond the National Flood Insurance Program's (NFIP) minimum requirements. In exchange for specific mitigation actions, individual households in CRS participating communities' receive premium discounts on their flood policies based on their community's CRS score. Although it is expected that this reward will motivate communities to participate in the CRS, it is not clear how additional mitigation and premium discounts will affect NFIP participation (i.e. policies-in-force) and insured damage claims. Recent papers that have shed light on this issue have not considered the effect of specific mitigation activities under the CRS on NFIP participation and damage claims, and have focused only on counties in Florida and Texas. Using community-level panel data on number of NFIP policies-in-force; number of claims; magnitude of claims; and CRS mitigation activities, elements, and classes for the period (1998-2011) for the states of Alabama and Mississippi, this paper examines jointly, the effect of specific CRS mitigation activities on NFIP participation and damage claims. We do so while controlling for key geospatial and socioeconomic characteristics. We expect to explain in detail, which specific CRS mitigation activities have the greatest impact on NFIP participation and insured damage claims.

**Ghose-Hajra, Malay**

Department of Civil and Environmental  
Engineering, University of New Orleans

**Economic and Social Implications of Natural and Man-Made Disasters in Coastal Louisiana and Improvements in Hurricane and Storm Risk Damage Risk Reduction System (HSDRRS) in the last 50 years**

Coastal property development, global climate change, sea level rise, geologic subsidence, loss of barrier islands, increasing number and intensity of coastal storms and other factors have resulted in water quality degradation, wetlands loss, reduced storm and surge protection, ground settlement, and other challenges in coastal areas throughout the world. These natural and human hazards are putting more people and property at risk exposing significant infrastructure to open water conditions and making the areas situated nearby less suitable for human as well as various wildlife and fish species. On August 29, 2005, Hurricane Katrina made landfall at Buras, Louisiana in Plaquemines



Parish about one hour south of New Orleans. Katrina was moving with Category 5 strength less than twelve hours prior to landfall. The storm generated a 28-foot storm surge and 55-foot waves. Approximately 80% of New Orleans was flooded to depths exceeding 15 feet in many areas. Surge and waves caused 50 major levee breaches in the regional Hurricane and Storm Damage Risk Reduction System (HSDRRS). Thirty-four of the city's 71 pumping stations were damaged, and 169 of the system's 350 miles of protective structures were compromised. Also contributing to the flooding was heavy rainfall: 14 inches in a 24-hour period. More than 1,500 lives were lost. According to the Federal Emergency Management Agency, Katrina is the costliest disaster ever to occur in the United States.

Since hurricane Katrina, design and analysis of foundations to support Hurricane and Storm Damage Risk Reduction Systems (HSDRRS) in the Mississippi River Valley division have undergone major revisions to account for uncertainties and incorporate higher design standards. Design and construction of conventional inland foundations vary significantly from foundations built to support coastal structures. In addition to supporting structural loading, foundations in coastal areas must withstand flood forces, high winds, scour, soil erosion, any seismic activity, and impact forces from floating debris. Based on recommendations from international experts, scientific organizations, government agencies and the private sector who studied causes of system failure during Katrina, new design and construction guidelines have been created to construct T-walls, I-walls, heavily loaded pump stations, sector gates, and other coastal infrastructures. This presentation will summarize the effects of hurricane Katrina and other major storm events on coastal foundations, incorporate lessons learned from this major storm event, and discuss new design methodologies and guidelines recommended and implemented for foundations to support coastal structures. Evaluation of economic impacts from these storm events will also be presented.

**Goedeke, Theresa L.**

**Sarah Gonyo**

**K. Eric Wolfe**

**Matt Poti**

**Dan Dorfman**

NOAA's National Center for Coastal  
Ocean Science and Center for Coastal  
Monitoring and Assessment

**Matt Gorstein**

NOAA National Center for Coastal  
Ocean Science

#### **Socioeconomic Evaluation of Alternatives to Manage Shipping and Other Uses of the Channel Islands National Marine Sanctuary (CINMS) Region**

This project estimates socioeconomic costs and benefits in support of the CINMS Marine Shipping Working Group (MSWG) planning process based on alternative shipping vessel management options for the region surrounding the Channel Islands. Scenarios to manage shipping traffic often include reduction in ship speed and/or changes to existing vessel routings. The goals of the working group process are to reduce the risk of ship strikes on endangered whales, decrease air pollution and greenhouse gas emissions in the region, improve navigational safety and efficiency of maritime commerce, and minimize interruptions to Naval operations and conflicts with other ocean users. In collaboration with researchers at CINMS, the MSWG, NMFS' Office of Protected Resources, and the NOS Chief Economist, the NCCOS project team identified key social and economic variables necessary to build relevant models for assessing the social and economic outcomes (potentially, direct and indirect) of the alternative scenarios advanced by the MSWG. Models developed to assess probable socioeconomic outcomes were run for the various alternative scenarios advanced. In addition to responding to the direct needs of the CINMS process, it is anticipated that the variables identified and models developed will serve as a foundation to build a broader assessment framework that could be employed in other marine areas that are designated, reserved or managed by NOAA, or partner agencies, for multiple uses, including shipping.

**Gopalakrishnan, Sathya**

**Yun Qiu**

Department of Agricultural,  
Environmental, and Development  
Economics  
Ohio State University

#### **Shoreline Defense against Climate Change and Capitalized Impact of Beach Nourishment: Evidence from the coastal housing market in North Carolina**

The densely developed coastal zone is particularly vulnerable to the impact of climate change. Wide beaches provide value through recreational amenities and protect coastal communities from storm damage. Coastal housing markets capitalize the value of wider beaches, beach views, and reduced storm risks (Bin, et al., 2008, Bin and Polasky, 2004, Gopalakrishnan, et al., 2011). Few quasi-experimental analyses have measured the impact of storm risks (Hallstrom and Smith 2005; Bin and Landry 2013) and constructed dunes (Dundas, 2014) capitalized in coastal property values. In this paper, we explore the capitalization effect of beach nourishment in North Carolina using the incidence of super storm Sandy as a natural experiment. To estimate the effect of beach nourishment along different segments of the shoreline, we use a difference-indifference approach and compare changes in housing values in two adjacent beach towns in the northern coast of North Carolina – Nags Head, which implemented its first beach nourishment project aimed at shoreline protection in 2011, and the neighboring town of Kill Devil Hills which has had no beach nourishment policy. We recover the storm protection value of nourishment policy and test the existence of spatial spillover effects from a nourished beach to its neighboring un-nourished beach. With detailed spatial and temporal information on the nourishment project in Nags Head we are able to compare property values in a nourished section of the coast with similar properties in a neighboring un-nourished segment during the pre-nourishment period, post-nourishment and pre-

Sandy period, and post-Sandy period. We estimate price premiums for properties located in the Municipality Service District (MSD) that pay a higher property tax towards a nourishment fund. Preliminary results suggest a positive spillover of amenity value reflected by an increase in surrounding property values in regions outside the MSD after the completion of a nourishment project. Storm protection benefits are, however, localized. Within a MSD, oceanfront houses face decreased prices due to a disamenity effect during the construction period, a positive amenity effect after the project ended, and an even larger nourishment premium in the wake of increased storm risk. Heterogeneity in the distribution of benefits to oceanfront vs nonoceanfront house owners within the MSD raise concern regarding the sustainability of funding to support nourishment policy. Our work suggests a need for spatially targeted policy that accounts for the spatial extent of benefit capitalization and spillover effects of shoreline stabilization.

**Gouldman, Carl**  
U.S. Integrated Ocean Observing  
System, NOAA/National Ocean Service

#### **Ocean Enterprise study**

Ocean information is important for safety, economic and environmental benefits that underpin the blue economy. Collecting and using ocean data is a significant business enterprise and one in which the United States is a world leader. Carl Gouldman, Deputy Director of the U.S. Integrated Ocean Observing System (IOOS®) Program, will present summary results of a three year study conducted by U.S. IOOS and NOAA. The Ocean Enterprise: A study of US business activity in ocean measurement, observation and forecasting provides an overview of profit and not-for-profit businesses which represent an important industry cluster supporting and fortifying all maritime commerce within the broader Blue Economy. The Ocean Enterprise study is designed to provide a description of private sector components within the ocean enterprise similar to previous studies of the weather enterprise. It's a large and growing enterprise, and one in which the U.S. is a leader, but until now, we've never assessed it nationally. This study identified more than 400 firms in the United States that were operating in the sphere of Ocean Enterprise. This includes businesses inland all contributing to the ocean enterprise, but not previously captured by regional studies. More facts and figures from the study will be made available during this session.

**Hanson, Terry**  
Auburn University

#### **The Economic Impact of Diseases on Aquaculture's Ability to Feed a Growing World Population**

With the world's population projected to grow to 9 billion people by 2044 the question of how to feed this increasing population arises. Aquaculture, the growing of fish as a crop, makes up more than 50% of all fishery products consumed in the world now and will certainly provide more in the future. New systems are being developed that intensifies fish, shellfish and crustacean production. Sustainability and profitability requires these new systems provide a healthy environment for the fish to keep survival levels high, from stocking to harvest. This presentation will focus on example projects carried out in the US farm-raised catfish industry over the last seven years. These projects focus on risk management and insurance products for catfish, a Pond-to-Plate value stream project, several new technologies (in-pond raceways, hybrids, vaccines, probiotics) used in three catfish production studies conducted on commercial farms. Results from the studies highlight the economic impact of uncontrolled disease impacts on the viability of aquaculture operations. Each study provides learning points that must be codified into best management practices and standard operating procedures to improve the viability of the US farm-raised catfish industry. New fish diseases occur, but means to investigate and manage them are occurring as well. Eventually diseases and animal health are deciding factors for profitable aquaculture operations. Good aquaculture operations develop strategies to manage around diseases but the aquaculture industries have a difficult time of getting rid of diseases entirely resulting in negative production and economic implications. Diseases have been controlled in other land animal livestock and new aquaculture technologies must be developed to control them. Without improvements in disease control it will be more difficult for aquaculture to play its part in feeding a larger population in the future.

**Harrison, Jane**  
North Carolina Sea Grant

#### **The Economic Cost of Water Quality Degradation at Milwaukee Beaches**

South Shore Beach in Milwaukee, Wisconsin historically has had degraded water quality and low visitor use rates. This urban beach is chronically closed due to elevated E. coli levels. Water quality advisories and closures range from 25% to nearly 50% of the swimming season, depending largely on the number of days of rainfall. Causes of pollution include localized runoff, regional sources such as stormwater discharges and combined sewer overflows, fecal waste from gulls and waterfowl, and limited water circulation due to breakwalls. Milwaukee County Parks, which manages South Shore Beach, estimated that improvements to water quality at South Shore Beach could cost anywhere from \$1.6 to \$5.6 million. In order to compare the costs and benefits of investments in the beach, a study was conducted to assess the economic cost of water quality degradation at Lake Michigan beaches in Milwaukee. The study employed travel cost and contingent valuation methods to compare urban and rural beaches, as well as beaches with poor and high water quality levels. In

addition to economic analysis, partnerships with beach managers and other beach stakeholders were developed to translate the economic findings into action. This effort led to significant investments to mitigate water quality issues at South Shore Beach, and may lead to water quality improvements at other Great Lakes beaches.

**Hayes, Chris**  
National Sea Grant College Program

**Lisa Wainger**  
University of Maryland center for  
Environmental Science

#### **Coastal SEES Collaborative Research project: Integrating stakeholder objectives with natural system models to promote sustainable natural resource policy**

With the goal of improving sustainability of natural resource management using the Choptank estuary and watershed as a case study, the Oyster Futures team will conduct collaborative modeling with a diverse stakeholder group to integrate stakeholder objectives and scientific understanding. The model and stakeholder engagement will be used to enhance understanding of the effects of alternative management policies on multiple benefits derived from oyster reefs and associated systems. We will analyze several economic benefits of oyster reef management, including examining market conditions that may limit profits retained by watermen in the watershed. We will focus on the economic benefits derived from ecosystem services that the oyster reefs provide (**Error! Reference source not found.**). We will develop benefit metrics that address concerns and needs identified by the stakeholder group using a combination of monetization and quantification approaches, as appropriate to each type of benefit. We will employ a variety of models from conceptual to empirical to translate the ecological outcomes predicted by the ecological models, also produced as part of this project, into meaningful endpoints for stakeholders to use in making recommendations consistent with their values. Once the benefits have been quantified, we will combine the multiple benefits into an objective function for the optimization model. This optimization model will be developed to explore opportunities to maximize a set of benefits that represent the breadth of stakeholder concerns. To combine the benefits, the team will use multi-criteria decision analysis (MCDA). MCDA is a type of structured decision making that is increasingly being applied to natural resource management decisions. It allows quantitative metrics of benefits (monetary and non-monetary) to be scaled so that they can be compared in a quantitative framework that represents stakeholder preferences.

**Heier, Michael**  
**Harry Vorhoff,**  
Louisiana Attorney General  
Lands and Natural Resources section.

#### **Dredging the Legal Channels of "Changing Course"**

With support and participation of the State of Louisiana and the U.S. Army Corps of Engineers, the international "Changing Course" competition invited multidisciplinary teams to design innovative and implementable solutions for maximizing the Mississippi River's potential to nourish coastal wetlands while sustaining navigation, coastal industries, and flood-related risk reduction. The proposals of the three teams selected as finalists share common themes of diverting water and sediment from the Mississippi River into surrounding marshes, relocating the primary river channel, and the eventual abandonment of outlying communities. The legal implications of implementing such proposals are manifold and the legal strategies for implementation should be further developed alongside their planning, design, and engineering. This panel will discuss the regulatory and administrative processes inherent to implementing public works of this magnitude and the potential effects of "changing course" on public and private property rights.

**Hemmerling, Scott**  
Water Institute of the Gulf

#### **A Place of Constant Change: Mapping Historical Resilience in Coastal Louisiana from 1950 to 2010**

Understanding the cumulative impacts of environmental and economic change on coastal communities and their respective responses to these changes is vital for effective coastal land use management, coastal restoration, and protection planning. Throughout the Twentieth Century, observed climate changes, major episodic events, and changing economic and social conditions have altered the landscape of coastal Louisiana in innumerable ways. Research suggests that an increased rate of exposure to perturbations and disturbances may reduce a community's resilience to future events. Scholarship also suggests that communities can develop a high degree of adaptive capacity to external events through time. Historically, community population shifts in Louisiana have reflected ecological, cultural, political, and technological dynamics, with population adjustments and community-level economic adaptations following each system disturbance. An examination of the historical demographic shifts that have occurred in response to external triggers in coastal Louisiana can allow community planners and coastal scientists to identify and work with communities that may have, through an increased frequency of external shocks, suffered a loss of adaptive capacity.

With an eye towards facilitating coastal community planning and science, The Water Institute of the Gulf has assembled a collection of historical data on the demographics, economy and hazards of the

coastal region. Illustrating the complex relationship between historical population shifts and myriad economic and environmental risks and hazard events in coastal Louisiana, this atlas geographically documents changes in resilience in the region. In total, the atlas has assembled over 80 unique datasets covering a seven-decade period from 1950-2010. These datasets are drawn from a wide range of archival sources, including global databases, government reports, and published literature. The data creates snapshots of community resilience before and after numerous and varied disruptive events. Innovative GIS and cartographic techniques allow the Water Institute to analyze and visualize these disparate data sources in an engaging way, enhancing the overarching narrative of community adaptation, recovery or decline.

**Henderson, Amy**  
**Matt Flyr**  
St. Mary's College of Maryland

#### **Variability in Relative Water Quality Measures: Implications for Stability of Hedonic Price Estimates**

The number of hedonic water quality studies has grown significantly over the past decade. Where Leggett and Bockstael (2000) found only 5 hedonic water analyses over the three decades preceding their analysis, at least 12 hedonic water studies have been published in peer-reviewed journals since 2000. Hedonic pricing analysis has been used to estimate willingness to pay for water quality in lake, river, and estuary contexts, providing important information regarding benefits to be derived from improved water quality. Despite the increasing application of the methodology to water quality, the approach remains less developed in the literature than hedonic studies of air quality. Many concerns raised with respect to hedonic air analyses apply to hedonic water studies as well, but hedonic water analyses may pose additional challenges, particularly as relates to the water quality measure. A problem which has not yet been adequately addressed in the literature is the reliability of the signal from water quality measures. Often the water-quality data used in hedonic analyses are of low frequency, in some cases taken from a single point in time. Yet water quality can be highly variable, particularly with respect to river and stream quality measures. Analysis of high-frequency water quality data reveals that commonly used indicators, such as dissolved oxygen, total suspended solids, and total dissolved nitrogen, can exhibit both temporal and spatial variability, with relative quality shifting within a watershed over short time horizons. Thus concerns may be raised as to whether estimates from data which have not been examined for such variability – or which cannot be examined due to the low-frequency of the data – yield reliable estimates of the hedonic price function. We exploit an unusually detailed water quality dataset, which spans 8 years, to test the stability of the estimated hedonic price function in the face of such variation.

**Henderson, James**  
**Stephen Dicke**  
**Jason Gordon**  
**Glenn Hughes**  
**John Kushla**  
**Brady Self**  
**Courtney Siegert**  
**John Willis**  
Department of Forestry, Mississippi  
State University

#### **Climate Change Education in Forestry Extension: A Mississippi Case Study**

Regardless of commodity or geographic region, climate change education is a priority in agriculture and natural resources education and outreach; however, efforts to convey climate change information and mitigation strategies are often approached as “one-size-fits-all” both in design and implementation. Such an approach contrasts with climate change models which predict variation within and across geographic regions. By contrast, climate change education should be tailored to suit the biophysical and sociocultural conditions existing at multiple scales – community, state, and region. To this end, Forestry educators at Mississippi State University have implemented a series of programs entitled “Extreme Weather Events and Risk Management Options for Family Forests.” The programs provided climate change information in relation to production, marketing, financial, and legal risks, while acknowledging the unique contexts and needs of the clientele. The programs are framed within the general context of risk management, a critical but often overlooked aspect of family forest management. The educational efforts are important for the continued economic potential of timber, one of the state's most important agricultural commodities, in light of increased frequency and intensity of extreme weather events. This paper describes the programs in detail and presents producers' attitudes and adaptations to climate change. Data were collected throughout the state from program evaluations and an online survey administered to county Extension agents. The paper concludes with implications for future research and education opportunities.

**Hindsley, Paul**  
Department of Environmental Studies,  
Eckerd College

#### **Assessing the Impact of Littoral Rights and the Public Trust Doctrine on the Valuation of Coastal Amenities Within Florida Residential Property Markets**

**O.A. Morgan**  
Department of Economics, Appalachian  
State University

Coastal and estuarine ecosystem goods and services provide a significant draw for the residents of and visitors to coastal regions. This demand for coastal goods and services leads to complex interactions between resource users. In the United States, littoral rights and the Public Trust Doctrine play an important role in identifying user property rights associated with many coastal environmental resources. In each coastal state, littoral rights and the Public Trust Doctrine establish distinctions for the rights of access by individual private property owners and the collective rights to access by the public to lands held in the public trust, such as shorelines, tidal areas, and submerged

lands. Public trust lands may be accessed by the public for a variety of uses, including navigation, fishing, and recreation. On the other hand, littoral rights provide shoreline adjacent properties with a right to access, use, and an unobstructed view. As such, these legal designations play an important role in defining the terms of access to coastal resources by making a distinction between property owners with and without littoral rights. In the absence of well-defined property rights, legal conflicts may develop over the use of these resources. In this study, we utilize a hedonic property model to investigate the ways in which coastal residential property markets capitalize the value for amenities governed by the Public Trust Doctrine. Our empirical application focuses on the implications of littoral rights and the Public Trust Doctrine for property owners' valuation of ocean views and beach access in Pinellas County, Florida.

**Hutt, Clifford**

ECS Federal, Inc.  
NOAA Fisheries; Office of Science and Technology

**Sabrina Lovell**

NOAA Fisheries; Office of Science and Technology

**Scott Steinback**

NOAA Fisheries; Northeast Fisheries Science Center

**Cost-Earnings and Economic Impacts of Independent Marine Bait and Tackle Retail Stores in the Gulf Coast Region**

NOAA conducted the Marine Recreational Bait and Tackle Economic Survey (RBTES) to better understand the economic condition and contributions of saltwater fishing bait and tackle stores to the national and regional economies. This study focused on retail stores that sell bait and tackle to saltwater anglers in coastal communities located in 23 U.S. states on the Atlantic, Gulf of Mexico, and Pacific coasts, including Alaska and Hawaii in 2013. The RBTES was designed to provide NOAA Fisheries' first baseline economic assessment of the retail bait and tackle industry, and focused on the costs and earnings of small businesses. Stores receiving the survey come from an exhaustive list of businesses compiled by NOAA Fisheries with the assistance of state marine fisheries agencies, and two major industry wholesalers. NOAA Fisheries received completed surveys from 944 stores out of 3,498 businesses that were identified as being eligible to participate (i.e., retail stores that sold bait and tackle) for a national response rate of 27 percent. Twenty-two percent (n = 204) of survey responses came from bait and tackle retailers located in the Gulf of Mexico region. Thirty-two percent of surveyed Gulf Coast retailers catered to recreational anglers exclusively, and averaged over \$724 thousand dollars in sales of saltwater bait and tackle in 2013, nearly double the national average. Overall sales of saltwater bait and tackle by independent retailers in the Gulf Coast region were estimated to be \$266 million representing 31% of national sales. These sales generated an estimated \$601 million in regional economic impacts and support 4,400 jobs.

**Hemmerling, Scott**

Water Institute of the Gulf

**A Place of Constant Change: Mapping Historical Resilience in Coastal Louisiana from 1950 to 2010**

Understanding the cumulative impacts of environmental and economic change on coastal communities and their respective responses to these changes is vital for effective coastal land use management, coastal restoration, and protection planning. Throughout the Twentieth Century, observed climate changes, major episodic events, and changing economic and social conditions have altered the landscape of coastal Louisiana in innumerable ways. Research suggests that an increased rate of exposure to perturbations and disturbances may reduce a community's resilience to future events. Scholarship also suggests that communities can develop a high degree of adaptive capacity to external events through time. Historically, community population shifts in Louisiana have reflected ecological, cultural, political, and technological dynamics, with population adjustments and community-level economic adaptations following each system disturbance. An examination of the historical demographic shifts that have occurred in response to external triggers in coastal Louisiana can allow community planners and coastal scientists to identify and work with communities that may have, through an increased frequency of external shocks, suffered a loss of adaptive capacity.

With an eye towards facilitating coastal community planning and science, The Water Institute of the Gulf has assembled a collection of historical data on the demographics, economy and hazards of the coastal region. Illustrating the complex relationship between historical population shifts and myriad economic and environmental risks and hazard events in coastal Louisiana, this atlas geographically documents changes in resilience in the region. In total, the atlas has assembled over 80 unique datasets covering a seven-decade period from 1950-2010. These datasets are drawn from a wide range of archival sources, including global databases, government reports, and published literature. The data creates snapshots of community resilience before and after numerous and varied disruptive events. Innovative GIS and cartographic techniques allow the Water Institute to analyze and visualize these disparate data sources in an engaging way, enhancing the overarching narrative of community adaptation, recovery or decline.

**Hymel, Thomas**

LSU AgCenter and Louisiana Sea Grant

**Direct Marketing of Louisiana Seafood**

Louisiana Sea Grant's strategic plan calls for development of practices, technologies, and systems designed for enhanced, more efficient operation of seafood culture facilities with minimal impact on

coastal and oceanic environments and habitats, on natural fisheries, and on the people who depend on natural fisheries. In this capacity, the program has invested a substantial amount of time and effort in the establishment of direct marketing (DM) strategies and channels for locally-sourced seafood. This presentation chronicles the history and logistics of the "Louisiana Direct" program. This program was instituted in 2011 and has since expanded coast-wide in response to the need for supplemental income to harvesters faced with rising input costs and global price competition from imported shrimp. The program originated in Delcambre, Louisiana, where 30 vessels participated in the program during 2015. Collectively, these vessels accounted for 180 individual trips and 360,000 pounds of fresh shrimp sold via DM channels. This shrimp was sold directly from the vessels to consumers, often at prices exceeding three to four times the prevailing rate for wholesale, commodity marketed shrimp. The program produced in excess of \$1 million in additional sales revenue to participating fishermen in 2015, and attracted more than 12,000 people to the small community of Delcambre for DM purchasing, farmers markets, and ancillary activities that are helping to sustain this small, but growing segment of the domestic seafood market.

**Irwin, Kimberly**  
**Duncan Knowler**  
**Ryan Trenholm**  
**Roberto Martinez-Espineira**  
Simon Fraser University, School of  
Resource and Environmental  
Management

### **Valuing improvements to the environmental performance of salmon aquaculture on the West Coast of Canada from the adoption of more sustainable technologies**

As one of Western Canada's fastest growing industries, salmon aquaculture has proven itself to be an important source of economic growth for the province of British Columbia, particularly for its coastal regions. However, the controversy surrounding the negative environmental effects of salmon aquaculture production has become a major issue in the province. In recent years, alternative systems of aquaculture, including integrated multi-trophic aquaculture (IMTA) and closed containment aquaculture (CCA), have been developed to address some of the environmental effects of conventional salmon aquaculture. Industry adoption of these technologies in British Columbia has been tentative, since there is little financial incentive for salmon aquaculture companies to improve their environmental performance. While previous studies have outlined the private economic benefits and costs associated with IMTA and CCA adoption, they did not address the benefits accrued to society associated with improvements to the environmental performance of the salmon aquaculture industry. Doing so would increase the economic value of these technologies, and provide justification for implementing policies that would encourage its widespread adoption. This study addresses several research questions: (i) how do residents of BC value improvements to the coastal environment that could be realized through the adoption of more sustainable aquaculture systems, (ii) how is this valuation affected by using different 'status quo' assumptions about ambient conditions before improvements, and (iii) are British Columbians supportive of promoting the adoption of alternative aquaculture technology? We used a discrete choice experiment via an internet survey of 1321 residents of British Columbia to carry out our analysis. Given the controversy surrounding the current environmental impact of salmon farming, considering the effect that the status quo has on willingness-to-pay (WTP) was a key innovation in the research.

Our results demonstrate that British Columbians are willing to pay to improve the environmental conditions surrounding salmon farms, and that this WTP varies depending on the status quo conditions. By making assumptions regarding the potential environmental improvements that could arise from widespread adoption of IMTA or CCA technologies in British Columbia, the benefits to society from their adoption can be approximated. Based on these assumptions, British Columbians would be willing to pay between CDN \$77.76 and \$159.54 per household per year to support development and fund incentives for adoption of IMTA, and \$133.28 to \$173.00 per household per year to support development and fund incentives for adoption of CCA, depending on status quo conditions. Opinions regarding IMTA vs. CCA technologies are mixed in British Columbia, with 32.4% of residents indicating a preference for CCA, and 25.5% preferring IMTA. Overall, results indicate that British Columbians are highly supportive of using government policy to improve the environmental performance of salmon aquaculture.

**Isaacs, Jack C.**  
Louisiana Department of Wildlife and  
Fisheries

### **Entry, Exit, and Continuous Participation in Louisiana's Fisheries among Licensed Commercial Fishermen**

The examination of Louisiana Department of Wildlife and Fisheries Licensing Section data points toward a decrease in the number of commercial fishing licenses issued over the quarter century from 20,367 resident commercial fisherman licenses in 1990 to 16,829 in 2000 and 11,658 in 2014. These figures, however, distort the number of active participants because they represent a count of those who hold commercial fishing licenses, many of whom do not actually land seafood in every year during which they hold licenses.

Louisiana Department of Wildlife and Fisheries trip ticket data provide a more accurate enumeration of active commercial fishermen by counting those who record commercial seafood landings. This research will examine that database further to identify the number of commercial fishermen who

entered or entered Louisiana commercial blue crab, oyster, and shrimp fisheries in each year within the 2000 and 2014 and the volume and dockside value of their landings. Trip ticket data are combined with data from license files to measure the personal characteristics of those who entered, exited, or stayed active within Louisiana's commercial fisheries.

**Isacs, Lina**

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**Making subtle values of marine ecosystem services visible**

To improve environmental management, there is a growing demand from policy-makers to take account of the values of ecosystem services in decision-making. Guidelines for policy appraisal increasingly prescribe that this should be made in monetary terms. Values that are hard to monetise, it is said though, should not be ignored or even “be given a fair weight”. Quantification issues, even in physical terms, make this task hard and non-monetised values tend to end up as inadequate qualitative descriptions in impact assessment reports. This is where non-marketed environmental values end up, and most certainly the more subtle values of ecosystem services. Thus, despite the fact that they might be significant, they often get little or no weight at all in decision-making material.

Although the literature on broader frameworks for environmental valuation grows, not the least since the widespread UN related work of The Economics of Ecosystems and Biodiversity, the single most popular way to address this issue is the employment of monetary survey methods aiming to elicit individuals' willingness to pay (WTP) for changes in ecosystem services. The validity of such approaches has long been severely challenged; based in neoclassical economics and utilitarianism they are claimed unsuitable in situations involving a plurality ethical issues, lack of information and uncertainty about long-term effects. Practical problems are indeed significant. So what are the alternatives? A recent body of literature advocates the need to acknowledge pluralism of both values and methodologies. Since preferences are neither given nor stable and ecosystem services have collective meaning, individuals should be allowed to act as social beings rather than as consumers, disqualifying a sole focus on individual valuation in monetary terms. Instead, deliberative group-based valuation techniques that bring together quantitative and qualitative measures of value are suggested. This way, they claim, deeper held subtler ecosystem service values may be surfaced and made explicit, including those related to distribution and equity. Results from studies comparing WTP before and after deliberation in groups do show people are more content with the latter. But there is still the problem of what is actually captured by different measures and what is not. Without a clear account, we cannot claim what is understated.

In this study deliberative valuation is used for the assessment of subtle values associated with marine ecosystem services and seawater quality. In experimental case studies at the Swedish west coast, individuals' WTP are elicited before and after group deliberation, explicitly asking participants about what they include in different expressions of value and how they perceive different results. Apart from WTP, we assess changes in expected subjective wellbeing as a measure of subtler ecosystem values in marine environments and control for facilitation tools in the deliberative process, which enables a more thorough analysis of drivers behind changes in values in deliberative settings. Lastly, we address the issue of how plural accounts of value can be made useful in decision-making in practice.

**Jenkins, Pam**

University of New Orleans

**View from the Ground: Nonstructural Risk reduction Strategies and Everyday Life**

*You cannot separate care of the environment from care of the people who are poorest and more vulnerable. It is all a matter of social justice. (Local resident)*

In the aftermath of Hurricanes Katrina and Rita, a lens was turned on the Gulf Coast of Louisiana. After 2005, the conditions in the Gulf Coast worsened. Cascading storms and the Deepwater Horizon oil spill created ongoing conditions of vulnerability. These events (hurricanes and oil spills) brought the spotlight to an area that had over the years experienced acute and chronic weather events. This paper documents, through a case study, the views of community people in the parishes most at risk – views that have rarely been captured anywhere else, including their views on current policy proposals. With nonstructural issues identified as a major focus of the 2017 iteration of the Louisiana Master Plan, there is an opportunity to further delineate these issues and recommend policy changes over the next two years. The three parishes (Terrebonne, Lafourche, and Plaquemines) are at the epicenter of coastal land loss and other critical changes in the environment. How residents understand and respond to the challenges of sea level rise and climate change will provide possible strategies and recommendations for local and state policy choices. Throughout the interviews, participants stated that they want to save their land and their way of life. They understand this is a complex process with numerous moving parts. For some, they want more elevated homes, based on a community needs assessment. For others, they want a dialogue with state officials, experts,

and community residents that leads to collaborative plan for all nonstructural measures. Few want to relocate and continue to be reluctant to discuss this solution. As policy issues of coastal restoration are discussed and move forward, the views and understandings of local residents need to be included.

**Jepson, Michael**  
NOAA Fisheries SERO

**Lisa Colburn**  
NOAA Fisheries NEFSC  
**Changhua Weng**  
NOAA Fisheries Affiliate NEFSC

#### **Building Climate Change into Social Indicators for US Coastal Communities.**

The NOAA Fisheries Human Dimension Team has developed a diverse set of indicators to measure community well-being through the concepts of resource dependence, social vulnerability and gentrification. These social indicators were assembled using census and fisheries data; factor analyzed, and then applied to over 3800 U.S. communities within coastal counties in the continental U.S., including Alaska and Hawaii. A recent addition that reflects vulnerability to climate change through sea level rise risk has been developed and added to the NOAA Fisheries Web Tool. Future research will further explore a community's business diversity and climate change vulnerability through a community's reliance on stocks that are susceptible to climate change and the location of businesses that are vulnerable to sea level rise. Both recent updates to the web tool and future research will be presented and discussed.

**Kagoya, Sarah**  
**Krishna P. Paudel**  
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and Agribusiness, Louisiana State  
University

**Nadhomi, Daniel L.**  
Department of Geography, Geo-  
Informatics and Climatic Sciences,  
Maker ere University, Kampala, Uganda

#### **Awareness and Adoption of Soil and Water Conservation Technologies in a Developing Country: A Case of Nabajuzi Watershed in South Western Uganda**

The promotion of a package of soil conservation practices referred to as Conservation Agriculture (CA) is being embarked on by the Food and Agriculture Organization of the United Nations (FAO) due to the increasing poor soil management practices in many parts of the world. CA entails continuous minimum mechanical soil disturbances, permanent organic soil cover and diversification of crop species grown in sequences and or in associations (FAO, 2001). In relation to that, Soil and Water Conservation (SWC) technologies have been widely available in most parts of Uganda. However, not only has adoption of these technologies by farmers been low but also many farmers seem not to be aware of these technologies. This study aimed at establishing the factors that influence awareness of and adoption of soil and water conservation technologies in Nabajuzi watershed in South Western Uganda. A bivariate probity model with partial observability was used in this study to examine farmers' awareness of and adoption of SWC technologies in Nabajuzi watershed. Findings reveal that the likelihood of being aware of and adopting SWC technologies is explained by age of household head and the number of years s/he has been farming.

**Kartez, Jack**  
New England Environmental Finance  
Center, University of Southern Maine

#### **Panelist - Economics of Sea Level Rise Adaptation**

**Kerner, David**  
The Tauri Group  
**Scott Thomas**  
Stetson Engineers Inc.

#### **The Resilience Attributes Framework**

Based on the resilience attributes introduced in the first presentation, we demonstrate how resilience metrics can be developed and used to assess system resilience. The approach for developing attribute-based resilience metrics has been tested on a U.S. Army application and is applicable to a very broad range of systems, inputs, and conditions. The metrics can be directly applied to assessing the resilience of coastal systems to natural and manmade stresses, including short- versus long-term and rapid-onset versus slowly evolving challenges.

**Kerner, David**  
The Tauri Group, LLC

#### **You Bought What?!**

Stuff happens, and you get funding to deal with it. How do you prioritize what to spend it on? You can only seem to figure out how to respond to the last disaster, but how do you choose – and justify – spending on things that will make you resilient to a whole range of problems that could come your way, and not just what happened last week? This presentation will provide a toolkit of resilience attributes that help stakeholders and managers figure out what will help their systems achieve a broad level of resilience, understand how to choose from and prioritize the many possible expenditures, and justify to the evil auditors and overseers why you made those expenditures. Everyone will walk away armed with a ready-to-use list of terms with which to make and defend their professional decisions.



**King, Philip**  
San Francisco State University

## **Panelist - Economics of Sea Level Rise Adaptation**

**Kriesel, Warren**  
Ag & Applied Economics  
University of Georgia

### **Did the Housing Bust Reduce a Housing Market's Response to a Natural Amenity?**

The effects of the housing bust of 2008-2011 were felt in most regions of the U.S. This research analyzed market data to answer a fundamental question: did property buyers and sellers reduce how they respond to the natural amenities locally available? A basic tenet of the real estate industry and economics is that buyers will bid up the price of more desirable properties. Sellers react in a similar way by offering higher prices for this land. While desirability is a personal choice, many people agree that homes with views of mountains, a bucolic pasture, or a saltwater marsh are desirable. During a period of severe economic stress the picture is less clear. Buyers whose employment is uncertain may be motivated to seek out basic shelter. Sellers under threat of foreclosure may be forced to discount the natural beauty that surrounds their properties. The benefits associated with certain natural amenities are commonly estimated through hedonic price analyses in real estate markets, and these benefits are part of the evidence used to justify policies related to the amenities. If the real estate market loses its relative valuation of natural amenities then public policies aimed at protecting these amenities would lose a part of their economic rationale. Conceivably, a shrewd policy maker could time a benefit cost analysis with the business cycle to achieve a desired outcome. Therefore, a goal of the current research was to provide a definitive statistical test of whether market participants reduced their valuation of a natural amenity during the recession.

To our knowledge the research examining how the Great Recession affected price differentials related to any sort of natural amenity is limited to two pieces. Cho, Kim and Roberts (2011) studied prices during the real estate boom period, 2000-2006, and during the bust, 2008. After evaluating each of the attributes, they concluded that marginal WTP for scenic views declined during the recession. Chadourne, Cho and Roberts (2013) studied a similar period and determined that the marginal WTP for forest views fell 13 percent during the recession. In both papers the conclusions are based on before-and-after comparisons of regression results. The current study aims to refine this body of literature.

Chatham County, GA, which includes the city of Savannah, was chosen as the study area because of its saltwater marshland environment and it is comparable to other metropolitan areas of the Southeast US such as Charleston, SC and Jacksonville, FL. The residential real estate market is mature, with the more desirable parcels having been developed long ago. The dataset combines individual property sales data for residential homes in Chatham County from the Tax Assessor's office for years 2005 to 2010, with a parcel-level GIS database. The property records contain information on housing characteristics and all the property sale prices were adjusted to 2011 constant dollars using the OFHEO price index for the Savannah metropolitan area. There were 8,244 parcel sales prior to the first quarter of 2008, and 3,882 in the recession. One of the econometric concerns in hedonic models is the presence of potential spatial dependence among neighboring properties. Ignoring the spatial dependence could lead to inefficient or even inconsistent estimates (Anselin and Bera, 1998). Recent critiques, for example Gibbons and Overman (2012), suggest that spatial models cannot provide a valid approach to causal identification. We employed a semivariance analysis of the regression residuals and determined that spatial autocorrelation was not a problem. The advantage of this analysis is it requires no assumptions about the form of a spatial weights matrix. Four different analyses were used. First, following the practice of Cho et al. and Chadbourne, et al. two hedonic price models were run for sales before and after January, 2008. A comparison of the calculated marginal implicit prices for marshland proximity revealed a decrease in the later time period. However MIP was almost guaranteed to decline because of the regression's functional form and the fact that average property prices declined during the recession. Second, an analysis of the pooled data set showed no significant effect for a recession/proximity interaction variable. Third was a difference-in-difference model that included marshland-influenced parcels in a treatment group, and the remaining parcels in a control group. Interaction of the treatment group with post-2007 sales was slightly positive but insignificant. Fourth was a variant of the D-I-D model with 1,456 repeated paired sales. In this formulation some potential problems are cancelled out, including omitted variables and spatial correlation. Again, the D-I-D estimator was positive, suggesting the opposite of the result that was obtained by Cho et al. and Chadbourne, et al..

Together, the four analyses did not lead to rejecting the null hypothesis that real estate market participants did not reduce their valuation of this important natural amenity during the recession. This research sheds more light on an important question in public policy: did real estate market participants reduce their valuation of a natural amenity during the Great Recession of 2008-2011? Many policies intended to limit urban sprawl through land conservation programs that preserve natural amenities, such as tax credits for conservation easements and wetlands protection, were

partly justified by how they can increase neighboring property values. If the public had lost its appreciation of these natural amenities during the recession then part of the economic justification for these policies is dubious. This research suggests that economic justifications for public policies that conserve this marshland amenity are on a firm basis.

**Lambert, Bruce**

Institute of Trade and Transportation Studies

**The Mississippi River: The heart of the region's transportation system**

The New Orleans Board of Trade poster highlights the importance of Navigation along the Lower Mississippi River from Baton Rouge to the Mouth of the River. The poster shows a few key economic variables, such as trade patterns up and down the river, while also providing a general introduction to both the ship types that operate along the river and other navigation activities. Finally, the key transportation assets along the river, such as anchorages, rail lines, highways, etc., are also displayed.

**Lambert, Bruce**

Institute of Trade and Transportation Studies

**Changing Course: Economic Implications of Mississippi River Avulsion**

Periodically, the Mississippi River has changed its course within the Louisiana Delta, so questions concerning if and when a future avulsion could occur remain important to consider when examining the importance of the Mississippi River to the nation's economy. If an avulsion would occur, the transportation system along the whole river would be temporarily and/or permanently altered, which would fundamentally change one of the worlds' largest maritime complexes. The Mississippi River remains a critical corridor for U.S. petroleum, chemicals, steel, etc., but this study seeks to focus only on agricultural exports, to provide some initial thoughts on ways to examine the larger interplay upon the river's transportation system and those the nation's economic vitality.

**Lynn Kennedy**

Department of Agricultural Economics, Louisiana State University

**Ports Resilience Index**

Coastal ports connect users of the sea and land in an environment exposed to coastal hazards and climate change impacts. Risks to ports include organizational problems, technological interruptions, and human factors. By assessing assets and capabilities before a hazard event, maritime industry members and port management can identify the resources needed to increase efficiency of hazard mitigation, response and recovery, thereby increasing resilience. Louisiana Sea Grant and the Gulf of Mexico Alliance have established a formal network of port and transportation specialists with the purpose to develop a list of indicators for a qualitative self-assessment tool through which a Port can evaluate its ability to return to an acceptable level of operation after a hazard event. The index raises awareness of challenges to port operations and the mechanisms to address those challenges, especially through social relationships and communication at different spatial and temporal scales. This presentation will summarize the participatory approach used to engage port stakeholders to develop a qualitative tool; the factors that the port industry identifies as relevant to increase resilience to natural hazards; and the results of pilot testing the Ports Resilience Index across the Gulf Coast.

**Land, Lauren**

LSU and Louisiana Sea Grant

**Economics of Shoreline Erosion Management and Adaptation to Climate Change**

The coastal zone is a dynamic and recalcitrant ecological system. Management problems stemming from coastal erosion, storms, and sea level rise are exacerbated by development along the coast and, especially, by development at the water's edge. More than 52% of the U.S. population lives in coastal counties. Focusing on U.S. East Coast barrier island beaches, approximately 86% percent of the shoreline has exhibited significant erosion in the past 100 years, averaging an annual rate of 1.6 feet of shoreline recession. A 2000 study by the Federal Emergency Management Agency estimates that 25% of homes within 500 feet of the coast could be lost by 2060, at a potential cost of \$530 million per year! This vulnerability has serious implications for economic welfare of coastal households, viability of private and public insurance programs, recreation and tourism along the coast, regional economies adjacent to the coast, and ecological sustainability of coastal systems. This session will include four empirical papers that examine economic aspects of shoreline erosion and adaptation to climate change. Dr. Gopalakrishnan (Ohio State University) will present a quasi-experimental paper that uses hedonic property price analysis to assess the value of beach width with and without beach replenishment, before and after Superstorm Sandy; her application is to Nags Head, North Carolina. Dr. Steven Dundas (Oregon State University) will present a hedonic property price analysis of shoreline protection along the Oregon coast; he uses variation in permission to install structural protection as an exogenous source of variation in arming to value structural protection vis-à-vis shoreline retreat. Dr. Paul Hindsley (Eckerd College) will present a law-and-

**Landry, Craig E.**

Department of Agricultural and Applied Economics, University of Georgia

economics piece that examines the influence of littoral rights and the public trust doctrine on Florida property values through their effect on beach access, use, and views. His analysis will include a discussion of how these factors may evolve under sea level rise. Lastly, Dr. Landry (University of Georgia) will present a joint revealed and stated preference model of beach use (recreation demand) and support (contingent valuation) for beach erosion management; the empirical analysis is formulated on a structural model that permits consistent estimate of both use and non-use values.

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**John C. Whitehead**  
Department of Economics  
Appalachian State University

**Economic Values of Coastal Erosion Management: Joint Estimation of Use and Passive Use Values with Recreation and Contingent Valuation Data**

The coastal zone is a dynamic and recalcitrant ecological system. Problems stemming from coastal erosion, storms, and sea level rise are exacerbated by development along the coast and, especially, by development at the water's edge. More than 52% of the U.S. population lives in coastal counties. Focusing on U.S. East Coast barrier island beaches, for example, approximately 86% percent of the shoreline has exhibited significant erosion in the past 100 years, averaging 1.6 feet of shoreline recession per year. A 2000 study by FEMA and the Heinz Center estimates that 25% of homes within 500 feet of the coast could be lost by 2060, at a potential cost of \$530 million per year! This vulnerability has serious implications for economic welfare of coastal households, viability of private and public insurance programs, recreation and tourism along the coast, regional economies adjacent to the coast, and ecological sustainability of coastal systems.

Options for management of shoreline erosion include shoreline hardening (seawalls and other structures designed to protect land and preserve property boundaries), beach replenishment (adding sand to the beach and dune system), and coastal retreat (moving buildings and infrastructure away from eroding shorelines as necessary). The effects of erosion management strategies on the configuration and value of the coastal housing units have been studied by a number of scholars. Management of erosion, however, also has important implications for the local tourism economy, the quality of coastal resources, and ecological sustainability over the long term. These aspects of management have received considerably less attention in the literature. Coastal property owners have been the most vocal proponents of shoreline hardening and beach replenishment, with other voices and options receiving little consideration. The project employs a survey of North Carolina households in order to evaluate the welfare effects of beach erosion management alternatives on the general population. The survey gathers data on use (and non-use) of coastal beaches, perceptions of coastal resource quality, knowledge of coastal processes, and stated preference referendum votes for programs to manage coastal erosion. With a 61% response rate, our online panel data compares favorably to U.S. Census descriptive statistics for North Carolina, with slightly more representation for more educated and wealthier households.

By combining information on beach users and non-users, we are able to represent diverse groups of stakeholders and conduct a comprehensive and comparative analysis of economic welfare and empirical tests on the magnitude of use and non-use values. We collect information on recreational visitation under current and hypothetical future conditions in order to assess the effects of coastal erosion and erosion management policies on tourism in the coastal zone. Our experimental design provides for both within- and between-subject tests of the economic effects of increasing beach width and negative environmental impacts on visitation patterns and economic value. This permits us to assess the effects of environmental quality on recreation value and tourism, and to conduct tests for sequencing effects (for each of the three erosion management strategies).

In addition, we implement contingent valuation to assess households' willingness to pay (both users and non-users) for different approaches to shoreline erosion management. Treatment effects relating to beach width and the presence of negative environmental impacts are included within the CV-design. Following modern best-practices in stated preference analysis, we implement a consequential survey design (highlighting policy relevance and application of study findings) and measure a number of important individual perceptions, including response certainty, perceived consequences of survey responses, and efficacy of government management actions.

We build on the microeconomic model of Eom and Larson (JEEM 2006) to jointly estimate parameters of recreation demand and passive use values. Our model does not impose weak complementarity (typically invoked in welfare analysis of recreation demand), but rather can test for its existence. By combining contingent valuation and contingent behavior data, we employ a consistent behavioral model that permits analysis of co-existing use and passive use values and how these values are affected by beach width, erosion management strategy, and the presence of environmental impacts engendered through management.

Preliminary results indicate that shoreline retreat receives the highest level of support among NC

households – both in terms of expected future beach trips and affirmative responses in the contingent valuation exercise. Beach replenishment is a close second, while shoreline armoring receives the lowest level of support among the general population of North Carolina. Projected beach visitation under beach replenishment is approximately the same as the RP status quo (3 trips/year), while the shoreline armoring scenarios exhibits an average treatment effect of 0.5 trips per year. Contingent trips under the shoreline armoring scenario decrease by 0.75 trips per year. Negative environmental impacts of management reduce recreation demand by at least one trip per year (with the greatest effect for shoreline retreat). Contingent recreation demand decreases in scenarios that describe the beach as severely eroded, but only increases slightly in scenarios that improve beach width. Preliminary analysis of contingent valuation data indicates similar patterns as the recreation demand results.

**Le, Trang**

Department of Agricultural Economics  
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**Effects of Climate Change on Rice Yield and Rice Market in Vietnam**

In Vietnam almost 48 percent of the total population rely on agriculture for their livelihoods. Within the agricultural sector, rice production plays a crucial role in sustaining national food security, creating employment in rural areas, and fostering the economic growth. Under climate change, agriculture is the most vulnerable sector because of its direct exposure to and dependence on climatic factors. Provided the crucial importance of rice to the nation's food security as well as the economy, this study aims to examine the effects of maximum and minimum temperatures and rainfall on rice yield and rice market. The long-run effects of temperatures and rainfall on rice yield are tested for three separate (planting) seasons, that is, spring, autumn and winter using the cointegration approach. Climatic yearly data covering 1960-2000 that consists of minimum and maximum temperatures, and rainfall for spring, autumn and winter are obtained from the UNDP Climate Change Country Profiles. Rice yields by seasons are provided by the Vietnam General Statistics Office. The cointegration concept provides a framework to deal with nonstationary time series. A cointegrated relationship implies that the two series have a long-run equilibrium, and therefore they cannot drift too far away from each other. Under the Augmented Dickey-Fuller tests, time series in the dataset are found to be a mixture of I(1) and I(0). Consequently, the bounds test is the appropriate framework.

Using the bounds test, the long-run effects of temperatures and rainfall on rice yield in autumn season are confirmed. Specifically, in response to an isolated 1% increase in the maximum temperature, rice yield would reduce 4.55%. On the other hand, an isolated 1% increase in the minimum temperature and the rainfall would raise rice yield by 3.05% and 0.54%, respectively. In order to determine the effects of these climatic factors on Vietnam rice market, I simulate an equilibrium displacement model specified for rice market. Under the low emission scenario (and compared to the average of 1980-1999), annual mean (unseasonal) temperature and rainfall will increase at least 2.12% and 1.03% respectively in 2020. Let us assume that autumn temperatures and rainfall would increase at the same rate as mean temperature and rainfall in the low emission scenario. With this in place, simulation results show that without any interventions, the predicted increase in autumn minimum temperature and rainfall would raise autumn rice yield by 6.47% and 0.56%, respectively, in 2020. Given the average yield of 3.29 MT/ha, this translates into an increase of 0.21 and 0.18 MT/ha, respectively. Predicted increase in maximum temperature, by contrast, would result in 9.65% (0.32 MT/ha) reduction. The effects caused by maximum temperature are large enough to offset the sum of effects of minimum temperature and rainfall. The climatic factors yield far larger effects on export demand than on domestic demand. For instance, predicted increase in minimum temperature would raise domestic demand by 0.02% in 2020. The corresponding figure for export demand is 4.18%.

**Lee, Matthew**

**Tim Slack**

**Troy C. Blanchard**

Louisiana State University

**Tracking Health Impacts of the Deepwater Horizon Oil Spill**

Understanding the contours of the public health and social impacts associated with the 2010 Deepwater Horizon Oil Spill (DHOS) represents an important research challenge. This talk outlines three related research initiatives funded by the Gulf of Mexico Research Initiative (GoMRI) aimed at taking on this task. The Louisiana Community Oil Spill Survey (COSS) is a 5 wave cross-sectional trend dataset that assesses impacts of the DHOS on residents of the coastal portions of Southeast Louisiana. Telephone survey data was collected in June 2010 while the oil was still flowing, approximately one month after the well had reached a "static" condition (October 2010), and then subsequently at the one-year, two-year, and three-year anniversaries of the rig explosion (April 2011, April 2012, and April 2013). The Trauma, Resilience, and Opportunities among Neighborhoods in the Gulf (STRONG) survey, a component of the Consortium for Resilient Gulf Communities (CRGC), is a telephone-based, cross-sectional survey drawing on a representative sample of the Gulf South being collected in spring 2016 and aimed at understanding adaptive

capacities of resilience. Last, Understanding Resilience Attributes for Children, Youth, and Communities in the Wake of the DHOS (RCYC) is a research effort aimed at assessing public health impacts from the DHOS with an emphasis on the experiences of children and their families over time. The RCYC, beginning in spring 2016, will combine three waves of longitudinal face-to-face survey data, focus group data, and social media analysis to examine various dimensions of resilience.

**Leeworthy, Vernon R.**  
**Danielle Schwarzmann,**  
NOAA Office of National Marine  
Sanctuaries, Conservation Science  
Division

**Goedeke, Theresa L.**  
**Sarah Gonyo**  
**Laurie Bauer**  
NOAA National Centers for Coastal  
Ocean Science and Center for Coastal  
Monitoring and Assessment

### **The Non-Market Value of the Outer Coast of Washington State: An Attribute Approach**

The National Oceanic and Atmospheric Administration's Office of the National Marine Sanctuaries and National Centers for Coastal Ocean Science completed an analysis of the non-market values respondents have for the ecosystem service and their attributes provided along the Outer Coast of Washington. The respondents included a random sample of households in the State of Washington. The survey was funded by the State of Washington to support their Marine Spatial Planning process and addressed visitation to the Outer Coast of Washington with emphasis on outdoor recreational activities. The survey used contingent choice experiments to elicit the values users have for various attributes of the ecosystems services provided along the Olympic Coast of Washington. This presentation will discuss the results of the contingent choice experiment portion of the survey. The contingent choice experiment was developed using a fractional factorial design that is orthogonal and balanced. Each respondent received four choice questions composed of the status quo option and two additional options. There were ten attributes associated with each option in addition to the cost of the scenario. Attributes included marine mammals, predators, tide pool organisms and access, and beach crowdedness.

The results of this research will include the econometric model, marginal values of each attribute (the marginal willingness to pay for changes to each attribute level), marginal rates of substitution between attributes, and the compensating surpluses from different policy/management strategies. Other key findings, such as correlations among attributes and socioeconomic variables and summary statistics will also be presented. One of the primary uses of this research will be to further understanding of the user groups and what they find important, support Olympic Coast National Marine Sanctuary (OCNMS) management, develop Condition Reports for OCNMS that evaluate the status of the recreation ecosystem service, and aid in marine spatial planning. The data was collected in 2013-14 by Point97 and the Surfrider Foundation. They conducted an Internet survey using a panel from Knowledge Networks (KN), a marketing research firm. In addition, the survey also covered user visitation to the Outer Coast over the past 12 months, detailed recreational activities participated in over the 12 month period and on the last trip: trip expenditures, spatial location of their last trip, and demographic information of the users.

**Li, Sheng**  
**Richard Vogel**  
**Nanda Viswanathan**  
School of Business, Farmingdale State  
College, State University of New York

### **Sustainable Development of Long Island's Coastal Industries**

Fisheries from commercial fishing to residential and tourist recreational uses in the Long Island, contribute over \$10 billion in impacts to Long Island's economy. Over the past decade, the commercial fishing industry in the region has declined due in part to water pollution, competition, and a lack of infrastructure. Annual landed commercial catch declined by 90% from 1993 to 2013. The pass-through impacts from the connections between the marine based industry and the larger economy (such as the tourism sector) may have some significant effects on the region's economic growth. This study focuses upon Long Island's recreational and commercial fishing industry and its interrelationship with the island's tourism and recreational sectors as well as its integration with the greater regional economy. Based on the 2013 IMPLAN data, a computable general equilibrium (CGE) model is built to make a quantitative assessment of sectoral contributions and the linkages among current marine and coastal economy. The preliminary results indicate significant contributions from commercial fishing, recreational fishing, charter vessels and marinas in coastal businesses and regional economic development.

**Liaoa, Yuan**  
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Consumer Economics, University of  
Illinois at Urbana-Champaign,

### **The Impact of ISO on Environmental Performance: An Empirical study of Chinese Manufacturing Industry**

Voluntary environmental programs are highly promoted by Chinese government and are adopted by many firms in responding to policy attention. This paper first examines the effect of the adoption of ISO9001 (quality management standards) on the likelihood of adoption of ISO14001 (environmental management standards) using a recursive bivariate probit model. With the Inverse Mills Ratios derived from the predicted bivariate probit results, a Heckman Selection Model with the control functions are used to examine the effects of ISO14001, ISO9001 and both ISOs on firms' environmental performance. Using facility-level panel data from 2006 to 2008, percentage of recycled water used and sulfur dioxide emissions are examined in the Chinese manufacturing

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industry. Regression results indicate firms with ISO9001 are 49.6% more likely to adopt ISO14001. With either or both certifications, firms use more recycled water on average compared to firms without any certification. ISO14001 is found to have a positive effect in reducing sulfur dioxide emissions, but the effect can be canceled out by ISO9001. These findings signal the effectiveness of ISO14001 in managing corporate environmental strategies without mandatory regulations. This suggests that Chinese firms are found to respond and take action to the demand of environmental protection by adopting ISO14001.

**London, James**  
Professor Emeritus  
Clemson University  
and London & Associates

#### **Panelist - Economics of Sea Level Rise Adaptation**

**Lupi, Frank**  
Agricultural, Food and Resource  
Economics, Michigan State University

#### **Economic Benefits of Reducing Algae at Great Lakes Beaches**

Record harmful algal blooms (HABs) in Lake Erie in 2011, 2014 and 2015 have led to a range of negative impacts on coastal resources including drinking water bans, odor and altered views for coastal property owners, and beach closures. These damages have heightened public and political interest in agricultural non-point source pollution loadings and resulting consequences for coastal zones. A better understanding of these economic damages can inform budding policy efforts to address the Lake Erie HABs. To date, there is only one published study of beach demand in the Great Lakes (Murray et al 2001), which uses data for 15 Great Lake beaches from 1999. Moreover, no available study links Great Lakes beach use to algae. To address this gap, we present results of a recreational demand model for Great Lakes beach visitation that is coupled with survey data on people's stated response to the presence of different levels of algae on the beach and algae in the water. A general population survey of 30,000 people was conducted to identify beachgoers and to collect information on all their Great Lake beach visits during the summer season. The revealed trip behavior is used to estimate a joint participation and site choice model of recreational demand on a set of 451 actual Great Lakes beach sites. Beach visits depend significantly on economic factors such as the travel cost from a person's home to a particular beach, as well as on environmental factors such as the water temperature and the history of beach closures at a site. The recreation demand model is then augmented with stated preference data on stated beach choices in response to different levels of algae on the beach and algae in the water. A variety of pooled model specifications are tested, but several are statistically rejected. The pooled demand model is used on the actual beach choice sets to generate counterfactual trip demand patterns and welfare measures for scenarios that reduce algal impacts on Great Lake beaches.

**Macari, Emir José**  
**Malay Ghose-Hajra**  
Department of Civil and Environmental  
Engineering  
University of New Orleans

#### **Graduate certificates in Coastal Engineering and Sciences to create global expertise, promote technological innovation, and enhance economic vitality in Louisiana coast**

According to the World Bank, New Orleans is one of the world's 10 cities most at risk of flooding as global climate change affects the low lying areas of the coast. In its recently published quantification of present and future flood losses in the world's 136 largest coastal cities, the bank calculates that the costs of flood damage and storm events could rise to \$1 trillion a year if coastal cities do not adapt. Louisiana's coastal land loss over the past 100 years and recent devastating storms in the Gulf and East Coasts have brought coastal sustainability and restoration to the forefront of today's social, economic and environmental discussions. These natural and human hazards are placing more people and property at risk exposing significant infrastructure to open water conditions and making proximal areas less suitable for human as well as various wildlife and fish species. Through an ambitious 50-year Coastal Master Plan, Louisiana is planning more than 100 projects worth an estimated \$50 billion to rebuild the coast. Firms from around the country and world are vying for these contracts. Firms with knowledge of coastal science and engineering are given higher qualification scores in the contracting selection process. Therefore, these companies are actively seeking avenues for their scientists and engineers to gain adequate knowledge and understanding to engineer a sustainable coast. The University of New Orleans (UNO) is uniquely positioned to create a multidisciplinary program to address the emerging scientific and engineering aspects of a deltaic coastal environment. Faculty members at UNO have extensive knowledge on coastal and deltaic processes and geomorphology, sediment transport, dredging, as well as design of coastal and hydraulic structures. In the Spring 2015, UNO started offering courses towards coastal engineering and coastal sciences certificate programs. Graduate students and working professionals taking these courses will have a unique perspective and understanding of the coast and will be able to readily apply the theory and knowledge to design restoration and protection projects in Louisiana and similar coastal environments around the world. This presentation will describe the requirements, overview, course outlines, and benefits of the two certificate programs to create a more sustainable

coast.

**MacColl, Spencer**

The World Bank

**Paul Onyango**

University of Dar Es Salaam

**Matthew Reimer**

University of Alaska Anchorage

**Yaniv Stopnitzky**

University of San Francisco

**Unintended Consequences of Enforcement in a Cooperative Institution: Experimental Evidence from Tanzania**

Small-scale fisheries provide critical employment and nutrition for millions of poor households around the world, yet they are commonly overfished and degraded. Top-down approaches to fishery management, which have been successful in advanced economies, are impractical or infeasible in developing countries, so policymakers and communities must seek different approaches to fishery management. Tanzania has attempted to address this problem with a greater role for local community management over fishing permitting, enforcement of regulations on fishing gear, and the collection of fines for violations thereof. Yet local norms regarding community enforcement often fail to eliminate use of illegal gear and associated overfishing.

We conduct a unique artefactual field experiment in Tanzanian coastal communities to study cooperation among fisherman on the interrelated issues of harvest levels, gear choice, and enforcement. Our results show that the enforcement mechanism hurts cooperative fishing behavior, relative to a baseline with a choice of illegal gear without enforcement, as players shifted from cooperative harvest strategies to more destructive ones. The net effect of this shift is faster depletion of the common-pool resource. Using data on harvest levels, illegal gear choices, and enforcement actions, we then provide evidence that fishermen respond to enforcement along one dimension of cooperative behavior by decreasing cooperation in another dimension, in particular, enforcement on illegal gear leads fishermen to harvest more “legally”. We interpret these results in a conceptual framework in which “cooperation” over common-pool resources occurs along multiple margins. In the model, if enforcement increases along one margin without associated informal or formal control along the other, then an enforcement regime can worsen collective outcomes.

**Mack, Sarah K.**

Tierra Resources LLC

**Robert R. Lane**

**John Day**

Louisiana State University, Baton Rouge

**Status and Challenges of Wetlands in Carbon Markets**

In the last decade, considerable global, national, regional and state-level governmental participation in the stabilization of atmospheric greenhouse gases has facilitated significant growth in emissions trading markets. Wetland restoration techniques have proven to be effective climate change mitigation strategies that promote enhanced carbon sequestration via increased vegetative productivity and carbon burial, as well as avoided carbon release when wetlands are lost. A carbon market that facilitates financial investment into wetland restoration can potentially create offsets that provide a wealth of co-benefits such as storm surge reduction, fish and wildlife habitat, recreation, job creation, and economic development that are vital to the sustainability of coastal Louisiana. To ensure quality and credit validity, protocols and methodologies must provide a transparent accounting methodology for the development, certification, and monitoring of carbon offset projects, and be approved through a transparent process that provides opportunities for stakeholder engagement and scientific review. In 2012, the first wetland restoration methodology “Restoration of Degraded Deltaic Wetlands of the Mississippi Delta” was certified by the American Carbon Registry introducing wetlands to carbon markets. Since that time other wetland methodologies have been certified in national and international markets. However, to date no carbon offsets have been transacted. This presentation will provide an update on regulatory and voluntary emissions trading markets with an emphasis on wetland carbon offset development. Louisiana’s wetlands will be discussed within the broader context of the opportunities and challenges that wetlands face within current carbon markets. Findings from wetland carbon pilot initiatives by Entergy and ConocoPhillips will also be discussed.

**Magliocca, Nicholas R.**

National Socio-Environmental Synthesis Center, University of Maryland

**Margaret Walls**

**Virginia D. McConnell**

Resources for the Future

**The Role of Subjective Risk Perceptions in Shaping Coastal Development and Adaptation**

The economic costs of weather-related disasters have been rising in the United States and around the world. There is some debate about the reasons for the increase, but most studies agree that the primary driver is an increase in exposure—that is, more people and properties, and more valuable properties, located in harm’s way. If climate change leads to an increase in the frequency and/or severity of storms and hurricanes, as many scientists expect, will disaster costs continue to rise? Or will people react to these worsening patterns by making adaptation choices that dampen the rise? To answer these questions, we need a better understanding of how people form risk perceptions and how those perceptions affect their choices over housing location and storm mitigation options. We present a dynamic agent-based modeling (ABM) framework for investigating the location and mitigation decision processes of residential housing consumers in coastal communities facing storm climates ranging from relatively mild (e.g., U.S. mid-Atlantic states) to severe (e.g., Florida). The economic ABM simulates coupled land and housing market dynamics, which we use to assess how current and incoming residents perceive risks from coastal hazards, form attitudes about location

and/or mitigation choices, and act on those choices. We also assess how heterogeneity among consumers with respect to these decisions affects spatial patterns of development and the evolution of land and house prices in a coastal region over time.

The economic ABM simulates three types of agents: landowners, a real estate developer, and residential housing consumers. Landowners decide each period whether to sell their land to the developer; the developer buys land and builds houses to satisfy consumer demand; and heterogeneous consumers choose housing location and/or modify housing characteristics to mitigate against potential storm damages. In making their choices, consumers maximize utility subject to a budget constraint, and their utility depends partially on house location and expected costs associated with potential property damages from a coastal storm or hurricane. We introduce a theoretical framework that integrates Salience Theory and Theory of Planned Behavior (TPB) for modeling subjective risk perceptions and their influences of residential housing consumers' decision-making. Residential agents form beliefs about the level and likelihood of expected costs from storms of a given severity. Individual beliefs are based on personal experience with coastal hazards (e.g., 'dread' or ambivalence) and/or influenced by beliefs transmitted via social networks. Attitudes towards locating along the coast and/or implementing mitigation actions are then formed based on beliefs and perceived salience of coastal hazard risks. This framework enables us to evaluate how alternative specifications of risk perception and belief formation processes affect spatial and economic outcomes. We identify the decision mechanisms that influence location and mitigation behaviors, which provides insight into possible leverage points to change behavior through policy interventions.

**Masum, Farhad**  
**Shaun M. Tanger**  
**A. Gordon Holley**

Agricultural Economics and  
Agribusiness, Louisiana State University.

#### **Factors that Influence Sales of Forestry-Related Specialty License Plates in Southern United States**

In recent years, vanity license plates have become an increasingly popular way to raise awareness and show support for a myriad of issues with which the plate is linked. Several states along with various forestry education provider organizations have developed a forestry license plate. Vehicle owners can purchase the plates to show their support towards forestry by buying that license plate, which generates revenue for the provider organization. Using county level data from 4 states in the United States, a statistical model was developed examine explanatory factors of forestry based specialty license plate sales in 2014. Using linear OLS model and elasticity model, we observed that the significant predictor variables are—income, population density, area of county in acres, acres of timberland in the county, percentage of people who are 65 or older, and the number of people associated with forestry related jobs. All these variables are found to be positively related to the increase of plate sales. After a certain level, plate sales started to decline with increasing number of people associated with forestry related jobs.

**Maung-Douglass, Emily S.**

Louisiana Sea Grant

**L.J. Graham**

**S. Sempier**

**Mississippi-Alabama Sea Grant**

C.M.S. Hale

Texas Sea Grant

M. Wilson

UF IFAS/Florida Sea Grant

#### **Sea Grant Programs of the Gulf of Mexico Oil Spill Science and Outreach: Communicating Science about the Deepwater Horizon Oil Spill**

In April 2010, the Deepwater Horizon (DWH) oil rig caught fire and sank off the coast of Louisiana (USA). The wellhead released an estimated 172 million gallons of oil into the Gulf of Mexico, making it one of the largest oil disasters on record. More than 1.84 million gallons of the dispersant Corexit were used in response; this was the first time in history chemical dispersants had been applied at great depth, close to a mile below the surface. In the nearly six years since the DWH oil spill, research initiatives have made major advances in understanding the implications of the incident (chemical, biological, physical transport, etc.). Major challenges encountered post-DWH include effectively synthesizing, translating and disseminating the scientific findings to people whose livelihoods depend on a healthy Gulf of Mexico. In 2014, the Gulf of Mexico Sea Grant programs and the Gulf of Mexico Research Initiative (GoMRI) embarked on a partnership to serve people who could utilize oil spill science in decision-making and/or who depend on the Gulf for their livelihood. These target audiences include elected officials, emergency responders, environmental non-profits, fishers, natural resource managers, ports and harbors employees, public health workers, tourism specialists, and scientists. The Gulf of Mexico Sea Grant programs assembled a team of four extension specialists – each with different areas of scientific expertise - to assess target audience needs and share oil spill science. Information on how the Sea Grant oil spill outreach team assesses the needs of target audiences, synthesizes and delivers oil spill science, connects a variety of target audiences to one another and evaluates the effectiveness of the outreach program will be shared.



**McLindon, Chris**  
Stone Energy

### **Changing Course: Geologic potential for Lower Mississippi River Avulsion**

The delta plain of southeast Louisiana has been constructed by a succession of sixteen delta lobes. Each new lobe follows a cyclical pattern of development and degradation that begins with a change in course of the Mississippi River to the site of the new delta. On average the river has changed course about once every 500 years over the past 7000 years. On a few rare occasions channel switches have resulted in major changes of the course of the river into a significantly different hydrologic basin. These changes are called avulsions of the river. The Mississippi River intercepted the course of the Red River in the 16th century near the current location of Old River. The two rivers have shared and exchanged flows since then. In the 1800s the Atchafalaya River, which had previously been the downstream arm of the Red River began receiving more flow through the juncture. A survey of the rivers in 1950 by Latimer and Schweizer for the Mississippi River Commission estimated that the Atchafalaya would be receiving 43% of the discharge of the Mississippi by 1965 at which point it would widen and become the main channel of the river, thereby completing a major avulsion of the river. Shortly thereafter Congress enacted the Flood Control Act of 1954 which authorized the construction of the Old River Control Structure to prevent the inevitable change in course of the river. An examination of the geological controls that have determined the locations of previous changes in course and avulsions of the river can be used to assess the potential for future changes. Course changes tend to follow well-worn pathways because the abandoned channel belts of earlier courses of the river consist of sand substrates that are easily erodible. A future change in course may also be caused by the failure of man-made structures that are intended to control or divert the flow of the river. These factors suggest a set of initial conditions that will favor the site of a change in course or avulsion that when combined with a trigger event, such as a major flood, will determine the most probable location. Scenarios for a future change in course are examined for three locations: the Old River Control Structure, the Morganza Spillway and the junction of the Mississippi River and Bayou Lafourche at Donaldsonville.

**Miller, Craig A**  
Illinois Natural History Survey,  
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### **Illinois agriculture conservation practices and Gulf hypoxia: Connection or Disconnect?**

We conducted a mail survey of 3,000 agriculture producers in Illinois to investigate conservation beliefs, attitudes, and reported behaviors in the context of water quality and Gulf hypoxia. We mailed producers an 8-page questionnaire that contained questions related to enrollment in federal and Illinois state conservation programs, beliefs about conservation, and perceptions of effects of their farming practices on Gulf hypoxia, and received 910 (32%) completed questionnaires. A majority (57%) of producers were either formerly (17%) or currently (40%) enrolled in the federal Conservation Reserve Program; of those currently enrolled 35% stated they planned to re-enroll. A majority (90%) of producers slightly to strongly agreed that it was their responsibility to decrease fertilizer run-off into streams, 92% felt responsible to help protect local water quality, and 71% agreed that that had a responsibility to protect water quality in the Gulf of Mexico. Most (84%) respondents felt farmers were doing their part to protect water quality, 90% agreed their own practices improved water quality on a local level, and 71% stated their farming practices improved water quality in the Gulf of Mexico. We examined attitudes toward effectiveness of stream buffers on water quality locally and in the Gulf of Mexico. A majority (61%) of farmers agreed that stream buffers on their land would improve water quality, 78% of Illinois farmers agreed with the statement "If more farmers had stream buffers, water quality in the state would improve" and 72% agreed with the statement "If more farmers had stream buffers, water quality in the Gulf of Mexico would improve." Less than half (41%) of respondents agreed that "Most farmers already use stream buffers." Although attitudes were supportive of stream buffers and the relationship between buffers and water quality, less than one-quarter (21%) reported they had stream buffers on their property, 74% reported having grassed waterways and 31% had filter strips. Agriculture producers in our study were supportive of practices they perceived would improve water quality on a local and state-level and in the Gulf of Mexico. Reported practices were not in agreement with attitudes, however. We will discuss underlying values that may provide an understanding of the apparent disconnect between farmers' understanding of the connection between conservation practices and water quality, and their actual practices.

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**Malay Ghose-Hajra**  
Department of Civil and Environmental  
Engineering  
The University of New Orleans,

### **Use of Unmanned Aircraft Systems (UASs) to monitor risk perception, assess hazard mitigation, and evaluate economic sustainability of Louisiana Coast**

Coastal property development, global climate change, sea level rise, geologic subsidence, loss of barrier islands, increasing number and intensity of coastal storms and other factors have resulted in water quality degradation, wetlands loss, reduced storm and surge protection, ground settlement, and other challenges in coastal areas of Louisiana and throughout the world. The loss of marshland in Louisiana coast has also exposed significant infrastructure to open water conditions and has

degraded the habitat of nearby areas. Published data indicate that coastal Louisiana and the Mississippi River basin have an annual marsh land loss of about 16 square miles. Since hurricane Katrina, design and analysis of foundations to support Hurricane and Storm Damage Risk Reduction Systems (HSDRRS) in the Mississippi River Valley division have undergone major revisions to account for uncertainties and incorporate higher design standards. In addition to supporting structural loading, foundations in coastal areas must withstand flood forces, high winds, scour, soil erosion, any seismic activity, and impact forces from floating debris. Based on recommendations from international experts, scientific organizations, government agencies and the private sector who studied causes of system failure during Katrina, new design and construction guidelines have been created to construct T-walls, I-walls, heavily loaded pump stations, sector gates, levees, and other coastal substructures. Another goal towards reestablishing a healthy coastal ecosystem have been to rebuild Louisiana's coastal wetlands with river diversion or sediment conveyance projects that will optimally manage and allocate sediments, minimally impact native flora and fauna, and positively affect the water quality. An unmanned aircraft system (UAS), commonly known as a drone, is an aircraft system without a pilot aboard. The flight of UASs may be controlled either autonomously by onboard computers or by the remote control of a pilot on the ground or in another vehicle. These autonomous, hand-launched aircraft systems can be equipped with an onboard global positioning system (GPS), inertial navigation system (INS), high resolution digital camera and computer. The UAS can be utilized for rapid acquisition of high-resolution aerial surveys and to collect geospatial data for various coastal protection and restoration projects. The UAS can collect geo-referenced visible and color-infrared imagery at a resolution between 2 and 10 centimeters for coastal infrastructure and natural resource monitoring efforts in both land and aquatic environments. The UAS can accurately repeat flights over a specific area, which allows users to monitor change over time. It can be used to monitor environmental conditions such as flooding, beach erosion/restoration, changes in vegetation or wildlife utilization, the success or failure of mitigation projects, and pre and post-storm conditions. It could also be used to track land use changes or monitor construction progress. The UAS technology can also be used to detect infrastructure problems along levees, dikes, and floodwalls. This capability allows the project team to survey areas where traditional surveys would be very time consuming and expensive. This presentation will summarize the components of unmanned aircraft systems that can be used in Louisiana coastal restoration projects. Application and benefits of UAS systems for Louisiana coastal protection and restoration projects will be deliberated using data obtained and analyzed from diverse projects in coastal Louisiana.

**Moran, Sharon**  
Department of Environmental Studies,  
State University of New York

#### **Understanding Noncompliance With Evacuation Warnings Concerning Coastal Storms: Engaging Narratives to Illuminate Decision-making Processes**

The prospect of increasing numbers of severe storms, in association with climate change and sea level rise, has raised awareness among researchers about the community dimensions of these disasters, and the need to minimize their impacts on both the built environment and the people who live there.

In order to provide the best insights into the problems associated with evacuating diverse communities, we argue that expanded research methods are necessary. Using examples from a research project examining the experiences of those who could not or would not evacuate when Hurricane Sandy was looming, we explain how approaches borrowed from narrative medicine are especially effective in gaining purchase on the lived experience of people who 'rode out the storm.' The approach is particularly useful in framing and contextualizing the behavior of people with disabilities, who constitute a disproportionate share of those harmed by coastal storms including Katrina and Sandy. These methods are especially challenging because they raise important epistemological and ontological questions, however, grappling with these complications is worthwhile because the methods help provide additional insight into people's thought processes and actions. Both researchers and resource managers have interest in understanding noncompliance with evacuation warnings. Interrogating the behaviors that constitute 'resilience' (or lack thereof) is essential to achieving more sustainable coastal communities. The findings discussed in this paper are based on a research project titled "Understanding Responses to Storm Warnings: Learning From Those Who 'Rode Out' Hurricane Sandy." It was one of ten projects jointly funded by NOAA-Sea Grant (NY, CT, and NJ) in 2014-2015.

**Morgan, Jordan**  
Bemidji State University

#### **Sustaining Ecosystem Services through Coastal Restoration Initiatives**

While climate shifts will bring about changes everywhere, the impacts that Coastal areas will realize are expected to be more severe. Storms, rising sea level, coastal erosion, changes in water quality and temperature will negatively affect ecosystems and the services they provide. But to people from the headwaters of the Mississippi – even ones versed and keenly interested in environmental

sustainability – the impacts of severe weather and climate change on coastal Louisiana appear distant and vague. During spring break, I seek to remedy this. I will be working with the Common Ground Relief effort to restore shorelines and coastal wetlands through planting salt resistant marsh grasses. My talk will be on what I have learned about marine wetlands as compared to fresh water wetlands; where private and non-government organizations fit in coastal restoration efforts; the expected impacts of climate change on coastal ecosystems, and what knowledge I will take back to Northern Minnesota with me to be an upstream ambassador for coastal restoration.

**Munn, Ian A.**

Department of Forestry  
Mississippi State University

**Yiling Deng**

Robinson College of Business,  
Georgia State University

**Keith Coble**

Agricultural Economics Department,  
Mississippi State University

**Haibo Yao**

Walker L. Cislis College of Business,  
Northern Michigan University

**Willingness to pay for potential standing timber insurance**

Evaluating a new insurance product evokes a fundamental question about whether the product design sufficiently appeals to the potential clientele to justify its development costs. In this study, we estimate the premium rate that landowners are willing to pay for standing timber insurance. Data were generated through a one and one-half bounded contingent valuation survey conducted in fall 2010. Design of the contingent valuation method takes into account multiple natural disaster risks, one deductible level and ten premium rates. Survey questionnaires were mailed to a random sample of Mississippi nonindustrial private forest landowners with at least 100 acres of forestland. The mean WTP for standing timber insurance is derived using two methods: by an interval censored survival model which allows a random utility interpretation, and by a Kaplan-Meier Turnbull nonparametric model which is robust to potential parametric misspecifications. The 95% confidence interval for the mean WTP is estimated by Krinsky Robb and bootstrapping methods with 5000 samples. Landowners have an “effective” interest in standing timber insurance but the WTP premium rate is around \$3.20 per thousand dollars of standing timber value, which is well below the existing premium rates provided by the current insurance companies. It partially explains the under-insurance phenomenon for natural disaster risks among landowners.

Key Words: Willingness-to-Pay, NIPF Landowner, Standing timber, Insurance

**Nataraj, Shanthi**

Rand Corporation

**Examining the Impact of the Deepwater Horizon Spill on Community Health, Social and Economic Outcomes**

How can communities build resilience to adverse future events like the Deepwater Horizon oil spill? The Consortium for Resilient Gulf Communities is using an interdisciplinary approach to address this question. The first component of the consortium's research effort involves place-based assessments of health, social, and economic impacts of the DH oil spill. The Consortium will conduct a household survey to examine oil-spill related health outcomes and perceptions, and the effects of social support networks and other types of resources that can explain resilience. The economic impacts of the DH oil spill will also be examined through an ex-post examination of industries that were closely linked to the spill: namely, the fishing, seafood processing, and tourism industries. A major challenge in evaluating the impact of the spill on these industries is that it is impossible to observe the counterfactual – that is, the outcomes in these industries that would have prevailed in the absence of the spill. For example, the Gulf's fishing industry has been faced with increased competition from imports and a variety of natural disasters, which have contributed to a declining catch value. While the DH oil spill likely contributed to a further decline in landings in 2010, disentangling this impact from the effects of other factors requires controlling for pre-existing industry trends. The economic analysis will attempt to develop a reasonable approximation for what the counterfactual might have been by comparing changes in more exposed versus less exposed areas of the Gulf region, using a difference-in-differences analysis.

The findings from the assessment will be used to build leadership capacity for community action planning and communicating risk. The Consortium will work closely with several Gulf communities in a number of ways, including soliciting feedback during the development and implementation of the research activities, and training community health workers on strategies for improving community resilience. Ultimately, the consortium hopes to establish a clearer picture of the ways in which the oil spill affected the surrounding communities and to develop evidence-based strategic planning and risk communication strategies for communities facing similar disasters in the future. The research will provide guidance for policymakers to help them identify specific actions that will mitigate future disaster impacts more effectively.

**Naquin, Dominick and Damian**

Isle de Jean Charles Band of Biloxi-  
Chitimacha-Choctaw

**Louisiana Coastal Tribe Resettlement: Through the Eyes of the Younger Generation.**

Coastal Louisiana bayou Native American communities are at the frontline of storm and coastal inundation challenges as they cling to vanishing lands and livelihoods. Youth of the tribes are inheriting both their historic cultures and the challenges of how to retain and invigorate them in the context of such very high risk. Two young members of a coastal Native community that is seeking

resettlement to a safe inland location will do this presentation. They are participating fully in this effort and will discuss the efforts and their vision for a successful resettlement from the lens of their generation and that of their children's and grandchildren's.

**Norris-Raynbird, Dr. Carla**  
Sociology Chair and Women's Studies,  
Bemidji State University

### **Building Upstream Ambassadors for Coastal Restoration**

If a picture is worth a thousand words, then personal experience is worth far more. This is ever on my mind when developing pedagogy that connects the conceptual with the practice of it. This year I have brought three students from Bemidji (first city on the Mississippi) to New Orleans, to discover for themselves the interdependence of coastal culture and the natural environment, the augmented vulnerabilities of marginal coastal communities to all manner of disasters, and the 'upstream-downstream' bridging that must take place to build awareness of the impacts of climate change to ecosystem services. Each student has committed to building their capacity in one of these areas; each student will engage in service learning with a relief organization in the 9th Ward and build knowledge in their area; and each student will take their experiential knowledge back to Northern Minnesota and beyond to share with other students, faculty and the community at large. It is my hope to continue this pedagogy to build a network of 'upstream ambassadors' who will in some small way be a resource for our Sister City, in return for the rich knowledge we have gained.

**Nyanamba, Yunuke**  
Bemidji State University

### **Healthy communities and climate adaptation: volunteers as a resource**

I come from Kenya and now study Community Health and Nursing in Northern Minnesota. My interest in working with Common Ground Relief is to gain knowledge about building sustainable capacities in communities which have suffered disasters, economic hardship and degraded health/well-being. How do we make marginal communities more resilient against chronic extreme weather events and other disasters? I will speak of my volunteer experience in the 9th ward of New Orleans and what I have learned about this community in comparison to communities in the north and in Kenya. I will speak of the many benefits of volunteer efforts: as a resource to the host community, as a national and international outreach initiative to bring volunteer resources into the community, and also as one way to build knowledge and skill sets in external volunteers that may have broader implication as they return to other areas of the United States...and the world.

**Odom, Hunter**  
Louisiana Sea Grant Law and Policy  
Program

### **Impacts of Sediment Diversion Efforts: Property Rights from Erosion, Alluvion, and Dereliction and Potential Tort Recovery by Commercial Fishermen from the State**

With the recent recommendation from the CPRA to continue the mid Barataria and mid Breton sediment diversions into the design and engineering phase, questions about their potential impacts are beginning to arise. One such inquiry is the effect an introduction of sediment laden freshwater may have on oyster, crab, shrimp, and fish populations in Louisiana bays, which begs the question: If these fisheries were to be negatively affected, could the commercial fishermen that depend on such populations recover damages or compensation from the state? This presentation is intended to give the viewer a basic understanding of Louisiana law as it relates to liability of the State for coastal restoration efforts. The Louisiana Constitution, statutory language, and jurisprudence will be discussed in depth as it relates to the topic. The potential recovery of oyster leaseholders will first be discussed including the effects of the "hold harmless" clause in oyster leases. The potential recovery of other commercial fishermen will be discussed separately due to different provisions provided in their commercial licenses. Lastly, potential legal theories that could allow commercial fishermen recovery for any adverse effects of sediment diversion will be hypothesized. This presentation will further discuss issues that may arise with regard to property interests of riparian landowners as a result of the erosion, alluvion, accretion, and dereliction that will inevitably occur from the implementation of these sediment diversions. It is intended to extend to the viewer a basic understanding of the legal principles that are applied when determining ownership rights over riparian land and land influenced by the erosion, alluvion, accretion, and dereliction caused by navigable rivers and waterbodies. The statutory language and jurisprudence that relates to such influence will be discussed and predictions will be made in the presentation.

**Osti, Surendra**  
**Jeffrey Gillespie**  
Department of Agricultural Economics  
and Agribusiness  
Louisiana State University Agricultural  
Center

### **Extent and Use of H-2A and H-2B Labor in Louisiana Crawfish and Alligator Production**

Louisiana is the largest producer of crawfish and alligators in the United States. In response to the reduced supply of unskilled domestic labor in Louisiana seafood production and processing, the use of H-2A and H-2B labor especially from Mexico has increased over several decades. In Louisiana, it was estimated that crawfish production was conducted on 225,389 acres with gross farm value of

\$172 million. Similarly, in the same year, it was estimated that the farm-gate value of alligators was \$77.3 million (LSU AgCenter, 2014). H-2A labor is increasingly used in aquaculture production, mostly crawfish, with these workers harvesting up to 40-50% of Louisiana crawfish. Similarly, according to the data collected by Mishra in 2011, 65% of the workers were H-2B laborers in Louisiana seafood processing. Recently, shortages of H-2A and H-2B labor and higher required wage rates granted by the U.S. Department of Labor (DOL) for this labor hold potentially serious consequences for the Louisiana seafood industry.

The major objectives of this study are to determine: the extent of uses of H-2A and H-2B labor in seafood production in Louisiana, the full costs incurred by firms in using H-2A and H-2B labor in crawfish and alligator production in Louisiana, the consequences incurred by Louisiana crawfish and alligator production firms under various scenarios of labor shortages and wage increases, and the value of H-2A and H-2B labor to producers of crawfish and alligators in Louisiana. To obtain the above mentioned objectives, surveys of all known Louisiana crawfish and alligator producers will be conducted via mail. This survey will follow Dillman et al.'s (2009) Tailored Design Method. The list of the crawfish and alligator producers will be constructed based on the names and addresses of Louisiana State University Agricultural Center Crawfish Newsletter subscribers and consultation with extension agents working in the area of Louisiana where alligator and crawfish production is concentrated. Questions on the surveys will ask producers about the extent of their usage of H-2A and H-2B labor, and reasons for using this labor instead of using domestic labor. In addition, they will be asked to participate in a choice-based conjoint analysis where their preferences for labor will be assessed for their willingness to pay for various labor attributes such as work ethic, punctuality and worker visa status. In the poster, the potential survey questionnaire and expected results of this study will be presented based on previous related studies conducted in the area of seafood production. Although the study concentrates on the impact of nonimmigrant labor on the seafood industry, its implications are also important for other industries which use non-immigrant labor. Furthermore, the results can help businesses to understand the impacts of changes in policy on their bottom line.

**Ousmane Sene, Seydina  
Krishna Paudel**  
Department of Agricultural Economics  
and Agribusiness, Louisiana State  
University

#### **The Brunt of Oil demand and US-Dollar Exchange Rate: Evidence from Net-Oil Importing Countries in Sub-Saharan Africa.**

This paper investigates the impact of the US dollar exchange rate on oil demand in net importing oil countries of Sub-Saharan Africa (SSA). Given that Global real Crude oil prices are exclusively denominated in US dollars, we test the hypothesis that, the variation in the dollar exchange rate affect the demand for crude oil in net imported oil countries using, non-US dollars currency in the world and domestic market of oil. We observed that, when oil prices are at record levels in dollar, the price of oil in euro lags behind and won't increase until few month later but not in other currencies. We use a multivariate specification of error correction model after testing for non-linearity issues pertaining to the effect of US-dollar exchange rate on oil demand under the assumptions that regional demand in SSA has no effect on the forces shifting the supply and demand on the equilibrium price of crude oil. We find that US-dollars exchange rate has stronger effect than crude oil price on oil demand in SSA. US-Dollars exchange rate impact on the terms of trade, firms performances and consumers prices suggests that foreign exchange markets appears to be more efficient, and react more strongly to early changes in the real economy.

**Pace, Niki**  
Mississippi-Alabama Sea Grant Legal  
Program, University of Mississippi  
School of Law  
**Melissa Daigle**  
Louisiana Sea Grant Law & Policy  
Program

#### **The Program for Public Information: Maximizing CRS Points for Communities**

The Program for Public Information (PPI), part of the Community Rating System (CRS), serves as a way to maximize CRS points earned through thought-out, well-planned outreach activities. The Mississippi-Alabama Sea Grant Legal Program and the Louisiana Sea Grant Law & Policy Program are part of a two-year regional project that is assisting CRS Users Groups in Louisiana and Mississippi in transitioning to the 2013 CRS Coordinators' Manual and drafting the PPIs. This presentation will discuss best practices and lessons learned during the first year of the project, including the benefits to working with attorneys and outreach specialist in drafting a PPI and in preparing the products and messages used for outreach. There are still many questions in regards to PPIs and this presentation will examine what questions have come up and how we have addressed them.

**Pace, Niki**  
Mississippi-Alabama Sea Grant Legal  
Program  
**Stephanie Showalter Otts  
Terra Bowling**  
National Sea Grant Law Center

#### **A Guide to Shellfish Restoration & Permitting Programs**

When undertaking a shellfish restoration project, it can be challenging to navigate the permitting requirements and policies of each state. This lack of a guiding framework can delay projects and add to overall project costs. To facilitate the process, the Mississippi-Alabama Sea Grant Legal Program and partners researched the regulatory framework governing shellfish restoration projects in 21

**Chris Boyd**  
Troy University  
**Catherine Janasie**  
National Sea Grant Law Center

coastal states. For each state, the guide identifies the responsible agencies, the application process, and the regulatory landscape. Using these findings, this presentation will provide an overview of key legal issues that reoccur in many coastal states, such as the role of the public trust, leasing of state owned submerged lands, and the relationship to state coastal programs.

**Pace, Niki**  
University of Mississippi  
Mississippi-Alabama Sea Grant

### **The Role of Living Shorelines in Adaptation Planning**

Permitting a living shoreline can be a complex system to navigate, involving federal, state, and even local oversight. This presentation will discuss work by Mississippi-Alabama Sea Grant Legal Program to further understanding of the permitting process. The presentation will also explore opportunities for local government implementation, changes on the horizon for federal permitting, and the elements of state regulation that may arise. Through the presentation, the case will be made for an early understanding of the legal nuances of your jurisdiction prior to embarking on the project design. Advance understanding can save time and money during the implementation of the project.

**Parker, Charles R.**  
**K. M. Hunt**  
Department of Wildlife, Fisheries &  
Aquaculture, Mississippi State University

### **A trends analysis of economic impacts and dependency at a trophy fishery, 1995-2015**

A mail survey of recreational anglers (n=961) at Lake Fork Reservoir in Texas was conducted from June 2014 to May 2015 to collect information regarding fishing trip characteristics and expenditures. An estimated total of 116,919 one-person, one-day trips were made to the reservoir throughout the year. Expenditures made in the local area by non-local-resident anglers totaled \$12,039,570. Using the IMPLAN software, it was found that these direct expenditures generated a total economic impact of \$14,718,739. Overall, anglers were willing to pay an additional \$19,556,881. This study was a replication of a study conducted twenty years earlier. During the first study (n=848), anglers were estimated to have taken 348,181 one-person, one-day fishing trips to the fishery. Anglers residing outside the local area were found to have spent \$14,540,000 which generated \$18,559,871 in total economic output in 1995. Anglers were willing to pay an additional \$10,679,095 for their trips. The observed two-thirds reduction in angling effort and more than 50% reduction in the real value of expenditures between the two studies were indicative of an economically aging reservoir. To explore the trends in economic impacts of angler expenditures and the local economy's dependence on the tourism sectors affected by anglers making trips to the fishery, economic impacts and dependency indices were calculated for each year between the two surveys. Expenditure profiles were extrapolated using the producer price index and economic impacts were calculated using multiple IMPLAN models. Economic dependence indices were calculated as a ratio of base output of tourism sectors to total output in the local economy using an automatic social accounting matrix (ASAM). Results from this study sought to improve the utility of economic impact studies by providing a cost effective methodology to annually estimate economic impacts and to determine relationships between dependency and impacts over time. Implications are applicable to both inland and coastal fisheries.

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Department of Agricultural Economics,  
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**J. E. Henderson**  
Department of Forestry, Mississippi  
State University

**Parsons, George**  
**Jenna Toussaint**  
**Jeremy Firestone**  
School of Marine Science and Policy,  
University of Delaware

### **Measuring the Effects of Offshore Wind Projects on Beach Use and Tourism on the East Coast of the United States**

We measure the effect of the presence offshore wind projects on beach goers on the east coast of the United States using a travel cost model combining stated and revealed preference data from an internet-based survey of residents from 20 east-coast states. The data were gathered by GfK (formerly Knowledge Networks) using their probabilistic-based, pre-screened KnowledgePanel. Respondents (n=2051) were shown photo simulations of hypothetical wind projects at distances ranging from 2.5 to 20 miles offshore and were asked if the projects would have affected their beach experience and/or caused them to change in their trips plans. In the context of a random utility model we predict changes in trip patterns and measure welfare effects. The east coast, in our case, includes beaches from Massachusetts to South Carolina. We have 275 beaches in our model. In addition, we consider a number of auxiliary models to predict (i) effect of wind projects on enjoyment, (ii) likelihood of cancelling a trip, and (iii) likelihood of making a special trip to see a new wind project. The results of the models are used to simulate impacts on selected beaches in each state on the east coast.

**Paudel, Krishna**  
**Doleswar Bhandari**  
**Matt Fannin**

### **Economic Impacts of Salt Water Intrusion in Mississippi River Valley Alluvial Aquifer and Possible Remedy**

CNREP, Louisiana State University  
**Frank Tsai**  
Dept. of Civil and Environmental  
Engineering, Louisiana State University

Irrigation water salinity and resulting secondary soil salinity is a serious problem in agricultural land around the world. In Louisiana, salinity problems have been observed in many coastal and inland aquifers. The salinity problem would result in a significant economic loss. Our focus is on the Mississippi River Valley Alluvial Aquifer, which lies under the major agriculture area encompassing 18 predominantly agricultural parishes in Louisiana. We model the transmission of irrigation water salinity to soil salinity using a dynamic model. We then estimate the crop yield loss and resulting economic impacts on local and state level because of soil salinity increase in the aquifer. We identify several solutions to minimize or alleviate salinity problems and assess the economic implications of these remedies to local and state economies.

**Petrolia, Daniel**  
Mississippi State University

### **Estimating the Value to the Public of a Buildout of the Gulf of Mexico Coastal Ocean Observing System (GCOOS)**

**Rex H. Caffey**  
**Matthew Fannin**  
LSU CNREP

The Gulf of Mexico Coastal Ocean Observing System (GCOOS) is a coordinated system of ocean observations data along the Gulf Coast, which includes data collected via ocean buoys, satellites, underwater gliders, and other monitoring stations. These data are collected by federal, state, and local government agencies, as well as public and private universities and other institutions. The GCOOS is part of the larger Integrated Ocean Observing System (IOOS). A buildout (i.e., an expansion) of the GCOOS has been proposed that would enhance the quality, quantity, type, and geographical coverage of data collected and end-user information products provided. Given the cost of the buildout, it is the objective of this project to derive an estimate of the corresponding benefits. To do so, a stated-preferences survey is being designed to elicit contingent-valuation responses from a representative panel of Gulf households regarding key end-user products explicit and implicit in the proposed buildout. The end-user products will be chosen so as to be representative of the key enhancements of the buildout, such that their value estimates comprise a leading share of the total value. Two of the end-user products chosen are an expanded beach conditions monitoring program and an improved hurricane forecast. The expanded beach conditions program scenario will focus on a Gulf-wide expansion of the Beach Conditions Reporting System maintained by Mote Marine Laboratory for the State of Florida. The improved hurricane forecast scenario will focus on improvements to the accuracy of key forecast attributes, including storm landfall location, landfall time, and severity. The welfare estimates for the proposed enhancements to end-user products will represent a lower-bound estimate of the maximum willingness to pay, i.e., a lower-bound estimate of the value of the benefits, of the GCOOS buildout.

**Pinto da Silva, Patricia**  
**Julia Olson**  
NOAA, National Marine Fisheries  
Service, Northeast Fisheries Science  
Center

### **Following the Fish: Mapping the flow of commercial catch in New England**

Fisheries management in the US gives little consideration to fish after it's landed, despite reference in national law to preferred social outcomes like food production; fisheries are part of regional/national food policy yet have rarely been part of that discussion either. We describe research to better understand these benefits by following the flow of different fisheries in New England, from where fish are caught to ultimate use and distribution. We explain research motivations and challenges encountered; present examples visualizing the use and destination of different species; and consider what this means for food and fisheries policy in the region and beyond.

**Sharon Benjamin**  
NOAA, National Marine Fisheries  
Service, Northeast Fisheries Science  
Center and Integrated Statistics, Woods  
Hole, MA

**Plummer, Cody**  
LSU CNREP

### **Louisiana Water Policy Challenges**

In 2014, a private company known as BWG Corp. approached the Arkansas Natural Resource Commission with intentions of designing a proposal to divert a section of the Mississippi River through the Southern part of Arkansas to the North East portion of Texas. This diversion is designed to provide water to be sold to private business, farmers, urban areas, and several other municipalities. Several of Louisiana's commission boards including those involved in fisheries, natural resources, health and hospitals, environmental services, agriculture, and numerous others have been informed of this proposal and have been asked to provide feedback based on each of their specific needs of the resource in their fields of governing. The pipeline plans to remove some 750+ million gallons of water each day continuously for an estimated 75 years. This presentation provides a brief overview of this proposal, related regulatory policies, and some of the implications for future water needs via diversions. The presentation highlights the potential reforms and policy mechanisms needed to address ownership and allocation of surface and ground water in light of future demands and other factors (population, competition, climate change, etc.).

**Pokhrel, Bijay K.**  
**Krishna P. Paudel**  
Department of Agricultural Economics  
and Agribusiness, Louisiana State  
University

### **Factors Affecting the Choice of Irrigation Technologies by U.S. Cotton Producers**

We used 2013 survey data collected from cotton farmers located in 14 U.S. states to understand the adoption and allocation of irrigation technologies. Our objectives are to (i) identify variables that affect the adoption of water saving irrigation technologies, (ii) understand what variables affect

**Eduardo Segarra**  
Texas Tech University

farmers to adopt multiple irrigation technologies in their cotton production, and (iii) determine variables that affect allocation of land under different irrigation technologies. Results from the probit model indicated that two explanatory variables i. farmers being from the Southplain and ii. having higher irrigated yield are significant determinant of farmers' adoption of water saving technologies. In the intensity equation where we examined why farmers adopt multiple irrigation technologies using a poisson quasi-likelihood model, five explanatory variables, viz., irrigated yield, land holding, education, computer use, and Southplain were significant. Results from the multinomial fractional regression model indicated that older producers are likely to adopt furrow irrigation whereas producers from the Southplain region are less likely to adopt furrow and center pivot, but more likely to adopt drip irrigation. More educated farmers are more likely to put land under the drip irrigation method. Results of this should help to target efficient irrigation technologies promotion among cotton farmers.

**Posadas, Ben**  
Mississippi State University

### **Economic Recovery Paths of Recreational and Commercial Fishing Sectors from Natural and Technological Disasters**

It has been more than a decade since Hurricanes Katrina and Rita devastated the coastal areas in the Northern Gulf of Mexico States in August and September 2005. Results of surveys showed that Hurricane Katrina caused approximately \$2.2 million in total damages to the resident Mississippi charter boat fleet. The estimated value of damages to Mississippi municipal and commercial marinas located in the three coastal counties reached \$41.38 million. The estimated value of total damages to live bait dealers in Coastal Mississippi reached \$4.17 million. The total estimated damages to the resident Mississippi commercial fishing fleet exceeded \$35 million. The closures of significant portions of Gulf federal and state waters to commercial and recreational fishing and closures of beach resources to human uses due to Gulf of Mexico oil spill in April 2010 altered the recreation and consumption decisions of residents and tourists in affected communities. Survey results showed that Mississippi charter boats businesses were shut-down for about 5.37 months in 2010. As a result, the charter boats for-hire businesses lost more than one-half of total sales in 2010. Mississippi commercial fishing businesses were shut-down for about 6.01 months in 2010. These fishing establishments reported less than two-thirds loss in annual total sales in 2010. Eating and drinking places in Mississippi were shut-down for less than a week in 2010. These eating and drinking places stated that they lost more than one-fourth of annual total sales in 2010. The Mississippi live bait and marina firms were shut-down for 2.37 months in 2010. As a result, the live bait and marina businesses suffered a reduction in annual total sales by more than one-half in 2010. In order to understand the magnitude of the economic impacts of the natural and technological disasters during the past decade to the recreational and commercial fishing sectors, multi-year baseline economic information about each sector in all five Gulf states are currently being compiled from various secondary sources. These long-term baseline secondary data will be used to determine the duration of the economic impacts of the disasters. Econometric analysis of these data will be conducted to determine the rate of economic recovery and measure the economic damages to these affected economic sectors. It is suggested that these assessments be conducted on a region-wide basis, state by state, and species by species.

**Ropicki, Andrew**  
Department of Agricultural Economics,  
Texas A&M University

### **Potential Impacts of Proposed Modifications to the Gulf of Mexico Red Snapper IFQ Program**

**Daniel Willard**  
Gulf and Southeast Oceans Program –  
Environmental Defense Fund

Amendment 26 to the Gulf of Mexico Fishery Management Council's (GMFMC) Reef Fish Fishery Management Plan (FMP) established an IFQ system for the commercial red snapper fishery with the following stated goal (GMFMC 2006): The purpose of the IFQ program proposed in this amendment is to reduce overcapacity in the commercial fishery and to eliminate, to the extent possible, the problems associated with derby fishing. The program has succeeded in meeting both objectives with: 1) the number of IFQ accounts falling 25%, and 2) the fishing season becoming year-round with fishers realizing increased dockside prices for their catch (NMFS 2012). However, that is not to say that the program is not without its critics. A survey of RS-IFQ shareholders found that small shareholders were dissatisfied with the program and believed it unfairly benefited larger shareholders (Boen and Keithly 2012). In addition, recent research on the RS-IFQ program found evidence that better connected shareholders were able to attain better prices when trading red snapper allocation (Ropicki and Larkin 2014), which means that social networks affect the value of rights created under the system.

**Sherry Larkin**  
IFAS Research Office,  
University of Florida  
Professor, Food and Resource  
Economics Department

Many of the issues associated with the RS-IFQ program were noted in the GMFMC's 5-year review of the program (GMFMC 2013). In response to the 5-year review and the recommendations of the GMFMC's Ad Hoc Red Snapper IFQ Advisory Panel, the GMFMC released a scoping document for Amendment 36 to the FMP outlining a number of potential modifications to the RS-IFQ program to



be considered (GMFMC 2015). Some of the potential modifications include: changing the eligibility requirements to participate in the program, changing the rules regarding red snapper discards in the fishery, capping the amount of IFQ allocation that shareholders may own, and restricting the trading of allocation (leasing of quota) through an use-it or lose-it provision. Many of these proposed changes could lead to drastic changes in all aspects of the fishery including: who owns the quota, how quota is traded, how the quota is harvested, and quota prices. Using publically available information on the RS-IFQ program and other catch shares programs along with economic theory our analysis will evaluate the potential implications of proposed modifications to the RS-IFQ program outlined in the scoping document

**Sanchez, Georgina M.**

**Ross Meentemeyer**

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**Jordan W. Smith**

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Society, Utah State University

**Adam Terando**

Southeast Climate Science Center, US  
Geological Survey

### **The Future of Urban Growth and Water Demand Across the United States' Southeastern Atlantic Coast.**

Coastal communities are disproportionately impacted by climate change and as urban areas expand, social, economic and ecological vulnerability are expected to increase. By 2010, 39% of the United States' population lived in coastal counties, with population growth projected to rise in coming years. The Southeastern Atlantic Coastal Basins of the Carolinas are a prime example of rapid, low-density, urban, coastal growth. The region has experienced between 20 and 40% increase in developed land cover from 1973 to 2000. The region also contains valuable natural resources, significant agricultural production and some of the highest biodiversity levels outside of the tropics. Sustainable growth strategies are required that accommodate the growing demand for housing near coastal amenities, while also acknowledging and mitigating the risks associated with sea level rise and the strongly negative impacts of development on ecosystems and ecosystem services. The production of actionable science is critical to addressing the challenge of sustainable growth, especially in light of climate change related stressors such as sea-level rise and drought, which are already having negative environmental and economic impacts throughout the region. Furthermore, rises in water demand associated with population growth, an increased number of tourists, and land cover change may result in the expedited movement of saltwater into freshwater aquifers. The goal of this research is to simulate different scenarios of future urban development across the region and analyze their impact on freshwater ecosystem services across the rapidly growing Southeastern Atlantic Coastal Basins of the Carolinas. To better understand sub-regional patterns and changes in future water demand, we conducted and evaluated geospatial analysis of various projected land conversion scenarios. Our modeling results, generated from the use of stochastic urban growth simulations run under different urban growth trajectories, can serve as a decision support tool for public and private water resource managers across study area.

**Saul, Steven**

Nova Southeastern University

### **The interaction of fisher behavior and fish population dynamics in the Gulf of Mexico: what can an agent-based model inform us about this relationship and its effect on stock assessment?**

Fisher decision making can influence the effectiveness of management measures and determines the spatial and temporal locations of fishery-dependent observations. In many stock assessments observations from fishers are used to infer the abundance of fish populations. To understand some of the ways that fisher behavior can influence our perception of abundance, an individual-based spatial model of the reef fish fishery on the West Coast of Florida was developed. The spatial distribution of fish in the simulation was generated by combining three sets of estimates: stock size from stock assessment models, fishery-dependent catch per unit of fishing effort estimates of relative abundance, and fishery-independent estimates of spatial autocorrelation in relative abundance derived from video survey data. A biased random walk model representing fish ontogenetic migration was developed using tagging data. Three decisions were modeled to represent fishing behavior: participation, site choice, and trip termination. Discrete choice model fits to daily logbook data from the fishery, in conjunction with vessel characteristics, weather, fish price, regulations, and the price of fuel were used to parameterize fisher behavior. This, together with daily simulation conditions, determined simulated fishing vessel decisions.

Results from the simulation model demonstrate that catch per unit effort is not always proportional to stock biomass because fisher behavior affects the location and timing of fishing (i.e. sampling) events. The calculation of catch per unit effort indices from fishery-dependent observations, and the stock assessment models in which they are used, assume that the observations are made (or sampled) randomly across the spatial and temporal domain being assessed. Current statistical methods are not always effective at removing fisher behavior effects from indices of abundance, which when driving stock assessment, could lead to biased perceptions of trends in stock biomass and inappropriate management.

Finally, catastrophic events such as the Deepwater Horizon Incident affected the catch and family income of fishers who lived adjacent to and operated in areas that were closed. Some may have been able to continue fishing, but may have had to reduce their time at sea, or alter their fishing locations to work around the spatial closures. Others may have left the fishery altogether. Beyond the short term affects, the need to alter behaviors in 2010 may have permanently transformed how some people conduct fishing operations. If the distribution of data collected from the fishing industry has somehow changed due to changes in how people are fishing, not understanding or accounting for this change could affect the assessment and management of the Gulf's fish resources. An expanded version of this model is being developed to study the magnitude and direction of these affects from the spill in order to understand fishing fleet dynamics, fish population dynamics, and the interaction of these in response to spatial closures and oil pollution. Alternative responses to the spill will also be evaluated to understand the scope of the possible effects of oil spills on fish populations in the Gulf, how they recover, and to explore different management strategies that can be used during such catastrophic events.

**Scheld, Andrew M.**

Department of Fisheries Science,  
Virginia Institute of Marine Science

**Donna M. Bilkovic**

**Kirk J. Havens**

Center for Coastal Resources  
Management, Virginia Institute of  
Marine Science

**The Dilemma of Derelict Gear**

Every year, millions of pots and traps are lost in crustacean fisheries around the world. Derelict fishing gear has been found to produce several harmful environmental and ecological effects, however socioeconomic consequences have been investigated less frequently. We analyze the economic effects of a substantial derelict pot removal program in the largest estuary of the United States, the Chesapeake Bay. From 2008 through 2014, commercial watermen in Virginia were hired during the winter off season to locate, document, and remove derelict pots and other marine debris. Spatially resolved data on 34,408 derelict pot removals was matched with commercial blue crab (*Callinectes sapidus*) harvests and effort and entered into a Schaefer-style translog production model. Counterfactual analysis revealed the removal program led to an additional 30 million lbs in harvest valued at US \$21.3 million—a 27% increase above that which would have occurred without removals. Harvest improvements were seen to result from enhanced gear efficiency. During the removal program, each actively fished pot caught an additional crab on every pull due to the reduction of rival ghost fishing gear. An unfortunate common pool externality, the degradation of marine environments is detrimental not only to marine organisms and biota, but also to those individuals and communities whose livelihoods and culture depend on sustainable marine resource use.

**Schiavinato, Lisa**

North Carolina Coastal Resources Law,  
Planning, and Policy Center  
North Carolina Sea Grant

**The Legal Dynamics of Habitat Management: Helping Communities Overcome Barriers To Implementation**

As more state and local governments across the nation are facing public and private land use conflicts in coastal zones legal tools are becoming an increasingly necessary element to help shape the structure of these strategies. The primary need being that coastal management strategies need to be defensible in a court of law so that they can be implemented in a way that achieves the goals set forth in local plans. Issues such as updating local land use ordinances and policies, preserving property rights, protecting public access, and considering local duty to maintain public infrastructure are a few of the more critical legal barriers to implementation for governments. The additional complexity with these issues is that the solutions and, therefore also the tools, are typically state--specific because laws and regulations that address public trust, public access, and local government authority are within the realm of state law. Moreover, legal barriers are often connected to assessing and mapping local vulnerabilities and utilizing local knowledge in a way that facilitates meaningful local policy. To this end, attorneys often work in partnership with social scientists to address barriers to implementation through an interdisciplinary lens. This interdisciplinary lens provides governments with tools tailored to their particular needs, so that they may address adaptation challenges holistically. However, communities face a challenge within a challenge in that they are not always aware of the potential legal issues until after they have adopted strategies and then face barriers to implementation; and when they do face legal barriers, they are not always aware of the services and programs available that can provide them with the legal information and analysis they need.

This session will discuss the complex law and policy issues coastal communities in particular face with adopting and implementing habitat management policies and strategies and include case studies of how attorneys have assisted state and local governments with their climate adaptation efforts, as well as other management activities. Panelists in this session include attorneys from the National Sea Grant Network, who provide planning assistance, workshops, legal trainings, and legal and policy analysis on legal and policy issues impacting coastal communities. By exploring several case studies, session participants will learn about some of the innovative ways in which Sea Grant

attorneys have partnered with social scientists to work with coastal communities on their adaptation strategies. Case studies will include floodplain management, sea level rise adaptation, and implementing law and policy changes at the state and local levels. Participants also will have the opportunity to share some of their own coastal adaptation challenges and learn about the range of resources and assistance available to them through Sea Grant.

**Schiavinato, Lisa**

North Carolina Coastal Resources Law,  
Planning, and Policy Center  
North Carolina Sea Grant

**Planning for the Future of North Carolina's Outer Banks: Overcoming Barriers to Resilience in a Multiple Decision-Maker Environment**

The Outer Banks of North Carolina is frequently cited in case studies as an area in need of greater resilience from storm surge and sea level rise. This is a rational statement; the barrier islands' mix of oceanfront and sound side habitats and development, coupled with a tourism-based economy and remote location make vulnerability a clear challenge, lead outsiders to wonder why residents choose to remain. But once one digs deeper, a complex picture of resilience emerges. Tourists are mingled with full-time and seasonal residents whose family histories in the Outer Banks span generations, and seemingly simple decisions to increase resilience to sea level rise and climate change are complicated by implementation barriers that are both social and legal in nature. One such barrier, for example, is the need to have multiple decision-makers involved in identifying challenges and prioritizing adaptation options. One Outer Banks community, the Town of Nags Head, has partnered with North Carolina Sea Grant and the NC Coastal Resources Law, Planning, and Policy Center to increase its resilience to sea level rise over the next 10-30 years. This effort is proceeding in parallel to the "FOCUS Nags Head" process, which will allow the Town to expand its land use plan into a comprehensive plan and develop a Unified Development Ordinance that simplifies the Town code. This interdisciplinary project is using social science and legal research and outreach, along with the Vulnerability, Consequences, and Adaptation Planning Scenario (VCAPS) process, to assist Town decision-makers in identifying adaptation options to support vulnerability mapping of public infrastructure based on local data and a legal analysis of barriers to adaptation. While support in the Town of Nags Head is strong for sea level rise planning, early project results indicate that the Town is not the sole decision-maker for many of its adaptation issues. For example, in South Nags Head, decisions by the Cape Hatteras National Seashore may impact drainage inside Town limits. Furthermore, the North Carolina Department of Transportation is responsible for many of the roads and ditches inside Town boundaries, and Dare County coordinates hazard planning and evacuation. This decision landscape may prove more complex than situations for which structured decision-making has been applied successfully in the past. Nags Head has a history as an early adopter on beach nourishment strategies, so a successful sea level rise planning process that leads to implementable actions may set a precedent for other North Carolina coastal communities. This presentation will discuss how a combination of social science and legal research and outreach is being utilized to assist the Town of Nags Head with: (1) identifying key adaptation issues and barriers; (2) using a participatory process to involve multiple decision-makers in prioritizing adaptation options; and (3) developing an implementation strategy that addresses barriers and sets community-supported goals.

**Schneemann, Margaret**

Chicago Metropolitan Agency for  
Planning, Illinois-Indiana Sea Grant

**Leslie Dorworth**

College of Engineering, Mathematics  
and Sciences'  
Illinois-Indiana Sea Grant  
Purdue University

**Ecosystem Services Valuation of the Indiana Coastal Zone**

This study is the first phase of an ecosystem service valuation of the Indiana Coastal Zone. The goal is to evaluate services provided by coastal areas in Northwest Indiana such as the local beaches and the coastal areas of Lake Michigan. This work augments existing land-based evaluation tools for the planning region. Ecosystem service valuation is a tool used to increase the effectiveness of coastal zone management decisions through knowledge of the economic value of ecosystem services (such as recreation and tourism, support of native flora and fauna, water regulation, etc.). The intended audience is coastal resource managers and decision-makers. This first phase in the ecosystem service valuation includes: (1) identification of the ecosystem services provided by the Indiana Lake Michigan Coastal Zone Program Area (LMCP) Area; (2) a prioritization of these services based on input from coastal-zone managers to get agreement on the set of services that would most effectively inform policy and planning decisions and; (3) a review of the available economic value estimates of these priority services.

**Schneemann, Margaret**

Chicago Metropolitan Agency for  
Planning, Illinois-Indiana Sea Grant

**Leslie Dorworth**

College of Engineering, Mathematics  
and Sciences'

**Ecosystem Services Valuation of the Indiana Coastal Zone**

This study is the first phase of an ecosystem service valuation of the Indiana Coastal Zone. The goal is to evaluate services provided by coastal areas in Northwest Indiana such as the local beaches and the coastal areas of Lake Michigan. This work augments existing land-based evaluation tools for the planning region. Ecosystem service valuation is a tool used to increase the effectiveness of coastal zone management decisions through knowledge of the economic value of ecosystem services (such

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Purdue University

as recreation and tourism, support of native flora and fauna, water regulation, etc.). The intended audience is coastal resource managers and decision-makers. This first phase in the ecosystem service valuation includes: (1) identification of the ecosystem services provided by the Indiana Lake Michigan Coastal Zone Program Area (LMCP) Area; (2) a prioritization of these services based on input from coastal-zone managers to get agreement on the set of services that would most effectively inform policy and planning decisions and; (3) a review of the available economic value estimates of these priority services.

**Schwarzmann, Danielle**  
NOAA Office of National Marine  
Sanctuaries, Conservation Science  
Division

#### **Taste, preferences and the value of Ocean Guardian; A National Marine Sanctuary Education Program**

**Seaberry Nachbar**  
NOAA Office of National Marine  
Sanctuaries

An Ocean Guardian School makes a commitment to the protection and conservation of its local watersheds, the world's ocean, and special ocean areas, like national marine sanctuaries. The school makes this commitment by proposing and then implementing a school- or community-based conservation project. Ocean Guardian schools receive federal grant money to promote their program and meet their commitments. The funding helps the schools and teachers to develop projects to help protect the ocean in the future and promote ocean conservation and stewardship. Projects include recycling, beach clean-up days, installing rain barrels, installing wildlife structures, composting, and energy reduction. These schools receive funding from the NOAA Office of Education and the Office of National Marine Sanctuaries. Schools can apply for funding up to five years. A number of schools have continued their Ocean Guardian School projects after the five years by funding the program themselves or using other sources of funding. Although the costs and sources of funding are known there is limited information known about the economic value participants place on this program and the economic value created by these schools and their many activities. The goal of this research is to implement a survey that collects information about the attitudes/preferences and importance/satisfaction with the program, extent of reach, level of teacher, student, parent and administrative involvement, and parents' willingness to pay for their student's involvement in the program. The presentation will discuss the development of the survey instruments, proposed data/econometric analysis methods, planned implementation and intended use as a communication tool by educators to promote and justify these types of programs.

**Scyphers, Stephen B.**  
**Tarik C. Gouhier**  
**Jonathan H. Grabowski**  
Northeastern University, Marine Science  
Center

#### **Sustainability on the edge of risk and resources: insights from waterfront homeowners' mental models of sustainable coastlines**

**Steven A. Gray**  
Michigan State University, Department  
of Community Sustainability

Traditional strategies for balancing human desires to live and work along coastlines with the sustained delivery of ecosystem services have fallen short. In many regions, one of the most prevalent drivers of coastal decline is the armoring of shorelines, which is often implemented by coastal residents to address concerns of erosion or to achieve some other socially desirable outcome. Previous surveys have shown that coastal residents are universally concerned with environmental sustainability, but their decisions to develop their shorelines are inconsistent with these expressed concerns, and it is clear that there are social and economic factors that are poorly understood and contribute to their decisions. We used fuzzy-logic cognitive mapping (FCM) to compare mental models of sustainable coastlines among waterfront residents with natural and armored shorelines in the southeastern United States. Our network analyses reveal consistent environmental goals among both subgroups, but more distinct clustering between homeowners with natural and armored shorelines emerged when pro-environmental behaviors and motivations were considered. Our study demonstrates that mental models and network science can provide useful tools for understanding how waterfront residents view coastal ecosystems and make decisions to better inform participatory management and conservation.

**Lauren I. Josephs**  
The Nature Conservancy, Global Marine  
Initiative

**Sempier, Tracie**  
University of Southern Mississippi

#### **Coastal Resilience Index**

The Coastal Resilience Index (CRI) is a tool communities can use to examine how prepared they are for storms and storm recovery. The CRI was developed in 2010 and has been implemented in 49 Gulf Coast communities. The purpose of the CRI is to provide a simple, inexpensive method for community leaders to perform a self-assessment of their community's resilience to coastal hazards. The CRI process identifies vulnerabilities and facilitates discussion among community leaders and stakeholders about how to build resilience. This presentation will discuss progress communities have made after completing the tool, lessons learned, and next-steps for the program including the addition of industry sector indices.

**Shackelford, Jason**  
Ramboll-Environ

#### **Integrated Planning for Coastal Restoration: A Net Ecosystem Services Approach**

The concept of ecosystem services is increasingly being identified in federal and state guidance documents as a useful and needed approach to environmental planning and decision making. A formal ecosystem services analysis requires analysis by an interdisciplinary team that includes environmental economists, ecologists, biologists, hydrologists, coastal engineers, and other technical specialists. Water resources projects are already required to consider ecosystem services as are all U.S. Forest Service projects. As of October 2015, all federal agencies will be developing guidance documents to include ecosystem services by the end of 2016. One of the main reasons this is happening is because the ecosystem services approach allows community and social values and realities to direct a planning or decision making process that will depend on the best available scientific evidence for support. This session will focus on the many different tools available to support the ecosystem services approach to integrated planning for coastal restoration.

Net ecosystem services are the gains in value of environmental services or other ecological properties attained by the action(s) minus the value of adverse environmental effects caused by the action(s). The approach must be systematic, consistent, transparent, defensible and understandable to all stakeholders. Decisions with these traits achieve environmental objectives in a timely and cost-effective manner, while providing a transparent basis for decision making. The overarching goal is to balance the risks, benefits and trade-offs between competing management alternatives. Panel experts will identify and describe innovative applications of ecosystem service quantification outside of the traditional natural resource damage assessment regulatory arena. This work is exemplified in the areas of alternative evaluations for site remediation, oil spill response, permitting, land development and siting, EIA alternatives and restoration planning. For example, proposed responses to sea level rise (SLR) are often focused on extending defensive engineering or 'hard responses' such as building dams, levees and channels to control flooding, and building or reinforcing seawalls to protect from SLR. Such engineered responses may be necessary in some instances, but they will not be sufficient to address the full scope of climate change impacts and can cause their own impacts to natural systems. When a net ecosystem services analysis is brought into this discussion, natural adaptation systems may in fact be more economically prudent than engineered solutions.

As state and local planners begin to consider specific restoration responses, they must be able to better understand when, where, and under what circumstances nature-based strategies can be an effective alternative to engineered approaches. Wetland and floodplain restoration, coastal reforestation, and other natural restoration work can help human communities become resilient while also helping to preserve the natural systems upon which we rely. The session will provide an overview of available tools for economic valuation, floodplain management, natural infrastructure (green infrastructure), incorporating uncertainty, and the essential stakeholder involvement that leads to addressing the most critical issues. In addition to the discussion of the separate ecosystem services analysis tools, panel members will address successes and failures in working in an interdisciplinary fashion. The session will conclude with a participatory exercise that focuses on real decisions that are being faced in the context of the implementation of the Coastal Louisiana Ecosystem Restoration Plan and Louisiana's Comprehensive Master Plan for a Sustainable Coast.

Panelists:

*Valuing Ecosystems Services*  
Mark Rockel PhD  
Economist, Ramboll Environ

*Floodplain Dynamics*  
Felix Kristanovich PhD, PE, CFM  
Water Resources Engineer, Ramboll Environ

*Bringing Nature into the Discussion*  
Greg Reub  
Ecologist, Ramboll Environ

*Incorporating Uncertainty in a Dashboard Approach*  
Gretchen Greene PhD  
Economist, Ramboll Environ

*Effective Stakeholder Engagement and Developing a Policy Response*  
Bea Covington  
Economist, Ramboll Environ

**Shirley, Mark G.**  
**Thu Bui**  
LSU Agricultural Center and Louisiana

**How far away is the GOM?**  
4H Club members in St. Mary Parish learned that they are very close, and in some areas, too close

Sea Grant College Program

**Natalie McElyea-Chittenden**  
**Jennifer Ducote**  
**Adriana Drusini**  
LSU Agricultural Center

to the Gulf of Mexico. The program presented at the November 2015 club meetings held at each school in the parish focused on their proximity to the Gulf, the changes that are going on in the coastal zone and what they need to do to be resilient in the future. Most of the community schools are less than 18 miles from the Gulf horizontally but only a matter of feet away from the Gulf vertically. Subsidence, sea level rise, hydrologic changes and other causes of coastal land loss were explained to the students. Over the next 50 years, the students will witness the coastal changes and will have to adapt their homes and communities to those changes. A rubber ball was used to illustrate the concept of resiliency. With proper preparation, their house and their community can bounce back after storm events with minimal impact. At the end of each meeting, the students dug a hole, mixed cement and implanted a benchmark in a prominent location outside their school. The elevations were measured and engraved into the benchmark so that all students, teachers and parents entering the school would notice the elevation and be aware of the consequences. Key Words: Resiliency, Elevation, Benchmark.

**Shiva, Layla**  
**Bruce A. McCarl**  
Department of Agricultural Economics,  
Texas A&M University

### **Economic Analysis of Alternative Agricultural Green House Gas Offset Market Designs**

Agriculture can participate in Greenhouse Gas (GHG) mitigation via a number of ways. But in most policy suggestions it is regarded not as a capped sector but rather as an offset sector. Herein we examine the economic and GHG consequences of agriculture contributing to GHG reduction programs voluntarily. A voluntary carbon offset program as modeled herein would pay agriculture for offset credits providing producers with incentives to apply GHG net emission reduction practices. However in doing this one needs to address the concern of baseline and additionality. Namely given a desire for real offsets, how does one design the baseline for a program to best insure the market gets real offsets when it pays. Here we will empirically study three baseline approaches: 1) no baseline i.e. producers can opt in and claim all offsets; 2) a perfect baseline where in a region payments are limited to those in excess of the net emissions that would have occurred under business as usual and 3) a per acre or animal baseline where producers get payments if they reduce net emissions below a regional rating per acre or animal produced. To evaluate these approaches we perform a model based on empirical study of agriculture sector participation in voluntary carbon offset markets at the national level. We will use a dynamic, nonlinear optimization model of the US agriculture sector under the different baseline definitions as well as a capped market to look at program effectiveness in terms of costs and the amount of additional net GHG emission reductions.

The results for different carbon equivalent prices are show that, on average, a mandatory, totally capped agriculture will generate 5.2 times more GHG abatement than a voluntary program. We also see that a no baseline totally voluntary carbon offset market leads to the highest amount of payments for GHG reduction, but at the same time the net emissions by non-participants is at its highest level with the true additional gains being small. The results also show that the program cost under the per acre baseline is higher than what occurs under the perfect baseline by about 18% on average; However this difference is much less for carbon equivalent prices under 30\$. Furthermore, we get almost the same amount of GHG offset at lower carbon equivalent prices (under 100\$) but less offset at higher prices. Applying the per acre baseline yields results much closer to carbon offset potentials under a capped sector while at the same time increasing program cost efficiency while reducing no additionality and leakage. We also examine the potential for international leakage examining comparative advantage and shifts in market shares. We find that those shifts are fairly modest much unlike the results anticipated in Searchinger et al (2008). We offer analysis of voluntary market designs and discuss how they address additionality and leakage. This study can provide insights of ways to harness agriculture potential in the world's effort to reduce GHG emission through voluntary markets.

**Siameh, Celestine**  
**Jesse Tack**  
**Ardian Harri**  
**Barry Barnett**  
Mississippi State University

### **Cotton Premium Rate Heterogeneities and Implications under Climate Change**

Response to adverse weather conditions by cotton and other major crops are likely to be heterogeneous across varieties, but it is unclear whether this translates into yield risk heterogeneity across varieties. Crop insurance is the dominant agricultural policy instrument and will play an important role for any potential adaptation path to climate change. However, the impact of climate change on the performance of crop insurance programs is not well established and currently the Risk Management Agency does not offer alternative premium rates across varieties. This study utilizes Mississippi cotton variety trial data for the period 1998 to 2014 to identify whether there are heterogeneous crop insurance premium rates across varieties using a moment-based model. Warming impacts on these rates will then be measured. Results are expected to show cotton yield risk heterogeneities across varieties, from which variety-specific premium rates can be measured. These rates are expected to vary across alternative climate change scenarios. Accurate prediction of these variety/climate-specific premium rates is expected to provide actuarial soundness and effective risk management strategies for the Federal Crop Insurance Program.

**Skinner, Pat**

Department of Biological and  
Agricultural Engineering, Louisiana  
State University, LSU AgCenter

**Post NFIP Reform Evolution and the Future of Flood Insurance**

The Community Rating System (CRS) has been helping communities save their constituents money on NFIP flood insurance since 1990. Interest in CRS skyrocketed, however, in the post Biggert-Waters (NFIP Reform) era, strongly promoted by FEMA as a way for communities to off-set the rapid escalation in premiums set in motion by the 2012 Reform legislation. While the 2014 "Affordability" legislation restored the "built-in-compliance" rating, and overturned the provision that would push premiums to full risk "at-sale" of the property, it otherwise simply spread the financial pain across the entire policy base. Partial reversals of Pre-FIRM policy rate increases were exchanged for a new surcharge on all policies. Untenable rate increases remain, leaving owners and occupants of business and residential rental properties in difficult – somewhat desperate – situations.

This presentation will look at how consumers have reacted and the NFIP has evolved since 2012, discussing the possible fate of the NFIP itself. Since the 2012/2014 Congressional actions, interest in and availability of private flood insurance has risen. How do we evaluate whether those alternate policies provide adequate protection and satisfy mortgage portfolio protection requirements? How are we capitalizing on our clearer understanding of the Flood Insurance Rate Map (FIRM) and new appreciation of the manner in which the FIRM and the NFIP impact personal property value and home equity? How is FEMA recognizing personal and community methods that provide less-than-hundred-year protection? And what does that recognition contribute to reduction of our long-term vulnerability to floods? Biggert-Waters re-authorized the National Flood Insurance Program for five years, ending July 2017. Given what we know now, do we expect the NFIP to survive? If not, how might our investments in CRS help with the transition to private markets?

**Smart, Lindsey S.**  
**Abinash Bhattachan**  
**Matthew Jurjonas**  
**Priscilla Morris**  
**Alex Moody**  
**Georgina Sanchez**  
**Paul Tallie**  
**Ryan Emanuel**  
**Erin Seekamp**

Center for Geospatial Analytics North  
Carolina State University

**Sea Level Rise Impacts on Socio-Ecological Systems in Rural Coastal Regions of the SE US: Implications for Resilience and Adaptation**

Rural coastal areas and communities face the same physical impacts caused by sea level rise (SLR) but can have vastly different socio-economic responses or impacts than their urban counterparts. Among many other economic differences, highly developed and urban low lying coastal areas have higher property values, stronger tax bases from tourism, and receive disproportionate attention for adaptation planning and disaster relief. In addition, climate change adaptation research has focused primarily on cities around the world where the greatest losses in property value can be realized. The focus on urban coastal areas continues, despite the fact that rural land cover accounts for 22% of the Mid-Atlantic Coastal Plain of the United States, compared to 9% for urban land cover. In addition, many rural coastal areas are majority minority and low income regions with the highest social vulnerability to climate change and sea level rise. Here we focus on a rural low lying coastal socio-ecological system in order to expand the coastal adaptation dialogue.

We use a socio-ecological systems (SES) framework, often drawing on specific parallels to the Albemarle Pamlico Peninsula (APP) located in a rural coastal region of North Carolina, to highlight the social, economic, and ecological impacts of sea level rise and the dynamic linkages between these systems. The APP is a 6,000 km<sup>2</sup> landscape comprised mostly of forested wetlands, herbaceous wetlands, upland pine forests, row-crop agriculture, and blackwater creeks. The peninsula is surrounded by the second largest estuarine complex in North America, which is buffered from the Atlantic Ocean by a chain of barrier islands. Over half of the peninsula is less than 1.5 meters above sea level, which exposes the people and natural resources of the region to impacts of SLR. The largely rural context of the APP results in a strong connection between stakeholders and the environmental resources of the region. Forestry and agriculture are the principal economies of this largely rural region, though industries related to fishing, hunting, and tourism are also important. In addition, unlike most other areas of the Southeastern United States, population growth on the APP is expected to be minimal in the coming decades. As such, the future of these already economically distressed populations promises to be strongly dependent on changes in natural resources and their associated ecosystem services.

This combination of sea level rise vulnerability and a local economy inherently linked to natural resources and environmental processes makes the APP a representative model of the impacts of climate change on low-lying coastal regions. To better understand the system and critical linkages, we present a conceptual model of a rural low-lying coastal socio-ecological system. We describe the hydrologic responses of sea level rise with impacts to biodiversity and ecosystem services. We then evaluate socioeconomic impacts of sea level rise on coastal economies and markets. The linkages between the systems described above are equally as important as the diverse systems themselves. Contextualizing the system within the SES framework allows us to address the inextricable linkages

between these social and ecological processes. This in turn, will facilitate the identification of vulnerabilities and opportunities for adaptation and better governance. Lastly, we discuss adaptive capacities of coastal communities and assess the societal resilience of the APP with science-driven policy recommendations for mitigation and adaptation.

**Solo-Gabriel, Helena**  
University of Miami

### **Integrating Oceans and Human Health into Gulf of Mexico Research Initiatives**

Through the research sponsored by the Gulf of Mexico Research Initiative considerable advancements have been made in measuring, modeling, and predicting the dynamics of oil spills. However, many times what is lacking is the translation of this information to answer questions that are directly asked by community members during times of crisis. Immediately after the Deepwater Horizon Oil Spill there was considerable confusion about what the oil spill meant with respect to its impacts on human health for those who utilize coastal systems for recreation and sustenance. This presentation will focus on describing a framework for integrating physical, chemical, and microbiological models of oceanic processes for estimating human health impacts. Specifically, the process requires translating offshore information about the oil spills towards the coastal zone such that contaminant concentrations can be estimated. Once the contaminant hazards are identified, exposure scenarios are then simulated for specific coastal uses and health risks can be estimated. Risk information should be integrated into a highly graphic and easy-to-use platform that provides information community members need for decision-making.

**Steinback, Scott**  
NOAA Fisheries, Woods Hole, MA

### **Actual versus Hypothetical Stated Values for Recreational Fishing Permits: Experimental Evidence of Fish Tales**

In this paper we compare nonmarket values estimated from responses to hypothetical questions to those based on actual cash transactions. The nonmarket good that served as the subject matter of our study was early season 2012 saltwater recreational fishing permits in Massachusetts. Modeling results indicate that nonmarket values estimated from simulated market transactions were significantly different than values calculated from identical hypothetical transactions. The mean value of a 2012 Massachusetts saltwater recreational fishing permit estimated from actual cash transactions was \$338. Values based on hypothetical willingness to sell and willingness to pay transactions were \$520 and \$71, respectively. These findings align with previous studies that found differences in economic valuation measures calculated from hypothetical versus actual behavior. Our results suggest that hypothetical measures of willingness to sell and willingness to pay for a saltwater recreational fishing permit in Massachusetts will be biased, but in opposite directions. This has important implications because economists typically employ hypothetical surveys to estimate recreational fishing values for use in ocean zoning debates, damage assessments, and evaluating investments that maintain or improve recreational fishing infrastructure.

**Kristy Wallmo**  
**Sabrina Lovell**  
NOAA Fisheries, Silver Spring, MD

**Eric Thunberg**  
NOAA Fisheries, Woods Hole, MA

**Sun, Jenny**  
**Fu-Sung Chiang**  
Gulf of Maine Research Institute

### **Changing Ocean, Changing Economics: Impact of Rising Temperatures on the Catchability and Profitability of American Lobster Fishery**

The American lobster (*Homarus americanus*) is an iconic fishery in New England, and this \$567 million landings value in 2014 sustains the livelihood of many families. Maine alone lands 84% of New England's lobster, and more than 78% of Maine's fisheries revenues were generated by this one fishery. Over the past five years, however, the American lobster industry in the Gulf of Maine has faced growing environmental and economic pressures, making long-term economic viability a pressing question for lobstermen and fishery managers. Record high temperatures in 2012 pushed the start date of the Maine lobster fishing season three weeks earlier than normal. As supply outpaced demand when high landings during a compressed time period more than doubled the volume experienced in June and July, an average 40% decrease in ex-vessel price significantly reduced fishermen's profitability. Despite an increase of approximately 18 million pounds (or 17.6%) in landings in 2012 over 2011, the total value of landings decreased by 1.1% compared to 2011, as a result of an average 15.9% ex-vessel price decrease. This study is sponsored by NSF Coastal SEES project to examine how the timing and location of lobster landings is affected by ocean temperatures, number of trips, distance fished from shore, price, and seasonality. Weekly lobster landings and the number of fishing trips in eastern, central, and western Maine from 2008 to 2013 were combined with NERACOOS buoy temperatures to model the change in productivity. The model shows warming leads to significant increases in landings.

We also used monthly landings, prices, and trade of live and processed lobster between the U.S. and Canada from 1990 to 2014 to specify a system of equations that captures how both markets are integrated and how they respond to changing market conditions. The model shows that an increase in landings in both areas leads to an increase in lobster trade and then to an increase in US imports



of frozen lobster meat. Furthermore, lobster exports to the emerging Chinese market started to expand after 2012 and grew to account for 21% and 11% of the exports value from U.S. and Canada, respectively. From 2010 to 2014, a sub-system model is specified to address how increasing demand in the Chinese market for hard-shell lobster could create incentives to delay production and increase the supply of hard-shell live lobster. The economic tradeoff between different fishing capacity management strategies is evaluated to show how larger boats are affected in comparison to smaller vessels, and assess policies aimed at avoiding overcapitalization as to explore ways in which this coastal social-ecological system can adapt to increasing ocean temperature.

**Tabarestani, Maryam**  
**Jack Isaacs**

Louisiana Department of Wildlife and Fisheries

**Alex Miller**  
Trace Register

#### **Gulf of Mexico Inshore Recreational Shrimping Survey, 2014**

This paper presents the result of a survey of anglers who held recreational shrimp harvesting licenses in three states in the Gulf of Mexico: Alabama, Louisiana, and Mississippi. Information obtained from this research may be useful to resource managers because it addresses a population of resource users whose activities are not regularly studied in creel surveys and trip ticket data. The questionnaire contains nine questions including respondents' age, the type of gear used to harvest shrimp, the number of recreational shrimping trips in a year, volume of catch in a typical trip, and trip-related expenses. The obtain results demonstrate that most of respondents in Alabama are in age 61 and above, in Louisiana and Mississippi are in age 46 to 60. In Alabama, Louisiana, and Mississippi, the majority of respondents, 86.1%, 68.5%, and 80.5% of respondents, respectively reported using trawls to harvest shrimp recreationally. The majority of respondents, in all three states, took at least one trip in the year prior to the survey. The average number of trips per respondent was six in Alabama, nine in Louisiana, and ten in Mississippi. The most commonly cited reason for recreational shrimping among Alabama and Louisiana recreational shrimping respondents (34.7% and 46.0%, respectively) was 'to catch food for themselves and their immediate family.' In contrast, the most commonly cited reason among Mississippi respondents (36.6%) was 'To catch bait for other fishing activity.' The average volume of catch per trip per respondent was 10 lbs. in Alabama, 35 lbs. in Louisiana, and 31 lbs. in Mississippi. The results also illustrate that the average expenses per recreational shrimping trip per respondent, is about \$60, \$57, and \$81 in Alabama, Louisiana, and Mississippi, respectively. In all three states, fuel accounted for the majority of trip expenses.

**Tabarestani, Maryam**  
Louisiana Department of Wildlife and Fisheries

**Walter Keithly**  
LSU CNREP, Louisiana Sea College Program, Department of Agricultural Economics, LSU AgCenter

#### **A Dynamic Demand System for U.S. Oysters by Source and the Influence of Exogenous Shocks, 1984-2014**

The Gulf of Mexico oyster industry has been the subject of several 'shocks' in recent decades including mandatory labeling, a partial ban of the product in California, and, most recently, publicity associated with a major oil spill that, some hypothesize, has resulted in long-term reduction in the demand for the Gulf product. This study applies a dynamic Inverse Almost Ideal Demand System, including both cointegration and an error correction technique, to (a) examine the influence of these 'shocks' on demand for the Gulf product and (b) to derive relevant own-and-cross price flexibilities. Building on work by Dedah et al. (2011), Pacific production, Chesapeake production, and imports (fresh and frozen) are considered potential substitutes for Gulf product. Based on quarterly data, results suggest a relatively rapid speed of adjustment with approximately three-quarters of adjustment toward equilibrium occurring within the quarter. Analysis also indicates that the short-run scale flexibilities demonstrate that oyster products differentiated by source are quantity-substitute. The long-run price flexibility indicates that the oyster imports are almost price inflexible.

**Tabarestani, Maryam**  
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**Walter Keithly**  
**Wes Harrison**  
LSU CNREP, Louisiana Sea College Program, Department of Agricultural Economics, LSU AgCenter

#### **An Analysis of the Influence of U.S. Imports by Products on the Gulf of Mexico Dockside Price**

U.S. imports of shrimp approximately doubled between 1995 and 2013; from 720 million pounds (headless equivalent weight) to 1.4 million pounds. During this period, the composition of imports also changed significantly. In 1995, for example, imports of headless shell-on shrimp represented almost 55% of total imports by quantity while peeled shrimp represented 45% and breaded shrimp represented less than 1% of total imports. By 2013, the share of total U.S. imports represented by breaded shrimp had increased to more than 7% while the share represented by peeled product had increased to almost 55%. It has been argued that much of the attribution of the increased share of breaded product is the result of diversion of merchandise product to non-merchandise product among those exporting countries subject to tariffs originally placed on the imports of certain products (headless shell-on and some peeled products) beginning in 2005.

The goal of this research is to examine the substitutability among imported shrimp products, by type, as well as the impact of the different imported products on the Gulf of Mexico dockside shrimp price. An ancillary objective is to analyze whether tariffs imposed on imports of headless shell-on product and peeled products (other than canned) resulted in among major exporting countries resulted in trade diversion from merchandise to non-merchandise products. To accomplish the research goal, we use a Mixed Rotterdam Demand System consisting of six equations; three representing imports by product type and three representing Gulf of Mexico shrimp landings by size. The Mixed Rotterdam model is necessitated by the fact that import quantities by product type are considered endogenous in the system while Gulf of Mexico dockside prices, by size, are considered endogenous.

With respect to imports, the results indicate that shell-on imports exhibits the largest marginal budget share followed by 46 percent. The Gulf of Mexico landings, by size, exhibit much smaller marginal budget shares than that associated with the imported products. All expenditure elasticity estimates for the imported shrimp products are positive and exceed one implying that an increase in the U.S. expenditure on shrimp products cause the share of all types of imported products to increase. However the Gulf of Mexico landings income elasticity estimates are less than one implying an increase in the U.S. expenditure on shrimp products will cause the share of GOM landings to decline.

**Tabarestani, Maryam**  
**Jack C. Isaacs**  
Louisiana Department of Wildlife and Fisheries

### **Results of a Survey of Commercial Fishermen Who Harvested Oysters in Louisiana**

Oysters are the third most valuable type of seafood product landed commercially in Louisiana. Oysters represented 13.2 percent of the dockside value of all commercial seafood landed in the state between 2008 and 2014, according to NMFS data. The Louisiana Department of Wildlife and Fisheries Cooperative Research Survey, a survey of Louisiana commercial fishermen with cumulative landings with a dockside value of at least \$5,948 dollars over a three-year period, indicated that approximately 23 percent of commercial seafood harvesters in Louisiana harvested and landed oysters most or all of the time while fishing commercially. Seventy-two percent of those who harvested oysters most or all of the time lived in three coastal parishes: Plaquemines, Saint Bernard, and Terrebonne. Ninety-seven percent were male. The majority did not complete high school. Twenty-eight percent held a high school diploma. The average age of an oyster harvester was 45.2 years old. Most oyster harvesters specialized in harvesting oysters. Approximately 70 percent claimed never to catch and sell any type of seafood other than oysters when fishing commercially. Approximately 84 percent of those who targeted oysters owned at least one commercial fishing vessel with an average of approximately two vessels. Ninety-three percent classified themselves as the captains of their own vessels. About 87 percent hired deckhands or crew members at some point during the year. Among these, the reported crew size on a typical trip was 2.6 persons. Dredges were the most commonly-used gear type among oyster-targeting commercial fishermen. The average number of dredges was 2.1. The average estimated useful life of a dredge was 2.3 years. Additional parameters examined in this research include the number and length of oyster harvesting trips, travel distances associated with oyster-harvesting trips, and the sales of oysters to different categories of purchasers.

**Tej Gautam**  
**Krishna Paudel**  
Department of Agricultural Economics and Agribusiness, Louisiana State University, LSU AgCenter

### **Willingness to Pay and Willingness to Accept Values for Irrigation Water**

We conducted survey to collect information from Louisiana farmers to understand their concerns related to irrigation water quality and availability of sufficient water for crop irrigation. We used logistic models to estimate the willingness to pay (WTP) and willingness to accept (WTA) values for irrigation water during critical crop growing periods. We compared estimated baseline mean WTP/WTA and certainty corrected WTP/WTA for more accurate mean WTP/WTA values. Our results indicate that certainty corrected model performed well to mitigate the hypothetical bias generated by baseline model and facilitates to obtain reasonable WTP and WTA amount. Variables affecting the difference in WTP and WTA values are income, land holding size, risk aversion, and types of crops grown in the farm. This analysis provides valuable information to formulate water trading policy with neighboring states or other farmers within Louisiana under the circumstances of irrigation water shortage caused by severe drought or decreased water table or salt intrusion.

**Thomas, Scott**  
Stetson Engineers Inc.

### **Measuring Coastal Resilience: How can we use resilience assessment to promote resilient policies?**

The concept of resilience has been developed to describe the behavior of coupled social-ecological systems. Resilience research spans many disciplines. Each has its own definitions, frames of reference, and approaches for measuring resilience. This session will focus on several approaches for defining and measuring resilience in coastal systems. The authors have developed analytical tools to assist agencies and organizations assess and manage for system resilience. The proposed outline follows:

**Thomas, Scott**  
Stetson Engineers Inc.  
**David Kerner**  
The Tauri Group

#### **What is resilience and what contributes to resilience in a system?**

The foundation for an assessment of system resilience is based on a comprehensive set of resilience attributes from which metrics can be developed. Building on prior efforts, the authors developed a suite of attributes for resilient systems that explore such factors as response diversity, collaborative capacity, single points of failure, interconnection options, pathways for controlled reduction in function, situational awareness, skewing subsidies, and autonomy, among others. The suite of attributes is intended to provide a firm foundation for beginning the resilience assessment process and for developing more holistic and insightful resource management policy.

**Thomas, Scott**  
Stetson Engineers Inc.

#### **How to build resilience in a coastal community**

Most coastal communities are focused on making themselves more resilient, but deciding to do so and knowing what steps to take are two different things. We know that we need to prepare, but it's hard to find the time and resources. And what specifically do we prepare for? So coastal leaders and business owners control risk by purchasing insurance, establishing safety plans and evacuation routes. They make establish back-up power and make operations more efficient, and they hope these activities make their organizations and the community as a whole more resilient. But that's not enough... not by a long shot. Resilience is a buzzword. After Hurricanes Katrina and Sandy, the Housing Bubble and Bust, and the Wall Street Melt-down, everybody wants resilience, even if they're not exactly sure what it is and what it takes to achieve it. This lightning talk will provide a rapid fire exploration of the ways that we can build resilience into our communities, providing an entry point for more detailed planning and analysis to examine vulnerabilities and gaps in coverage to make coastal communities less vulnerable.

**Thomas, Scott**  
Stetson Engineers Inc. & Desert  
Research Institute  
**David Kerner**  
The Tauri Group

#### **Resilience Assessment of an Isolated Military Outpost in Austere Conditions**

This project demonstrates a methodology to rationally and systematically assess the resilience posture of a remote military outpost in austere conditions, with a focus on energy and water resource resilience. We characterized the baseline functions and conditions of the system, including interactions with other systems at similar and larger scales. Next, we developed a set of potential disruptive scenarios to stress the system. The assessment process entailed examining each system function or sub-function according to the Resilience Attributes Framework that we have developed and presented at CNREP previously. The resilience attributes, and how they are expressed within the various outpost functions, were examined for the baseline condition and the disruptive surprises. The assessment results were analyzed from three perspectives: by individual resilience metric, by distinct outpost function, and for the whole-system. This study resulted in key findings for improving the resilience of combat outposts in austere environments. The Resilience Assessment Framework yields actionable information to support informed decisions. The methodology reveals factors that can undermine mission success. Using scenarios, the methodology helps identify problems in advance. Moreover, the study shows that the resilience attributes are necessary and sufficient to describe the resilience of systems in general and demonstrates an approach that can be used to assess coastal systems at various scales from community/watershed to multi-county/parish. Indeed this resilience attributes-based approach is currently being used in water resource planning by a coastal watershed Joint-Powers Authority serving over six million people in California.

**Turner, R. Eugene**  
Department of Oceanography and  
Coastal Sciences, Louisiana State  
University

#### **Why the Mississippi River delta will not be restored in our lifetime**

There are at least three data-rich reasons why the Mississippi River deltaic plain will not be restored in our lifetime (unfortunately). Each is common to other estuaries: historical conditioning, modern nutrient loading increases, and future climate change. First, the delta (part of the deltaic plain) was narrow at the time of the European arrival, but then thickened with increased sediment load. The size then decreased as the sediment load decreased, but with a shorter response time than that of its growth phase. The retention of the sediment now is 96%. New land will, therefore, only appear at the expense of existing land; it is a zero-sum gain. Second, nutrients affect the delta in several ways, but almost all result in the loss of belowground strength, especially in the organic zone. Third, the age of thirty-six deltas throughout the world is  $7244 \pm 117$  ybp, for micro- and macrotidal

environments, Arctic and Equatorial climates, and with and without mineral recovery efforts ongoing. Delta appearance is the result of reaching a tipping point in the balance of sediment supply, erosion, organic soil growth and relative sea level rise. The age when these 36 river deltas formed is coincidental with a slowdown in sea level rise. This coincidence supports the conclusion that the anticipated sea level acceleration will be detrimental, and fatally so, when sea level rise reaches the same tipping point. The risks of assuming status quo planning conditions are consequentially disastrous to budgets, people, and land.

**Valderrama, Diego**  
University of Florida

**KathrynAnn H. Fields**  
Texas A&M University

### **Estimating Target Densities and Costs Associated with Manual Removal of Invasive Lionfish Stocks in the Western Atlantic**

Two species of Indo-Pacific lionfish (*Pterois volitans* and *P. miles*) have invaded and rapidly expanded throughout the tropical Western Atlantic since the 1980s. Because eradication is unfeasible, scientists are urging for the implementation of lionfish management plans to reduce the environmental and economic impacts of the invasion. An essential component of these plans is the estimation of target densities for lionfish stocks under which consumption by lionfish does not exceed the productivity of prey fish biomass. Data on prey fish and lionfish assemblages collected from dive trips at Bacalar Chico Marine Reserve (BCMR) in northern Belize in 2014 were used to compute rates of biomass production by prey fish as well as consumption rates by lionfish, leading to preliminary estimates of lionfish target densities beyond which declines in the biomass of native prey species would occur. Production of prey fish biomass was estimated at 326 kg/ha/year. Given that preliminary surveys place lionfish densities at BCMR at  $27 \pm 9$  lionfish/ha, the annual rate of prey consumption was estimated at approximately 270 kg/ha/year. Although local productivity of prey fish populations may be high enough to compensate for lionfish predation, culling programs are still recommended to ensure a target density of around 32 lionfish/ha is not exceeded. These preliminary estimates will be further revised based on the results of continued biological sampling at the reserve and the refinement of ecological models and assumptions on prey fish productivity and consumption rates by lionfish. Information is also presented on the spearfishing catch rates and costs associated with the target densities in order to assess the economic implications of manual removal of lionfish stocks. The methodology used in this research can be adapted to develop local management plans for lionfish containment throughout the invaded range in the Western Atlantic.

**Verchick, Robert R.M.**  
**Shawn "Pepper" Bowen**  
**Nowal Jamhour**  
Loyola University, New Orleans School  
of Law

**Carmen Gonzalez**  
Seattle University School of Law

**Alice Kaswan**  
University of San Francisco School of Law

**Yee Huang**  
Center for Progressive Reform

### **Climate Refugees in the Lower 48: Nonstructural Adaptation for Vulnerable Communities in the Gulf Coast**

Gulf Coast residents are both resilient and vulnerable: They demonstrate profound care for each other, self-sufficiency, and a wealth of traditional knowledge about the natural history of their communities, but they are also often marginalized and suffer disproportionately when natural disasters strike. Adapting to the impacts of climate change can take many forms, such as structural measures like levees and dams, as well as nonstructural measures such as property buyouts, elevation, and pre-disaster planning. Historical policies have favored structural measures, but federal agencies and state and local governments are increasingly turning to nonstructural measures and strategies. These strategies support mechanisms for adaptation that are flexible, that operate on a range of levels from the individual homeowner to entire communities, and that provide protection or additional protection in vulnerable areas. Implementing these strategies can help minimize the need to build large-scale, hard infrastructure such as levees or dams, protection from which may be over- or under-inclusive or fail catastrophically, as in the case of Hurricane Katrina. Some nonstructural adaptation strategies offer permanent, long-term protection against natural hazards; others significantly reduce the risk to people and property over the medium- to long-term and provide additional hazard reduction outside of areas protected by hard infrastructure. Frequently, a combination of both structural and nonstructural strategies is required.

In Louisiana, the 2012 Coastal Master Plan and the forthcoming 2017 update both emphasize the importance of nonstructural programs "to help residents improve their resilience in the face of storms." The Plan identifies options for reducing flood risk through better design and residential elevations, as well as a limited number of voluntary acquisition measures. Nonstructural adaptation strategies provide medium- to long-term protection and risk reduction for communities along the Gulf Coast in the face of sea-level rise, changes in precipitation patterns, and sea surface temperature changes that could lead to more intense hurricanes. However, unless these programs and funding opportunities are designed to reach socially vulnerable communities, these communities will lack the knowledge, financial resources, and legal, technical, and social support necessary to seek and apply for funding to reduce their overall risk. Non-physical, nonstructural adaptation strategies include identifying areas of risk, pre-disaster planning and risk mitigation, developing post-disaster recovery strategies, implementing floodplain regulations and obtaining flood insurance,

implementing land use regulations or zoning ordinances, and educating the public about the risk from natural hazards. Physical, nonstructural adaptation strategies inclusive flood-proofing homes through elevation and relocating homeowners to less vulnerable locations by compensating them for their property. This talk will examine selected case studies of nonstructural adaptation strategies implemented in response to flood-related disasters in Mississippi and Louisiana, in Cedar Rapids, Iowa, and along the East Coast. It will summarize lessons learned and best practices for implementing selected strategies in vulnerable communities. The goal is to inform the policy and advocacy discussion about how best to help vulnerable communities adapt to climate change impacts.

**Walls, Margaret**  
Resources for the Future

**Valuing Ecosystem Services from Coastal Wetlands: Benefits and Costs of Protection from Storm Surge**

**Celso Ferreira**  
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And Infrastructure Engineering  
George Mason University

Wetlands and other natural lands in coastal areas can provide a wide range of ecosystem services. One of the most important may be protection from hurricane storm surge--related flooding. The dense vegetation and shallow water within wetlands tends to slow the movement of surge inland and the vegetation dissipates waves, thereby reducing the amount of destructive wave energy that propagates on top of surge and worsens its impacts. As the climate warms, scientists predict that the worst hurricanes will increase in frequency along the Atlantic coast of the U.S. thus wetlands and other coastal natural lands may become more valuable in the future. In this paper, we integrate state-of-the-art mathematical modeling of storm surge and waves with a careful economic valuation exercise to calculate the value of coastal protective services from wetlands and other natural lands. Our study region is the Maryland counties on the Atlantic coast and bordering the Chesapeake Bay and its tidal waters. We combine results from surge and wave simulations using the ADCIRC+SWAN hydrodynamic and wave models, calibrated to the Chesapeake Bay, with detailed information on property values and land cover. Our benefit--cost exercise evaluates alternative land conservation, and wetlands restoration, scenarios; our measure of benefits is avoided economic losses due to property damages from hurricane flooding and the opportunity costs of permanently protecting, or restoring, those lands is our measure of costs. We evaluate benefits and costs under alternative scenarios for the location of wetlands conservation/restoration and under alternative future population growth scenarios, including the location of new households in the region. The research highlights how the value of ecosystems service is highly dependent on (i) the size, location and characteristics of wetlands, (ii) the track and intensity of storms, and (iii) the location of households and value of property that the wetlands are protecting.

**Wang, Hua**  
**Krishna Paudel**  
**Rex Caffey**  
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& Policy, Louisiana State University

**Estimation of the Demand for Surf/Marsh Fishing in Louisiana: An Application of the Kuhn-Tucker Model**

Based on utility theoretic framework, the Kuhn-Tucker model (KT) has been used for estimating multiple site recreation demand behavior. The KT model relies on a single structural framework and simultaneously incorporates both site selection and participation decisions with corner solutions. This model embody the substitutability between recreation sites and sites attributes, and allows consistent welfare analysis. Thus, it is possible to value the data including individuals' various patterns of site selection (some sites are not visited, some sites are visited more than once). In this paper, we apply the Kuhn-Tucker model to estimate the recreational demand (Surf/marsh fishing) in coastal Louisiana. A total of 1126 completed observations obtained from online and intercept survey about their most preferable activity for natural resource enjoyment in coastal Louisiana for economic impact and demand analysis. The surveys provide detailed information for most of these responders, including the number and destination for recreational activities, the type of preferred activities, and preference over different site quality, travel time, trip expenses, and the sociodemographic characteristics of the survey respondents. For modeling purposes, we chose six sites in this analysis. These sites represent most popular recreation destination in coastal Louisiana. Understanding the demand for these recreation sites allows to better value current and potential policy changes.

The result shows some statistically significant effect of individual's demographic characteristics and sites physical and environmental characteristics. Individual's age and the ownership of a boat are significantly affect fishing trips. Ease access to site and pollution level are also significantly affect site choice. However, gender variable and some other environmental variable such as total catch rate, low human congestion, and lack of development are found to be insignificant, which might cause by non-random sample. Further study would to explore welfare effects associated with changes in site environmental characteristic. It would be desirable to compare this model with nested logistic model or other alternative models. Thus, several topics for analysis remain to be explored in future studies.

**Wang, Hua**

**Factors Affecting Landowners' Participation in Income-generating Activities - A Double-**

**Walter Keithly**

Center for Natural Resource Economics  
& Policy, Louisiana State University

**Hurdle Approach**

The coastal zone of Louisiana contains more than five million wetland acres, or about 40 percent of the nation's total. Since 1930, Louisiana has experienced a net loss of over 1,500 square miles of coastal wetlands. Currently at risk are the remaining coastal wetlands, 80 percent of which are under private ownership. The acceptance of private wetland owners in restoration programs and their participation in these programs are critical if future coastal restoration efforts are to be successful in Louisiana. Gaining the cooperation by the coastal landowners, however, is complicated by the fact that while the public benefits accruing from wetland protection and restoration projects are likely to be large, private benefits (measured by changes in net income to the landowner) are likely to be small and, potentially, negative. Small private benefits from a publically-funded restoration project are the outcome when property changes associated with that project yield only marginal positive income changes to the landowner. Negative private benefits accrue when the landowner's post-project income as a result of project implementation is reduced. The risk averse nature of the majority of coastal landowners in conjunction with the relatively low income derived from surface-use activities suggests that, unless well-crafted to protect or enhance their private benefits, opposition by the landowners to publically funded restoration projects is likely to be high even if the expected public benefits associated with the project are large.

The overall goal of the proposed research is to develop a theoretical and empirical model of the factors that motivate private landowners to participate in and generate surface-based income from their coastal wetland tracts. The research methodology is designed to integrate current knowledge about land use, based on a micro landowner perspective, into a comprehensive economic model of private coastal wetland income-generating activity. An empirical model, using a Double Hurdle modeling approach, will then be estimated and used to evaluate the efficacy of potential policy instruments aimed at encouraging private participation in coastal wetland maintenance and restoration. This understanding will contribute to design potential policy instruments that provide incentives for private coastal wetlands stewardship.

**Landings, discards, and fleet movement across time and space in multispecies fisheries:  
An application to the Gulf of Mexico reef fish fishery**

This paper develops a dynamic, structural ecological-economic model of a spatially diverse multiple-species fishery. Within a fishing season, agents (fishermen) maximize expected profits by undertaking multiple trips and moving their fleet across various fishing regions and landing ports. Choices are constrained by (i) an individual transferable quota program combined with spatial and/or temporal closures, (ii) endogenously determined stock conditions that vary across space and time, and (iii) a weak-output-disposable harvest technology. Markets for trading in quotas for all species exist. We derive a rational-expectations equilibrium that determines fleet harvesting activity, i.e., multiple-species landings and discards, across time and space. A *no-hotspot* condition dictates landings and discard patterns. In equilibrium, there are no excess harvesting profits to be made through spatial or temporal redistribution of landings and discards (therefore, fishing effort). We use the model to quantify ecological-economic outcomes in the Gulf of Mexico reef fish fishery under various regulatory scenarios. The effectiveness and efficiency of alternative regulations, including adjustments to species-specific seasonal quotas and spatial, temporal closure regulations, etc., is examined. Our work is the first to combine an inclusive and state-of-the-art ecological model with a model of rational spatial-temporal fishing behavior. Our ecological-economic model offers a significant advance toward implementation of ecosystem-based fisheries management in a major U.S. fishery.

**Singh, Rajesh**

Quinn Weninger\*  
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**Westra, John**

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**Robin Moore****Andy Marcum****Steve Ewest****Terry VanDerPol****George Boody**

Land Stewardship Project

**Kylene Olson****Paul Wymar****Jennifer Hoffman**

Chippewa River Watershed Project

**Abdullah Jaradat****Jon Starr****The Chippewa 10% Project: Analyzing Ecosystem Services and Economic Impacts from  
Increased Perennial Cover in an Agricultural Watershed**

The Chippewa River Watershed (CRW) drains 1.3 million acres of mixed natural & managed ecosystems. Corn and soybeans dominate throughout the watershed, especially in the south. In the eastern and northern sections, grazing livestock and longer crop rotations are common. Valuable ecosystem services and goods are adversely affected by agricultural production practices that result in increased nitrate-nitrogen, total suspended solids, reduction in soil carbon and other ecosystem stressors in the receiving waterbodies in the watershed. Because research has demonstrated positive correlation between perennial cover and water quality as well as other ecosystem services, we evaluated impacts of modeling increased continuous living cover land area in this watershed by 10%. Predicted results from such increased perennial cover, from changing cropping and livestock systems, resulted in Total Maximum Daily Load (TMDL) in-stream reductions goals being 100% attained for phosphorus, 40% toward nitrogen goal and 30% of total suspended solids. Using ten-year average prices, under such a scenario resulted in approximately \$4 million increase in Net Farm Income (NFI) for the watershed.

USDA Agricultural Research Service

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**Hypoxia: Land Grant Universities Collaborative Response**

Southern Extension and Research Activities (SERA) committees are formal USDA National Institute of Food and Agriculture (NIFA) and land-grant university (LGU) funded committees that promote multistate, research and extension activities. SERA-46 was created as the result of a Non-funded Cooperative Agreement between the Mississippi River Gulf of Mexico Watershed Nutrient Task Force (Hypoxia Task Force or HTF) and land-grant university (LGU) Extension and Experiment Stations in the North Central and Southern Regions. SERA-46 brings together researchers and extension specialists sharing a common interest and expertise related to the environmental, social, and economic factors contributing to nutrient loss from agricultural lands, state-level nutrient impairments, and hypoxia in the Northern Gulf of Mexico. Goal of SERA-46 is to promote effective implementation of science-based approaches to nutrient management/conservation that reduces nutrient losses to the environment. Objectives of SERA 46 include: (1) establish and strengthen relationships that can serve the missions of multiple organizations addressing nutrient movement and environmental quality; specifically, SERA-46 is focusing on strengthening relationships among land-grant universities, the Hypoxia Task Force and its member agencies, and agriculture; (2) expand the knowledge base for discovery of new tools and practices as well as for the continual validation of recommended practices; (3) improve the coordination and delivering of educational programming and increase the implementation effectiveness of nutrient management strategies that reduce nutrient movement for agricultural and non-agricultural audiences.

**Whitehead, John**

Appalachian State University

**Tim Haab**

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**Sherry Larkin**

**Sergio Alvarez**

University of Florida

**John B. Loomis**

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**Estimating Lost Recreational Use Value of Visitors to Northwest Florida from the Deepwater Horizon Oil Spill using Revealed and Stated Preference Data**

The lost recreational use values (RUV) from the BP/Deepwater Horizon oil spill in the Gulf of Mexico that began April 20, 2010 were evaluated for cancelled recreational trips to Northwest Florida. The Northwest Florida study region was defined to include the following 12 coastal counties: Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, Franklin, Wakulla, Jefferson, Taylor, Dixie, and Levy. The impacts were calculated using two economic valuation techniques – the travel cost method (TCM), for single and multiple sites, and the contingent valuation method (CVM) – with primary data collected from surveys and household population estimates from the U.S. Census. The primary data were collected August-September 2011 through Knowledge Networks Inc. with respondents residing in 13 U.S. states that constitute the primary market for coastal tourism to Northwest Florida. The survey gathered information from 2,181 respondents on their recreational visits to the Gulf of Mexico and South Atlantic coastal areas, including detailed information on their most recent trip, past trips, planned future trips and the number of trips cancelled to the study region due to the oil spill. This information was compared to data obtained from personal interviews of 2,540 visitors to the main beach areas in Northwest Florida to confirm the market area and share of visitors accounted for in the resulting estimates. The empirical analysis involved the estimation of a number of models including: (1) single-site demand functions for recreational trips to the Northwest Florida study region, (2) probability-based models of respondents' willingness-to-pay (WTP) higher trip costs, and (3) multiple-site choice random utility models (RUM). The primary variable in each of these models is the travel costs between a visitors home and the destination site, measured using distance and time (per mile travel costs and the opportunity costs of time and, in some models, the reported transportation and lodging costs). A visitor-reported site quality variable is also important. Each model was estimated with different groups of the sample data and explanatory variables, and each produced unique estimates of lost consumer surplus to Florida households, the **measure of economic value upon which to assess lost recreational use value.**

**Whitehead, John**  
**Ash Morgan**  
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**Bill Huth**  
University of West Florida

### **Combining contingent valuation and behavior data to estimate the willingness to pay for a seafood traceability program: the case of Gulf of Mexico oysters**

Gulf of Mexico oyster safety is a significant health issue, ranking as the fourth leading cause of foodborne death in the United States. Seafood traceability is an approach that can be used to increase oyster safety. Traceability is the ability to follow food through all stages of production, processing and distribution. We estimate the willingness to pay for an oyster traceability program with the contingent valuation method (CVM). The survey was conducted with an internet panel sample of oyster consumers and obtained a useable sample size of 795. The CVM referendum vote scenario followed contingent behavior questions about oyster meal consumption under a seafood traceability program. We construct a behavioral response variable as the change in consumption with the traceability program and higher prices with the program and include it as an explanatory variable in the referendum vote model. We find that a negative (positive) behavioral response leads to a lower probability of voting for (against) the traceability program. The referendum votes suggest that oyster consumers are willing to pay \$2 more each meal for the traceability program. Willingness to pay changes by 20% for each one unit change in oyster meal consumption with the traceability program. Aggregated over the number of Gulf of Mexico oyster consumers, the total benefits of the traceability are about \$20 million. The estimate of the marginal effect of the behavioral response may be biased due to endogeneity. We explore various methods to control for endogeneity.

**Wilkins, James**  
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### **The Evolution Louisiana's Coastal Zone Boundary Politics versus Science**

Louisiana's Coastal Management Program was enacted in 1978 in response to the federal Coastal Zone Management Act of 1972. The CZMA provides incentives for states to establish coastal zone management programs under federal guidelines. One of the most important federal requirements is the delineation of a state's coastal zone boundary that must be inclusive enough to allow the goals of coastal zone management to be accomplished, which is to sustainably balance the conservation of coastal natural resources with their development and use. States with an anti-regulatory bent were placed in the difficult position of being enticed by federal funds available to states with federally approved CZM programs for addressing impacts of offshore energy production, as well as authority to require federal actions be consistent with the state CZM program, but having to establish new regulatory requirements in the coastal zone. In 1975 the Center for Wetland Resources at LSU conducted a scientific study to determine what bio-physical features and parameters should determine the extent of the Louisiana coastal zone. The findings of the study indicated an approximate scientifically based boundary but that work was ignored two years later when the Louisiana Coastal Commission proposed legislation establishing the coastal zone as a three mile strip of land along the coast, a massive reduction from the scientifically based area. An opinion by the Louisiana Attorney General strongly indicated that such a meager coastal zone would not meet federal requirements and therefore not qualify for federal funds. A geo-political compromise was struck that used major portions of the boundary recommended by the scientific study but excluded large areas including the Atchafalaya Basin, one of the most important freshwater swamp complexes in North America. In 2009 the Louisiana Legislature passed a resolution directing The Coastal Protection and Restoration Authority to conduct a science-based evaluation of the coastal zone in light of environmental changes such as coastal land loss, sea level rise and recent hurricanes. The Office of Coastal Management in the Dept. of Natural Resources performed the work with an inter agency team. The team used many of the same parameters that were examined 35 years earlier in the initial study but with the benefit of advanced scientific techniques also looked at additional factors. The recommendation that resulted was for a significantly expanded three tier boundary that incorporated areas that had been excluded from the 1975 proposed boundary in the Coastal Use Permit area, an Intergovernmental Coordination Area and a Watershed Planning Area. In 2011 the Louisiana Legislature expanded the Coastal Use Permit areas by adding 2000 square miles. This was part of the area that was recommended in the 1975 study. The Legislature did not include the Intergovernmental Coordination or Watershed Planning Areas in the expanded coastal zone. Future climate change impacts especially sea level rise could severely diminish Louisiana's coastal zone. Will the state at some point revisit coastal zone boundary issues and bold steps to protect this vital resource?

**Wilkins, James**  
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### **Protecting Louisiana's Aquatic Ecosystems Amidst Increasing Needs**

Louisiana is in the process of re-examining its legal regime of water rights for surface and ground water. Surface and ground water are treated as separate resources under current law though modern science shows they are merely different phases of the same resource. Louisiana seemingly has abundant surface water but the abundance may be an illusion. There are increasing human demands for surface and ground water and changing climate conditions that could cause major changes in precipitation patterns. Increasing demands for coastal restoration, energy production and



calls for regional redistribution of surface water added to traditional uses for municipal, agriculture and navigation will require development of a water budget, including considerations of high and low water events, to make sure an equitable balance is struck between competing uses. One crucial function of water, usually surface water, is the creation and sustenance of aquatic ecosystems. Although aquatic ecosystems are some of the most productive and important ecosystems in the world they often take a backseat when water is being divvied up among competing human uses. There are several dramatic examples of this phenomenon most notably the Colorado River and current disputes in Texas and the southeastern U.S. Some western states have attempted to provide for “environmental flows” but are often constrained by their legal system of water distribution known as “prior appropriation” where “senior” water rights trump those that came after including those for ecological maintenance. Most eastern states like Louisiana practice a different system to apportion water known as riparianism. Theoretically the riparian regime should make it easier to legally protect environmental flows but the specter of takings challenges and social and political pressure will present challenges. Louisiana can learn from the experiences of other states who have struggled with meeting human demands while maintaining aquatic ecosystems that also provide human benefits. The examples of other states will inform the process of developing a comprehensive water code for Louisiana that protects its valuable aquatic ecosystems.

**Williams, Deborah**  
**Matthew James Fannin**

Louisiana State University Agricultural  
Center

### **Unpaving Paradise: Modeling Who Gets to Enjoy and When**

This research aims to explore the multifaceted dimensions of what many researchers are calling the Restoration Economy and make suggestions for the methodological framework that would most accurately portray the winners and losers in this economy. In the process, we hope to make clear some of the uncertainties concerning the benefits and pitfalls for society and not strictly defend one side of the debate in isolation from the overall well-being of people. Measuring well-being, especially in the long-run, requires thinking about wealth versus returns to wealth, which remains a challenge and is currently getting less attention as billions of dollars are flowing from the recent “recovery economy”. We suggest researchers explore the relationships and interactions of both tangible and intangible wealth in their analysis of the restoration economy that is our natural, but also physical, human, and other forms of capital. Thinking of the restoration economy in a more comprehensive way, which may require using systems thinking and using analytical tools that capture these dynamics, can help us answer questions like how long it would take for the benefits to gradually spread to our more disadvantaged society members or model whether the benefits spread at all.

### **Farmers Markets and CSFs: Assessing the Viability of Two Direct Marketing Options for the Georgia Fishing Industry**

Georgia seafood producers and consumers are faced with an oddly complementary set of dilemmas. Seafood producers find it difficult to sell their product in the inland market. Meanwhile, inland consumers, particularly those motivated by the local food movement, are frustrated by the lack of local seafood. This paper explores two direct marketing options: Farmers Markets and Community Supported Fisheries (CSFs) as options for introducing larger amounts of Georgia seafood into the inland market of Atlanta and Athens as part of the local “foodshed” (Hand and Martinez 2010). We assess the viability of extending the local food direct market approach to include seafood, using insights from qualitative interviews with seafood producers, and analysis of survey data from farmers market and farm share (CSA) patrons to examine issues such as willingness to pay, preferences, and barriers to entering each market.

**Yandle, Tracy**

Department of Environmental Sciences,  
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**Gina Shamshak**

Department of Economics, Goucher  
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### **Is There a Market for Branded Gulf of Mexico Oysters?**

Gulf Coast oysters are mainly produced through an extensive method and sold as generic oysters. We address the question of whether there exists any market opportunities for geographic branding of Gulf oysters, as is typical on the Atlantic and Pacific Coasts. This work aims to identify factors influencing preferences for Gulf of Mexico oysters, and to estimate willingness-to-pay for specific attributes, including harvest location / brand, size, taste (saltiness), and cultivation method (wild vs. farm-raised). An online choice experiment was designed and administered to a sample of U.S. raw oyster consumers, complemented by in-person taste panels conducted at restaurants in Point Clear, Alabama; Houston, Texas; and Chicago, Illinois. We find that when labeled, local branded varieties dominate consumer choice, although these same varieties fare no better than other varieties under blind taste-tests. Non-Gulf respondents preferred Atlantic and Pacific oysters relative to Gulf oysters while Gulf respondents preferred the generic Gulf oysters over branded varieties. Small and wild-caught oysters were generally preferred over larger and farm-raised oysters. Non-Gulf respondents are likely to require a price discount relative to their own local varieties to purchase Gulf oysters, on the order of \$3-9 per half-dozen, implying a retail price of \$4-10 per half-dozen in Non-Gulf markets. A positive price premium for branded Gulf varieties is found for Gulf respondents, on the order of \$0-5 per half-dozen, implying a retail price of \$9-14 per half-dozen in Gulf markets. Additionally,

**Yehouenou, Lauriane**

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wild-caught Gulf oysters are estimated to fetch a price premium of \$3 per half-dozen relative to farm-raised ones.

**Yoskowitz, David**  
Harte Research Institute, Texas A&M  
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### **A Socio-Economic Observing System for our Coasts**

The coastal and offshore regions of the United States are endowed with a tremendous amount of natural and human resources that together produce important economic and cultural assets critical to the energy security, economic vitality, and environmental health of the country. The ocean and Great Lakes economy in 2012 was \$343 billion and employed 2.9 million people (NOAA, 2015). Our ability to assess and monitor these dynamic ecological and social systems, especially during times of acute impacts (hurricanes, oil spills, harmful algal blooms, etc.), is vital to assuring resilient communities. The bio-physical sciences have developed an array of sophisticated means to assess environmental conditions - water quality, fish populations, climate and physical parameters like sea level rise and ocean acidification. Broad-based monitoring efforts have been organized into formal systems like the Gulf of Mexico Coastal Ocean Observing System (GCOOS), Southeast Area Monitoring and Assessment Program (SEAMAP), and Fisheries Information Network (FIN). There is no analog for socio-economic variables with the exception of well entrenched government programs such as Census, Bureau of Economic Analysis, and Bureau of Labor Statistics data and their State equivalents, for example. However these programs, in many cases, miss the important connections of how changes in environmental conditions impact human communities. What is currently missing is the consistent collection of 'non-traditional' socio-economic metrics (e.g. levels of subsistence fishing, non-market ecosystem service valuations, and social connectedness). Much of this type of data is collected in one-off studies that are rarely repeated and unfortunately lose some of their value over time.

There is a clear need for such an integrated system to collect relevant socio-economic metrics on a regular basis for three important reasons: 1. Significant commercial activity and rapid population growth in the U.S. coastal zone will likely see increased vulnerability of coastal residents and businesses that can be affected by both man-made and natural disturbances. There is a need to quickly assess socio-economic impacts of these disturbances in order to provide effective management and recovery. 2. Economic analysis is mandated through various state and federal laws as well as Presidential directive. An effective assessment of the socio-economic impact requires collecting 'non-traditional' data in a reliable and consistent manner. 3. Restoration and conservation activities along our frequently taking place along our coasts. Over \$15 billion in projects could take place in the Gulf of Mexico region alone over the next 15 to 20 years. Bio-physical measures of success will not be enough. It is imperative to know if these activities are having a positive effect not only on ecological health but human well-being as measured by traditional and non-traditional socio-economic variables.

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