Collaborative Scientific Research Opportunities Relative to the Gulf Oil Spill

Conference Proceedings

November 1 - 2, 2010
New Orleans, Louisiana

Collaborative Scientific Research in Relation to the Gulf Oil Spill

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Louisiana EPSCoR and the Louisiana Board of Regents, in collaboration with Alabama and Mississississippi EPSCoR organized the Gulf Oil Spill Conference to help identify and encourage collaborative scientific research. The event, planned by a 32-member tri-state steering committee, brought together participants from diverse campuses, disciplines, and states, among whom are leaders in other Gulf oil spill conferences and initiatives. A heartfelt thanks is due to the presenters, facilitators, and panelists who exercised leadership roles during the conference. We offer special appreciation to Dr. Uma Venkateswaran, EPSCoR Program Officer, for her counsel and guidance as conference planning proceeded, and for her participation.

Few days pass without new questions being posed about the oil spill and its consequences. Many of the questions can be answered from positions of knowledge only by scientists, and numerous of these can be answered with authority only by teams of scientists conducting interdisciplinary research.

As insights are shared and partnerships are formed, it is useful to remember Abraham Lincoln's timeless advice: "As our case is new, we must think anew." The success of the conference will be measured by the extent to which attendees and their colleagues, think "anew" to address oil spill research by forming partnerships across disciplines, campuses, states, and agencies.

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I. Executive Summary

For 85 days Gulf Coast residents kept vigil, along with the rest of the world, as oil flowed from the depths of the Gulf of Mexico in a catastrophe that dwarfed the Exxon Valdez and the Mexican rig Ixtoc I to become the largest accidental oil spill in history. As the news media led viewers in counting the days of the oil spill disaster, experts from industry, government and academia debated, studied and experimented with containment methods, engineering solutions, coastal and ocean remediation and protections, economic impacts, and the immediate and long-term effects on human communities living near the catastrophe. The oil spill dramatized in real time the value and importance of scientific research, as well as the urgent need for scientists across disciplinary, institutional, state and national boundaries to work together to understand and begin to mitigate this multifaceted disaster.

A. Conference Organization and Purpose

With hundreds of researchers eager make sense of the spill's comprehensive impact over the coming decades, the Louisiana Board of Regents and Louisiana EPSCoR (Experimental Programs to Stimulate Competitive Research), along with the Alabama and Mississippi EPSCoR programs, hosted a 1 ½-day oil spill conference in New Orleans on November 1-2, 2010. The Conference, "Collaborative Scientific Research Opportunities Relative to the Gulf Oil Spill," was designed to identify multidisciplinary research priorities related to the spill while focusing on fostering collaborative research and building partnerships to study these complex issues across and among disciplines. It also provided a forum for researchers to discuss research funding opportunities directly with NSF program officers, and for government and industry representatives to gain insight into ongoing scientific work.

B. Key Observations and Recommendations

To facilitate cross-disciplinary discussions, the Conference was organized into four broadly inclusive research strands, each designed to attract a variety of interests and expertise: Engineering Aspects and the Transport and Fate of Spilled Oil; Coastal and Ocean Environments: Damage, Remediation and Recovery; Human Communities: Disaster Management, Sustainability and Health; Economics, Policy and Decision Support Systems.

Engineering Aspects & the Transport and Fate of Spilled Oil

Coastal and Ocean Environments: Damage, Remediation and Recovery

Economics, Policy and Decision Support Systems

Human Communities: Disaster Management, Sustainability and Health
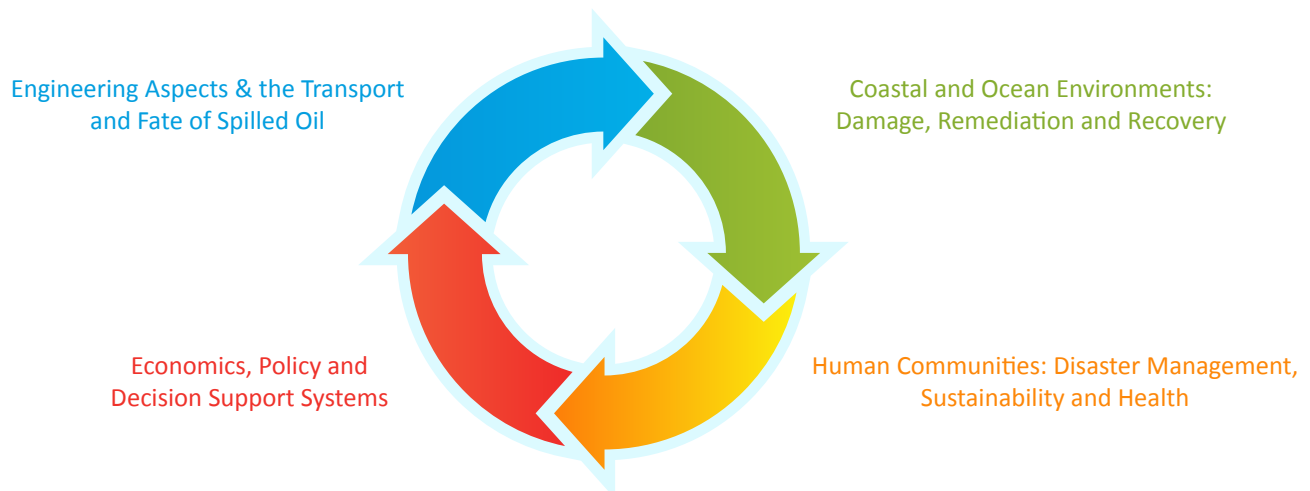
Researchers across all strands agreed that the impacts of the spill are likely to continue to emerge for many years to come, and its magnitude will not likely be fully understood for decades. As scientists study the impacts as well as ways to respond better to such disasters or even prevent them from happening, they also want to more fully understand the total picture of the damage to the Gulf region, from the undersea environment's response to oil and dispersants, to the impact on the Gulf's fragile wetlands, the characteristics of the oil and dispersants as they travel and degrade, health effects among related human populations, and the ultimate damage throughout local, regional and national economies.

Researchers participating in the conference proposed the development of data systems encompassing numerous disciplines to make information available to scientists and others and to facilitate collaboration. They suggested ways to pool research expertise and data collection efforts, to ensure that their efforts are not duplicated and all qualified scientists have direct access to the information necessary to conduct meaningful research. National databanks, shared facilities, research partnerships, and well-maintained electronic resources were all identified as critical mechanisms for ensuring availability and utility of scientific information.

Considering the comprehensive impacts caused by the Gulf of Mexico oil spill, interdisciplinary collaboration will be crucial to meaningful scientific study. The profound interconnectedness of the impacts makes it difficult to meaningfully study small issues in isolation. In addition, large-scale collaborative projects, given their importance and potential for significant impact, are often given priority by funding agencies like NSF, as well as the private sector.

Providing observations in the final session of the conference, Robert Twilley of the University of Louisiana at Lafayette urged researchers to seek out interdisciplinary research opportunities around the topic of the Gulf Oil Spill and for future efforts to think in terms of "grand challenges" which require multidisciplinary, systemic collaboration. Such grand challenges were the theme and substance of this Conference. Each of the breakaway strands spent time assessing the priority collaborative topics within and across subject areas, to address the most pertinent, sweeping issues raised by the oil spill. These priority topics were reported to the Conference during a closing plenary, and are summarized in the Proceedings.

Indeed, even as it urged partnerships, this Conference served as a model of collaboration. Louisiana EPSCoR and the Louisiana Board of Regents worked together with representatives from across Louisiana campuses, as well as Mississippi and Alabama, to plan and organize the event. Speakers and poster presenters represented a spectrum of research interests across a host of disciplines as well as a number of universities, business, and states. Through this approach, the Conference attracted 380 participants: more than 300 scientific researchers, as well as government, industry, business and community representatives, to intensively discuss spill-related research. These discussions resulted in broader general understanding of the scope of ongoing and prospective activities, a set of priorities within each of four broadly defined research strands, potential collaborative opportunities, and a renewed determination to aggressively pursue these research areas so critical to the survival and restoration of the Gulf Coast.

II. Background and Rationale for the Conference

Immediately after the Deepwater Horizon drilling rig exploded, killing 11 workers and leaking an unprecedented 185 million gallons of oil into the Gulf of Mexico, members of the scientific community mobilized to offer assistance and expertise to industry and government response teams, to help minimize the damage and respond to the vast environmental, engineering, economic and health needs the disaster would surely generate. In addition, researchers understood that the disaster provided unique research and learning opportunities that would be critical both to understanding the nature and causes of the disaster itself, and preparing us for the next such event.

More than six months after the Deepwater Horizon catastrophe began to unfold, a host of questions remain about the short- and long-term impacts of the spill on the environments, communities and economies that rely on it, as well as about deepwater drilling, industry practices, and the science and technology required to ensure they are safe.

A. History and Funding of the Conference

A month after the beginning of the Deepwater Horizon oil spill began, Louisiana EPSCoR and the Board of Regents approached NSF with a white paper proposing a conference, to be held as soon as possible, to discuss the oil spill and related research needs. The idea for the conference was born of two events held in the aftermath of Hurricane Katrina, which focused on rebuilding research capacity in storm-damaged regions and building collaborations, including multi-state partnerships, in the Gulf Coast region. The magnitude of the oil spill and its impact on the region, as well as our focus on research collaborations, demanded a comprehensive regional response similar to that afforded by the post-Katrina events. Upon review of the white paper, NSF encouraged development of a full tri-state proposal, which was recommended for funding in August 2010. In the same month, the Louisiana Board of Regents unanimously agreed to support the Conference.

With funding in place, Conference design and organization began. A Steering Committee of 32 members, including representatives from several Louisiana universities and research campuses, as well as individuals from Louisiana, Mississippi and Alabama EPSCoR and the Board of Regents was appointed to guide Conference planning. The Committee, with support from Louisiana EPSCoR and Board of Regents staff, determined a direction and theme, developed an agenda, identified and contacted speakers, and assisted in all aspects of planning.

B. Context for the Conference

The Louisiana EPSCoR/Board of Regents Conference, "Collaborative Scientific Research Opportunities Relative to the Gulf Oil Spill," was preceded by several other conferences, forums, workshops, and working group sessions to discuss research issues as well as the immediate and long-term ramifications of the oil spill.

One such event was a June 3, 2010, conference held at Louisiana State University in Baton Rouge. The "Deepwater Horizon Oil Spill Science Symposium" took place as oil gushed unabated from the well and responders were still operating in crisis mode. More than 200 participants gathered to hear from government representatives on the status of the spill, as well as response and research activities. According to the conference summary, the meeting featured breakout sessions aimed at "estimating the flow rate of the spill, projecting its fate and determining the effects of the oil and the dispersants on the environment and human health." Participants urged greater coordination among researchers to allow more efficient use of resources and less duplication of efforts. This conference provided a basis for much of what was discussed at the November EPSCoR conference.

Also, in the months since the oil spill there have been hearings sponsored by the U.S. Congress, the BP Deepwater Horizon Oil Spill and Drilling Commission and a joint panel of the U. S. Coast Guard and the Bureau of Ocean Energy Management, Regulation and Enforcement to collect facts and testimony and to generate reports from researchers and others about the cause, impact and issues prompted by the spill. In addition, there have been workshops sponsored by the NOAA Southeast Fisheries Science Center and all of the Gulf states have task forces dedicated to the spill.

Other conferences, forums and symposia that addressed the Gulf of Mexico oil spill include:

- "Oil in Troubled Waters," a forum sponsored by the University of Texas on May 18, 2010. The forum focused on the causes and consequences of the Deepwater Horizon disaster.
- Gulf Coast Oil Symposium, sponsored by the Louisiana State Bar Association on May 25, 2010 to explore the legal and policy issues, public investigations and expert testimony.
- "The Deepwater Horizon Blowout," a session of the 2010 Gordon Research Conference on Oceans and Human Health, on June 17, 2010, in Biddeford, Maine. The session was led by researchers from the University of Southern Mississippi.
- "Assessing the Human Health Effects of the Gulf of Mexico Oil Spill," sponsored by the Institute of Medicine in New Orleans, was held on June 22 and 23, 2010. It addressed the possible adverse health effects from the oil spill, as well as monitoring and surveillance activities, data sources and research methods.
- TEDxOilSpill Conference, sponsored by TED in Denver, Colorado on June 28, was a combination popular/academic, live/online conference that addressed scientific and policy issues related to the spill. It featured high-profile academic and non-academic speakers.

- "Gulf Oil Spill: Tackling the chemistry and food science implications," was a day-long symposium sponsored by the American Chemical Society on August 24, 2010, during the organization's annual meeting in Boston. It featured a spectrum of oil spill topics related to chemistry.

- "The Louisiana Oil & Gas Symposium: The BP Gulf Oil Spill: Long-term Impacts and Strategies," sponsored by the Baton Rouge Geological Society on August 16 and 17, 2010, was a regional conference featuring papers from Louisiana scientists and officials. More information is available at www.brgs-la.org.

- A lecture series on the BP oil spill was held in the fall semester of 2010 at Tulane Law School. The series involved the technical, scientific and policy aspects of the Deepwater Horizon/BP well blowout.

- A Technical Symposium: "Bioremediation of Oil Spills," sponsored by the Florida Sea Grant, University of Florida and the University of Cincinnati on August 31, 2010, explored oil spill bioremediation: methods, effectiveness, issues and concerns.

C. Framing Principles

From its inception, the Conference's core framing principle was collaborative research across disciplinary boundaries. The focus of the Conference on interdisciplinary collaborative research aligned it well with national and NSF priorities, as well as approaches necessary for addressing the magnitude and interrelatedness of the spill's impacts. In recent years, interdisciplinary research has grown in significance, as the explosion of scientific and technological advances have spread across traditional boundaries and increasingly required diverse expertise. Moreover, as the oil spill disaster unfolded and its impacts spread from engineering issues and ocean environments to coastal environments, then human populations, it became clear that scientific response, to be relevant and useful, would have to focus on broader issues and the interconnectedness of a variety of research questions and areas.

The Conference attracted 380 conferees from an impressive variety of backgrounds, all interested in the spill, the immediate response, and long-range study and outcomes. Conferees hailed from universities in Louisiana, Alabama, Mississippi, and elsewhere across the country, as well as research groups, government agencies, private-sector business and industry, and community organizations.
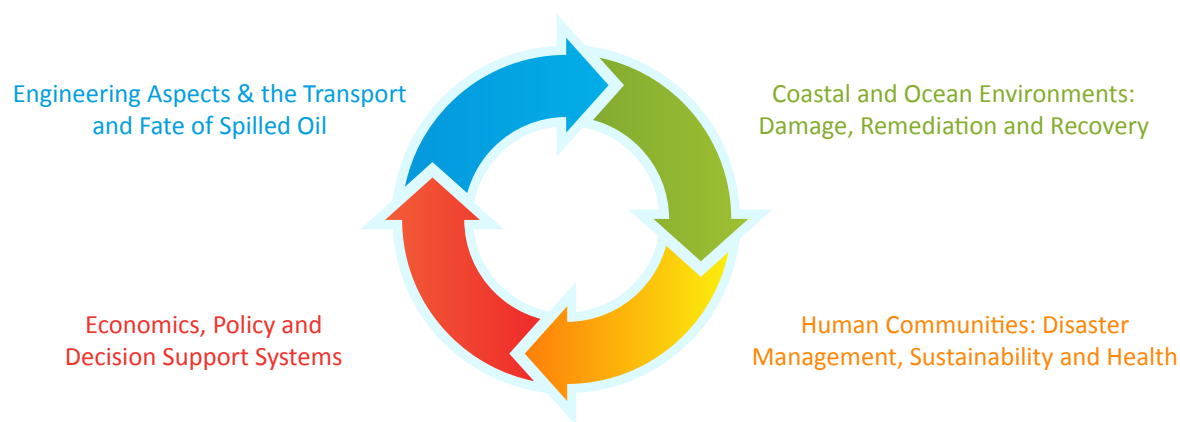
III. Summary of Conference Proceedings

A. Agenda Structure and Goals

The Conference was unique in design, intended to provide both plenary sessions to discuss the value of interdisciplinary research in a variety of contexts, as well as ongoing research efforts across the Gulf Coast related to the oil spill. The remainder of the Conference was divided into crosscutting breakaway strands organized by broadly defined research areas and intended to promote wide-ranging multidisciplinary discussions. Conferees attended these breakaway strands throughout most of the conference, providing them with maximum opportunities to hear about the diversity of ongoing research, consider their individual interests and knowledge in a variety of contexts, and pursue potential partnerships.

In initial discussions, the Conference Steering Committee identified eight topics--representing the highest priority research areas related to the oil spill-- to guide the conference. Upon discussions with NSF and further consideration, the Committee combined these eight priorities into four more inclusive breakaway strands that would attract a greater variety of research interests and result in cross-pollination of ideas among researchers not traditionally grouped together.

The four breakaway strands, then, represented both the highest priority ideas and ways in which they converge across subject areas, research topics, and funding sources:

Engineering Aspects & the Transport and Fate of Spilled Oil

Coastal and Ocean Environments: Damage, Remediation and Recovery

Economics, Policy and Decision Support Systems

Human Communities: Disaster Management, Sustainability and Health

The plenary sessions which began the Conference each day set the stage for the rest of the Conference by focusing on the central theme of interdisciplinary, collaborative research, thus providing a framework in which the breakaway strands could explore more specific, but still broadly interdisciplinary research ideas and priorities. The intent of this design was not only to encourage discussions about the oil spill and the specific collaborations that might arise from it, but also to encourage researchers to think always in terms of partnership and interdisciplinary work. As NSF EPSCoR Program Director Uma Venkateswaran urged participants, "Share your research and use this opportunity to form potential collaborations that will lead to long-term research -- not only in oil-spill related research but in areas that are of relevance to Gulf Coast states."

B. Plenary Themes

Plenary sessions on both days focused on the importance of collaborative research in the context of the oil spill – to comprehensively address research issues, to build a better understanding of complex, interlocking natural and manufactured systems, and to position for federal funding. By its very nature, the oil spill impacts more than just the Gulf Coast of Alabama, Louisiana, and Mississippi. It impacts every geographic area that touches the Gulf or could come into contact with leaked oil or dispersants, every population that consumes Gulf of Mexico seafood, every business or community directly or indirectly involved in any aspect of the spill and its aftermath – the effects are endless. The unprecedented reach of the spill could yield unprecedented outcomes, something that will take decades of study to determine.

The scale and scope of the disaster necessitate a research approach that is multidisciplinary and geographically diverse. Plenary speakers acknowledged the challenge of interdisciplinary research, which requires a different set of skills from purely intradisciplinary work and even integration of different research cultures. But the benefits of interdisciplinary collaborations are palpable. It helps researchers develop a more comprehensive understanding of research issues, carve out better positions to address complex, multifaceted questions, and position themselves for federal and private-sector funding, which often prioritizes multidisciplinary projects with broad impact. Speakers encouraged university faculty to make interdisciplinary research a part of their curricula so future generations of researchers will be accustomed to the practice.

Collaborative research is central to the mission of NSF and particularly the EPSCoR program. Speakers from NSF emphasized to the conferees that federal funding is increasingly focused on complex research issues rooted across disciplines rather than within a single, narrow area. This allows funding to reach those projects with the potential to contribute measurably to understanding our complex and interrelated natural and man-made systems.

Throughout the plenary sessions, the value of the tri-state partnerships between Louisiana, Mississippi and Alabama EPSCoR was heralded. These three programs have, since Hurricane Katrina, worked together to address issues of common importance, and recently received a major Research Improvement Initiative (RII) Track 2 award to establish the Northern Gulf Coast Hazards Collaboratory. The Conference, a collaborative effort among the three States, also embodied the partnership's willingness and ability to combine resources and talents toward a common objective. This EPSCoR-based partnership has already and will continue to provide a vital context in which researchers across the Gulf Coast can make contact, share research ideas and resources, and establish meaningful collaborations.
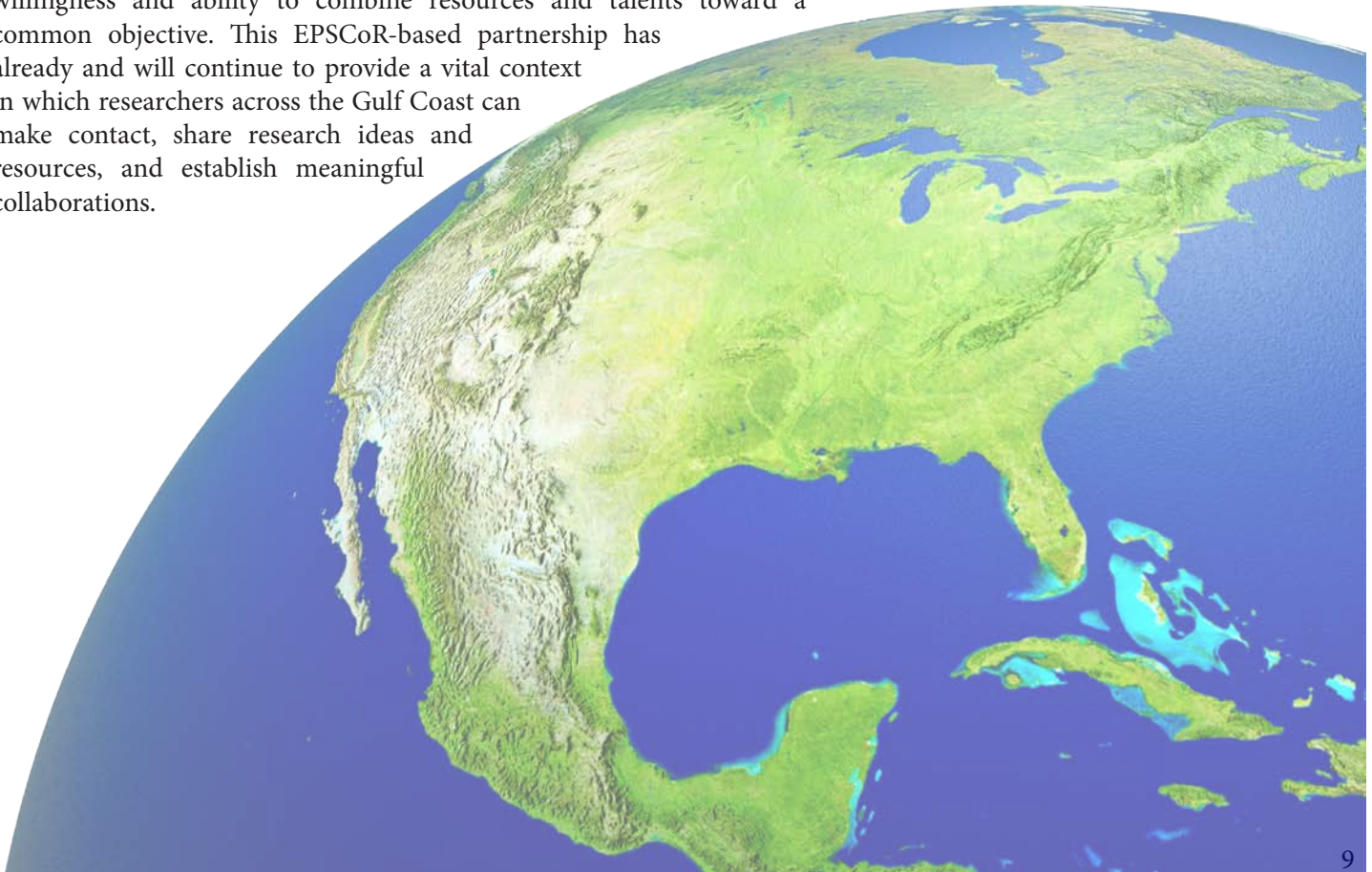
C. Plenary Sessions

1. Opening Plenary: An NSF Perspective on Interdisciplinary Research

The Conference opened with a plenary talk by Thomas F. Russell of the NSF Office of Integrative Activities. Russell discussed the drivers of interdisciplinary thinking, all of which have relevance to oil spill research, including the inherent complexity of nature and society; the desire to explore problems that are not confined to one discipline; the need to solve societal problems; and the power of new technologies. He explained that collaboration and interdisciplinary research go to the heart of NSF's strategic plan:

Discovery increasingly requires the expertise of individuals with different perspectives – from different disciplines and often from different nations – working together to accommodate the extraordinary complexity of today's science and engineering challenges. The convergence of disciplines and the cross-fertilization that characterizes contemporary science and engineering have made collaboration a centerpiece of the science and engineering enterprise.

Russell referred participants to the NSF's website (www.nsf.gov) for a more detailed discussion of transformative and interdisciplinary research. He also described several of NSF's interdisciplinary programs, which oil spill researchers might explore for funding in the short and long term:

- Cyber-Enabled Discovery and Innovation (CDI) -- Five-year initiative to create revolutionary science and engineering research outcomes through innovations and advances in computational thinking.

- Science, Engineering and Education for Sustainability (SEES) – Will integrate existing efforts in climate science and energy research with new education and cyber-based activities.

- Decadal and Regional Climate Prediction Using Earth System Models (EaSM) -- Calls for the development of next-generation earth system models.

- Dynamics of Coupled Natural and Human Systems (CNH) -- Promotes interdisciplinary analyses of relevant human and natural system processes and complex interactions among human and natural systems at diverse scales.

- 2011 EPSCoR Research Infrastructure Improvement Program: Track 2 Awards -- Awards to consortia of EPSCoR jurisdictions to support innovation-enabling cyber infrastructure of regional, thematic, or technological importance.

- Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences (UBM) -- Long-term research experiences for interdisciplinary, balanced teams of at least two undergraduates from departments in biological and mathematical sciences.

- Integrative Graduate Education and Research Traineeship Program (IGERT) -- Establishing innovative new models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries.

- Science of Science and Innovation Policy -- Research designed to advance the scientific basis of science and innovation policy.

- Science and Technology Centers: Integrative Partnerships -- A means to undertake important investigations at the interfaces of disciplines and/or fresh approaches within disciplines.

In addition, Russell reminded the conferees that unsolicited proposals and projects outside of the categories above are also welcome. He said NSF has recognized the importance of taking more risks with funding and awarding funds to projects that push the boundaries of traditional research. He encouraged researchers to think creatively and collaboratively as they identify topics for exploration and position their research for federal funding opportunities.

2. Plenary II: Perspectives on Research Activities Already Underway

During the second plenary session, speakers recognized the unique opportunities presented by the oil spill to gather first-hand knowledge about a disaster of unparalleled scope and scale, to analyze and study its full range of impacts and to help improve disaster response, remediation and recovery. Conference presenter Chris D'Elia, Dean of LSU's School of the Coast and Environment, said he was well aware of the scope of potential opportunities in the earliest days of the incident, when BP approached him to discuss research funding related to the spill.

D'Elia and his colleagues at LSU's School of the Coast and Environment were fortunate to obtain funding – NSF RAPID funds, $10,000 Louisiana Sea Grant development grants, and portions of what would become the $500 million BP Gulf Research Initiative—to begin their research very early in the unfolding of the disaster. In fact, D'Elia indicated BP created its research fund in response to his urging that the company fund projects from the best and brightest researchers on the Gulf Coast and beyond through a high quality, peer-reviewed, open access process.

He shared a list of his group's research topics and related funding, along with what he sees as the best opportunities for collaboration:

- Ecosystem-level studies related to long-term effects of the spill, especially on trophic systems and nutrient dynamics.
- Interdisciplinary research involving the natural and social sciences.
- Studies on the safety and practice of deepwater drilling and potential oil spills.

He said society's need for energy dictates that deep-water drilling has to continue. He suggested that, while the need for oil is great, the oil spill demonstrates that the industry must find ways to drill more safely and with less impact.

In her presentation, LuAnn White of the Tulane School of Public Health and Tropical Medicine explored what happens when drilling intersects with human health. She sees a silver lining to the oil spill. White said that the spill's occurrence 50 miles offshore and one mile below the surface of the gulf makes it necessary to understand how the qualities of the oil change as oil moves onshore or into areas fishing areas. Understanding the environment will mean partnering with colleagues in biological and chemical sciences, she said.

In addition to the effects on the environment and food safety, White said there needs to be a significant amount of study on the psychological impacts of the spill, since the psycho-social effects sometimes outweigh the physiological. Researchers need to understand how the burning of oil affects people, and which agents interact with human populations. Researchers also need to effectively communicate the importance of the research they are conducting and explain their results in ways that avoid the kinds of myths and misinformation that sometimes tainted media coverage of the oil spill, she said.

White emphasized that universities are still learning how to better structure their bureaucracies to facilitate the kind of collaboration that needs to take place with community groups, industry and other institutions. Forming collaborations lends to the richness of the study, but there are practical reasons for partnering as well. Researchers do not have the kinds of facilities and resources they need to handle the vast amount of samples involved in oil spill research. Working in teams can help manage this, she said.

One of the incentives to collaborate is the opportunity to pool research dollars. White recommended that researchers use the conference to make contact with colleagues from other disciplines and locate potential partners. "One of the biggest barriers to collaboration is the fact that we don't know each other," she said.

Alice Clark, Vice Chancellor for Research and Sponsored Programs at the University of Mississippi, agreed with colleagues that oil spill research opportunities present a "teachable moment" on the virtues of collaborative research. She discussed the kinds of collaborations underway though the Mississippi Research Consortium (www.mississippiresearch.org), particularly in the areas of ocean sciences and social and economic sciences. She also discussed some of the consortium's wide-ranging oil spill-related work, including: coastal observations and forecasting oil transport and fate; environmental monitoring of water quality, marine life, and fisheries; impacts and distribution of oil at the spill site and in offshore waters; application of sand berm for protection against coastal erosion; understanding impacts to human health and wildlife health; evaluating social and economic impacts; filming and documenting events; and facilitating community education, outreach, and technology transfer.

A benefit of collaborative research is improved coordination, something with which Nancy Rabalais can relate as Executive Director of the Louisiana Universities Marine Consortium (LUMCON). She documented her observations of oil spill-related research in "The View from the Tower," an article about the oil spill as she experienced it from the tower at the LUMCON Marine Center in Cocodrie, La., located about a quarter mile from the BP operations center.

One of the lessons she learned involved the value of effective media relations. Rabalais said LUMCON was barraged with media requests after the spill. She felt it was important to be reasonable, forthright, honest, yet not inflammatory. Although media requests were overwhelming at times, she found them to be an important avenue to the public.

Her close proximity to oil-drenched marshes has also contributed to her concern about conducting oil spill research in such delicate environments. Rabalais has seen some habitat destruction as a consequence of oil spill research and cautioned researchers to respect the wildlife habitat in the areas in which they collect samples. "A marsh with oil on it can only take so many more people trampling on it. We need to be careful about spoiling our nests," she said.

Steven Sempier of the Mississippi-Alabama Sea Grant Consortium, a program of the National Oceanic and Atmospheric Administration (NOAA), spoke about his efforts to identify Gulf of Mexico research priorities. He reviewed strategic plans produced by Sea Grant offices of states along the Gulf Coast, conducted surveys and held workshops to identify priorities. An initial plan was released in September 2009, but the oil spill of April 2010 forced him to revisit the priorities. After collecting about 1,000 responses through surveys, conferences and online questionnaires, he developed the following priorities:

1. Examine the impacts of oil and dispersants on food webs, life histories and abundance of aquatic organisms.
2. Determine the distribution of oil and evaluate the fate and persistence of oil in the ecosystem, including the roles of dispersants and microbes.
3. Assess the impacts of oil and dispersants on barrier islands, water column, coastal, nearshore, offshore and deep-water habitats and water quality.
4. Examine the effects of oil and dispersants on seafood safety, including the potential for bioaccumulation.
5. Quantify the impacts of the oil spill on ecosystem services in monetary and in non-monetary terms.
6. Determine the toxicity of the oil, dispersants and drilling mud on humans and the ecosystem.
7. Assess the economic losses to commercial fishing interests, seafood processors and dealers, restaurants and related industries.
8. Assess the status, well-being, vulnerability and resilience of coastal communities.

Also, as a service to the research community, Sempier developed an online database to gather Gulf of Mexico research and monitoring activities, regardless of funding source. Sempier encouraged researchers to visit the database and submit their activities as a way to connect with potential collaborators. The database, which has had more than 2,500 unique visitors, can be found online at www.gulfseagrant.org.

Oil spill related databases include:

- Oil Spill Research and Monitoring Activities database, managed by Sea Grant and Texas A&M University, is located at http://gulfseagrant.tamu.edu/oilspill/database.htm. The database features ongoing oil spill-related research.
- Oil Spill Related RFP database (http://gulfseagrant.tamu.edu/oilspill/rfp.htm), also managed by Sea Grant and Texas A&M, includes funding opportunities for spill-related research.
- Congressional Research Service has a database of selected issues for Congress at www.ombwatch.org/files/crsrptdeepwaterhorizonspill.pdf. The database includes legal and policy, as well as major research and remediation issues.

Organizational Initiatives focusing on the oil spill include:

- Oil Spill Academic Taskforce (http://oilspill.fsu.edu), consisting of representatives of Florida universities and government agencies, is a statewide task force charged with identifying major research issues and directions related to the oil spill. It provides an inventory of needs and resources.
- LSU, The Woods Hole Oceanographic Institution (WHOI) and LUMCON have formed a consortium to address oil spill-related issues. More information is available here.
- LSU Health Sciences Center and Texas A&M have formed a consortium to address long-term health effects of the oil spill.

Providing ways for researchers to ask questions, share ideas and learn from one another is vital to the level of research being done in relation to the oil spill and can have a direct impact on crisis response. Vijay John of Tulane University organized a workshop focused on the science and technology of dispersants as they are used in deepsea oil releases. The September workshop, which was held in Arlington, Va., brought together about 55 participants from federal agencies, academia and industry including EPA Administrator Lisa Jackson, who was among the presenters. The workshop was funded in part by a $48,000 grant from NSF, according to a press release from the office of Congressman Joseph Cao.

John said the workshop was driven by the realization that there was little knowledge about what happens to dispersants when injected at great depths and at low temperatures. The workshop addressed diverse topics including environmental impacts from dispersants moving onshore; interaction with sediments; and designing better dispersants.

Participants wanted to understand the impact of dispersants that had been developed to treat surface spills, but in this case were being deployed at much greater depths and lower temperatures than ever before. They felt there was a lot to learn that can be applied to the next generation of dispersants. The EPA is scheduled to release an RFP for a $2 million research program on this topic.

D. Breakaway Strands: Multidisciplinary Development of Research Priorities

Making sense of the oil spill and its impacts, as well as preparing for future catastrophes, will require a greater understanding of a host of issues across a spectrum of science, technology, engineering, and social sciences research areas.

The Breakaway Strands were devoted to investigating these potential issues and identifying the top priorities within and across the strand topics.

Each strand included several speakers who provided their perspectives on collaborative research within the topic area as well as priorities for partnerships. These individual perspectives coalesced by the end of the first day into a comprehensive picture of the current state of and major future directions for the topic areas.

Participants in each of the four groups identified a wide range of research issues associated with the oil spill. They agreed that there is still a wealth of knowledge to amass in connection with the spill, now and for decades to come. The ultimate goal of the research agenda is to understand the comprehensive impact of the spill and to use this knowledge to help the affected areas recover while devising plans to respond to similar events in the future.

Each Breakaway Strand concluded its discussions by identifying the highest priority areas for collaborative research going forward. These priorities were presented to the Conference in a plenary session at the end of day 2. The reports were presented by facilitators of each strand and selected breakaway speakers:

Engineering Aspects and the Transport and Fate of Spilled Oil
Doug Blakemore, Chevron

Coastal and Ocean Environments: Damage, Remediation and Recovery
Denise Reed, University of New Orleans

Human Communities: Disaster Management, Sustainability and Health
Jay Grimes, University of Southern Mississippi

Economics, Policy and Decision Support Systems
Florenz Plassmann, Binghamton University
Geoffrey Parker, Tulane University

Their findings are presented on a strand-by-strand basis below.

Engineering Aspects and the Transport and Fate of Spilled Oil

According to presenter Doug Blakemore, the Engineering Aspects group identified five priority areas for collaborative study.

Properties of Oil

Participants reported that understanding the chemical composition of the oil that spewed from the Macondo well after the April 20 explosion would be vital in helping researchers analyze its interaction with waters of the Gulf of Mexico, as well as its reaction to various containment and remediation measures, including burning and the use of dispersants.

They indicated that oil is a complex substance that varies in composition from one location to another and that different wells can produce very different materials. It is important to understand the properties of the oil in question, how it varies from one location to another and how these differences determine the various risks involved.

Questions still remaining about the properties of the oil include:

- How does oil interact with sea water?
- How does oil interact with other compounds present naturally or with current or newly-developed surfactants?
- What is the behavior of natural oil as a function of components such as methane, hydrates, ionic strength of seawater, temperature, etc.?

Researchers are interested in the thermodynamic characteristics of the oil, particularly in the presence of methane hydrate. They suggested research addressing the scaling parameters at the nano and macro scale that mimic Deepwater Horizon oil spill characteristics. They also said it would have been advantageous to conduct research at the location of the well opening on the Gulf floor, to determine the P gradient and how dispersants get sucked into the main stream.

Interaction of Oil with Dispersants

Responders to the Gulf of Mexico oil spill applied some 1.8 million gallons of dispersants to the oil, the largest amount ever used. Questions about the safety and effectiveness of the products prompted the EPA to halt application of dispersants at one point.

Blakemore said researchers still have a number of questions about dispersants:

- Which dispersants are non-toxic?
- What is the best way to determine toxicity and whether newly developed materials or techniques of implementation are sustainable?
- Are dispersants effective at extreme conditions?
- What is the best way to inject a dispersant into a deep sea oil torrent, and what is the best mechanism to apply it? How is the velocity of the oil plume affected?
- Are there any mechanisms that function as heavyweights to hold the dispersant/oil complex at the bottom of the sea (i.e. sediments), or does it remain suspended in the water column?
- What is optimal rate of dispersion-oil mix, and how do deepsea conditions affect dispersants?
- What is the polarity of dispersants alone and in the oil/dispersant system?

- What is the drop behavior they exhibit, and what are the oil decomposition mechanisms?
- Do dispersants make the oil more available to microbes or other organisms?
- Are drops biodegradable, and are they going to be effective?
- How is the biodegradation uptake being affected?
- What are the conditions for having micro emulsions, and what are the parameters that will drive the design of effective dispersants?

Researchers proposed using special techniques, such as small angle neutron scattering and X-ray diffraction, to determine structure and nucleation and/or crystallization mechanisms under extreme conditions. They discussed the use of electron microscopy (cryo stage and other surface characterization techniques), as well as a step-down approach from atmospheric conditions to high P and high T conditions. The group suggested developing a model of the experimental properties, activity coefficient and optimization parameters relevant to realistic processes.

Researchers cautioned that studies should use oil with similar properties as the one involved in the Gulf oil spill ("sweet oil"). It will be important to preserve the samples and prevent oxidation through a protocol involving Argon storage and stable temperatures.

Determining Oil Plume Characteristics and Movement

Researchers said that it is important to recognize that oil is complex and will change over time, and that the oil released from the Macondo well has not reached its ultimate destination. There have been reports of an underwater plume of oil that is still moving in the deeper waters of the Gulf of Mexico. Understanding the plume's dynamics from physical, chemical, biological, and toxicological perspectives will contribute to a basic understanding of the deeper Gulf of Mexico and how it is impacted by deep water oil exploration and development.

Among the researchers' issues related to the plume are:

- What are the long-term impacts of the plume on the ecology, biology, diversity and chemistry in the deep waters of the gulf that are in its path?
- What is the likelihood of the plume returning to more productive surface waters or sinking into deeper sea?
- Ecosystem approach infused with process studies
- Deep water carbon cycle and budget
- Oil release stress versus other Gulf of Mexico stressor impact

Blakemore said researchers suggested creating a model of the plume to help define the characteristics of oil and water at the subsea source. Such a model would help responders position surface response vehicles and resources. These would guide officials in developing toxicity, environmental, and health data sampling protocols during the spill and provide real-time research that can be used for future studies. Related questions include:

- What are the flow dynamics and the effects of mixing surfactants, shear forces, compositions, and surface properties?
- How does oil reach the sea floor? How does burning the oil at the surface or applying dispersants impact the oil's movement to the sea floor?
- What are the consequences to the deep sea flora and fauna and within the water column during transport?
- What will control where this material lands and what it does?
- What mechanisms will be a factor?
- How can we make predictions in the future?

The group identified the following types of modeling that would be most beneficial:

- Crude, crude compounds and dispersants in water, sediment and shoreline. The objective would be to predict the concentration of crude and crude compounds on a geo-spatial and temporal scale, which will include transport and fate phenomenon (water column, sediment, shoreline, and wetlands).
- Air Quality Modeling. Be able to model the impact of the spill and spill-related emissions on air quality.
- Health Risk Modeling. To model the impact of the spill and spill-related emissions on public health.
  - Estimate emissions using inverse-dispersion modeling that involves the existing ambient air monitoring and/or other methods.
  - Develop emission spectra for various air pollutants (on-time scale).
  - Use emission spectra (emission rates) to model incremental air pollutants in the ambient air.

Other types of modeling to consider:

- A fluid dynamic model. This would help researchers understand oil drift from the well-head to the surface. The model would estimate the volume change from the well-head to the surface.
- A multi-component supercritical high-speed fluid to mix into a stagnant water body (short term). This will help predict oil concentration at different locations and time periods.
- A large-scale and long-term model that includes weathering phenomenon, transport, and fate of crude oil.

Remote Data Retrieval

Researchers called for the development of a deployable real-time collection and analysis system that would allow researchers to gather data remotely and, therefore, minimize potential negative environmental impacts of human data collection.

The benefits would include:

- Providing emergency responders, scientists, trustees and environmental managers with timely, accurate and valid data to make effective and safe plans and decisions during an emergency event.
- Performing as a real-time online collaborative decision support system, integrated with other system behavior models and GIS to support technical, operational, political and socio-economic interests.
- Enhancing responder safety.
- Enhancing data collection techniques.
- Deployable data gathering systems would include sensors, platform development, data mining and decision and support systems, and robotics and automation. Considerations for their development include:
- Sensors to detect air chemistry, dispersant chemistry, meteorology, and oil chemistry.
- Intelligent algorithms for sensor networks.
- Adaptiveness of the system to weather and other changing conditions.
- Ability of platforms to operate at various scales to take samples.
- Use of aerial and marine vehicles, including vehicles to deploy smaller vehicles.
- Need for abnormal event data management models enabling researchers to detect malfunctioning or ill-placed sensors.
- Fusion of data to produce useful information with data mining techniques.
- Integration of new data with existing data streams.

The disciplines required to address these research needs include: applied physics, atmospheric science, chemistry, computer science, engineering, mathematics, and oceanography.

Restoration and Remediation Strategies

Researchers suggested developing an effective bioremediation process, as well as techniques that meet government deployment standards during an oil spill. This would provide an approved remediation protocol so decision makers and responders could spring to action when a disaster strikes. The plan would address the following:

- Implementation of remediation technologies.
- Remediating historic structures without causing damage to the site.
- Access to materials, data, mapping and instrumentation.
- Biological and ecological aspects of the work.
- Oxygenation of water in bioremediation environment.
- The Clean Water Act and its legal implications.
- Simulation in the lab of deep water situations (e.g. pressure, temperature, oxygen limitations), individually and collectively.
- Sampling techniques that will more clearly confirm and allow bioremediation in situ.
- Liability and legal issues and how engineers and scientists can still get good data.

Coastal and Ocean Environments: Damage, Remediation and Recovery

The coastal group reported the need for pilot wetland sites that would allow researchers to test remediation techniques and materials both in the lab and in the field. The group looked at the fate of oil, restoration and remediation strategies, data management and toxicity and how each pertains to different parts of the Gulf (onshore, nearshore, offshore, etc.).

Researchers reported it is essential to look at what was unique about the Deepwater Horizon spill and to learn from it. Among the priorities identified by the discussion groups were:

- The resilience of plant and animal species to variations of spill exposure and how each interacts with natural stresses. The Gulf of Mexico suffers a variety of stresses that preceded the oil spill. How do these pre-existing stresses interact with those prompted by the oil spill? In Louisiana, this might mean coastal wetland loss and other coastal issues. There should be baseline data that shows how the environment was faring under pre-existing stresses (i.e. coastal wetland loss in Louisiana).

- The need to look at physical, biological and chemical processes and how they interact with each other. The group suggested developing standardized research stations in the field and establishing baseline data that would enable standardized comparisons and contrasts.

- A group focused on the nearshore (from the beach out until the water gets to a depth of about 20 fathoms) said there are specific kinds of dynamic processes associated with this zone – its waves, tides, long shore currents, influence of river flow and stratification. They influence biogeochemical processes as well as the fate of the oil and other contaminants and their ultimate biological impacts.

- A group focused on oceans (deeper water) discussed the consequences of an underwater plume. They discussed the kinds of changes that may be taking place in the gulf as a result of the plume, how the plume can be tracked, how it changes over time and the likelihood of its movement up or down. They expressed interest in determining the consequences of oil reaching the sea floor and importance of understanding how it gets there. Is this movement a result of either the use of dispersants or burning of oil on the surface? What are the consequences to the deepsea flora and fauna on the sea floor and within the water column?

- A group discussed transport and fate of oil, an issue common with the engineering group. The thought, said Reed, is that oil is very complex and dynamic. It changes over time. There is a need to understand what was released to begin with and what exists now. Also, study is needed to determine how it has changed chemically and physically, when and how it will reach its ultimate destination and how to predict this movement in the future.

- There is a recognition that oil is complex and varies in composition from one well to another, so environmental researchers must be proactive in developing remediation strategies, technologies and materials. They must also identify places in the field to test their ideas. As they think proactively, researchers should determine appropriate courses of action for different circumstances.

- Data storage and management are key concerns for environmental researchers. The group determined it might be best to have a core data management team that provides ideas and approaches to researchers.

- Toxicological impacts of oil and surfactants must be studied in the post-spill Gulf environment. The group discussed the distinctive elements of the northern Gulf of Mexico and the unique research opportunities for collaboration and learning.

Human Communities: Disaster Management, Sustainability and Health

The strand focused on human communities saw the need for continued research on the impact of the spill on families and communities and ways to improve the response in the future. High priorities for collaborative research include:

- Communication. Researchers in this group discussed the importance of disseminating resources back to the community and using credible sources to communicate complex topics, such as risk, to a variety of populations. It was proposed that universities incorporate communications into the curricula for young researchers. This would help ensure that communication is part of every crisis plan in the future. How to communicate risk was discussed in all of the groups. Participants agreed that it's important to identify credible sources that can help communicate risk. Not every source will be effective with every group.

- Community Resilience. The group felt that the preservation of the culture was important in every situation, whether there is a hurricane, an oil spill or another type of disaster. During discussions, participants stressed the importance of effective communication in the resilience of the community, as well as the value in focusing on the resilience of children and families. Also, while coastal communities have a reputation for resilience, they have their weaknesses as well. It is important to understand and address these weaknesses.

- Data Collection. The group talked about the importance of monitoring and surveillance. Even though, it's not always deemed as vital as cutting-edge basic research, scientists still need baseline monitoring efforts over a long period of time. That way, when there are incidents like the Deepwater Horizon explosion, there will be a ground reference. They talked about how to be effective and efficient in data collection. It may be useful for researchers to have common sources of data to aid in efficiency and cost-effectiveness. The data would need to be properly georeferenced, archived and accessible for various constituencies that need them.

- Physical and Mental Health. It is critical to study the physical and mental health of human communities following the release of so many potentially toxic compounds into the atmosphere, as well as the high levels of stress that plagued so many for so long and the emotional toll of such a destructive event. The research would focus on both immediate response and long-range understanding of the spill and its aftermath.

- Research to Address Short and Long-term Health Effects (Toxicology). This research would look at short- and long-term effects on human health of the oil spill and the mixture of oil and dispersants. Participants discussed how to effectively communicate risks in ways that address concerns that were voiced after the oil spill, particularly since the general public embodies very different levels of understanding and stress. Somehow, researchers have to convey complex issues in ways that promote understanding and reassurance.

- Seafood Safety. This group looked at toxicological effects from and short- and long-term perspective. Participants discussed toxicology, mixtures and the idea that oil combined with dispersants might have a more toxic effect than either on its own. Researchers reported that these issues cut across all aspects of human impacts from the spill. Seafood safety and the perception of safety heavily impacted coastal communities, not only because their diets were heavily reliant on seafood, but because fishing was such a major part of their livelihoods and culture.

Economics, Policy and Decision Support Systems

The Economics and Policy group identified three high-priority areas, all of which are already focus areas in the region and ripe for additional investment.

Market-Based Solutions

Researchers discussed the importance, acutely felt in the Gulf coast region after several major disasters over five years, of having policies in place before a disaster strikes. This would help ensure adequate preparation and allow industry coalitions, instead of government, to make the first attempt at suggesting a course of action. This would allow members to share information and risks, similar to the way that banks joined forces in the nineteenth century to build a mutual insurance system to protect against bank runs.

Researchers further suggested the development of an institutional and legal framework to encourage firms to internalize costs of community impacts through insurance or other market-based mechanisms in the event of a firm or operational failure.

Within this topic, collaboration would be required among researchers with expertise in law, economics, risk management and insurance.

Economic Impact/Valuation Studies

Researchers indicated that economists need help across other disciplines to assess costs that lie outside of market systems. Approaches, they suggested, should be rooted in economics, but shaped by other disciplines, with an objective of determining and verifying how parts of the ecosystem work together.

To accomplish these studies, rapid, predictive economic impact modeling (baseline model) using simulation and analysis capabilities would be required, including:

- Post-event (real-time) data-driven models.
- Regional models (standardized models across the region).
- Improved ecosystem valuation methodology and approaches.

Researchers reported the importance of identifying appropriate indicators of disaster impact that go beyond dollars to other types of economic and quality of life assessments. Such factors could include

- Economic Assessments:
  - Jobs, GDP, income, etc.
  - Health, workforce, crime, education, displacement.
  - Military influence in region.

- Long-term quality of life factors:
  - Cultural elements.
  - Changes in medication use; human health; mental health.
  - Multi-year impacts.

- Social indicators.

According to Plassmann, these indicators may provide important information about how severe a disaster is and, more important, when people consider the disaster to be over. In other words, the oil might not be leaking any more, but people might continue to be affected by the spill for months or even years. How should researchers measure how severely people are affected beyond job security?

Also, there is a need to determine which communities are particularly resilient or vulnerable and which are not. The indicators for measuring resiliency include:

- Household level
- Community/sector level
- Urban vs. rural
- Diversification as means of resiliency to economic stressor
- Examine natural resource dependence
- Implications on non-profits

Collaborating on disaster management planning involves sharing infrastructure and operating costs. The group indicated that it is important to determine the mechanisms or incentives that support shared resources. It would also be beneficial to define the boundaries, and how do people communicate past these boundaries.

Another key area of focus is in public policy. It is vital to understand how regulatory policies (Stafford Act, Jones Act, and National Flood Insurance Program) impede or support response and recovery and how such policies can be revised to serve the needs of a disaster-impacted community.

E. Common Areas for Collaboration across Strands

At the end of the event, the Strands converged in a discussion of areas in which collaboration would be most appropriate. Three shared areas were identified as highest priorities:

a. Research into ocean and coastal environments will require the collaboration of researchers from a host of specialties including physical oceanography, hydrate chemists, particle transport, biogeochemical degradations of oils and dispersed oil, biology (all types), microbiologists, toxicologists, and many other subject areas.

b. Multidisciplinary involvement is urgently needed in modeling across a variety of topic areas. The models must involve physical, chemical, biological, economic, and other discipline-specific principles while also requiring the computer science, statistical and programming expertise to develop, test and operate the model. This area represents real multidisciplinary collaboration and interdependency – it is urgently needed and cannot be accomplished without close partnership across all related disciplines.

c. A variety of disciplines must work together to accurately address computational fluid dynamics, heat/mass transfer, chemistry, meteorology, environmental science and engineering, air quality, computer science, mathematics, physics, physical oceanography and microbiology.

Acknowledging the diverse perspectives supplied by researchers from different disciplines, the groups recommended developing a Gulf of Mexico-specific catalog of experts that would identify multidisciplinary teams and academic institutions, and provide a resource for scientists seeking particular expertise or partnership opportunities.

Closing Remarks

In closing remarks, University of Louisiana at Lafayette Vice President for Research Robert Twilley reminded conference participants of the key objectives for scientific investigation in the current environment. He emphasized that, in the case of the BP oil spill, it is particularly important to break down disciplinary and institutional boundaries and collaborate as much as possible.

Twilley challenged conferees to ask themselves how well higher education has done since scientists initially proposed greater collaboration in the months after hurricanes Katrina and Rita. He encouraged the three partner states – Louisiana, Mississippi and Alabama – to continue to collaborate along three dimensions. He urged them to think offshore to onshore, vertically (in deeper environments) and longitudinally – across the varied topography of the northern Gulf coasts.

He said the three state coasts – which run the gamut from deltaic muds to sandy beaches within a very short distance -- are uniquely equipped to test different hypotheses. The three states probably represent the greatest environmental gradients of any shoreline in the U.S., which would put them in good position to do a study on real estate values and economics from one type of coast to another.

He reminded conferees -- particularly from Louisiana, Mississippi, and Alabama -- to develop research ideas that appeal to broader audiences than just those in the three states. Considering the funding available through NSF, BP's Gulf Research Initiative and other funding programs, research that features the elements of good research are in the best position to be funded. These are programs with 1) strong professional capacities, as established through the Principal Investigators involved in the proposal; 2) good ideas and 3) good facilities that institutions can offer to researchers. At the same time, they have to ensure the highest standards of intellectual credibility, a factor that is especially important when industry dollars are sponsoring research.

Twilley suggested that conferees take the information from the oil spill conference and develop five or six grand questions on which to collaborate regionally. In issuing this challenge, Twilley reminded researchers to keep in mind the scale and scope of the disaster: "This is a system of complex risk and it needs a system of collaborative solutions."

The large attendance at the Conference, combined with extensive opportunities to explore collaborative research both conceptually and related to ongoing and prospective projects, helped launch conferees toward their own interdisciplinary, multi-institutional, multi-state partnerships. Bolstered by information about funding opportunities and federal and private-sector interest in large-scale, high-impact research collaborations, scientists have already begun to explore either expansion of existing projects or establishment of new partnerships to address the most pressing spill-related issues.

Discussions following the Conference revealed the need for more venues like this, to bring diverse research groups together and give them space to discuss their shared interests and possibilities for joint work. This event provided an excellent foundation, but alone is not sufficient to spur the intense work needed to make such partnerships a reality. The announcement, a month following the Conference, of a request for proposals to distribute $500 million in BP funds for spill-related research, provided additional impetus to get these collaborative relationships started. Several meetings have already taken place among research groups interested in submitting collaborative proposals to this competition.

Organizing and conducting the Conference also had the effect of bringing Louisiana, Mississippi and Alabama EPSCoR together to work jointly in an administrative capacity, which build relationships and awareness of each state's resources and strengths. These relationships will undergird work on the EPSCoR RII Track 2 project, just initiated, as well as help to foster additional significant collaborations going forward.

That these relationships were reflected and expanded in the combination of researchers from all three states, as well as nationwide, is another major benefit of the Conference. To begin working collaboratively, researchers must first share their ideas. The Conference allowed them to do just that, and to more diverse audiences than other, discipline-focused events.
The real value of this Conference lay in the awareness and energy it fostered. By reinforcing at every step the importance of collaborative, multidisciplinary research, and providing researchers with the tools to find related research, explore new partnerships, and discover possible funding sources, the Conference lay the foundation for a new generation of highly engaged, deeply committed, and well-prepared researchers to help the region and the nation reach a full understanding of the Deepwater Horizon catastrophe.

V. Next Steps

The Conference concluded, following Twilley's words of encouragement, with renewed enthusiasm among the participants to seek out opportunities for collaboration and partnership across any and all boundaries. In a meeting of the Breakaway facilitators and plenary speakers following the Conference, several essential next steps were identified:

a. Facilitate smaller follow-up meetings and workshops with researchers and research groups interested in pursuing specific collaborative opportunities, particularly related to BP's Gulf Coast Research Initiative.

b. Conference organizers consider hosting a follow-up conference to provide a venue for researchers to join together to explore forming new collaborations relative to oil spill funding opportunities.

c. Make all presentations, posters and other materials offered at the Conference available online; post email addresses and areas of specialty for all attendees for easy reference.

d. Develop an oil spill research wiki or other online interactive resources for researchers to share ideas and plans.

e. Establish a central clearinghouse listing funding opportunities for collaborative oil-spill research.

Poster Presentations

Modeling short term dynamics of marine mammal populations near the BP oil spill site (Gulf of Mexico)

Azmy Ackleh[1], Nabendu Pal[1], and Natalia Sidorovskaya[2]
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Modeling and simulation for water-based pollutants in preventative & consequence management situations – research needs

Mustafa S. Altinakar, Yan Ding, Xiaobo Chao, and Yafei Jia
University of Mississippi/National Center for Computational Hydroscience and Engineering

Autonomous underwater exploration using a swarm of mobile sensor nodes

Paul Bender and Kay Kussman
McNeese State University/Dept. of Mathematics, Computer Science, and Statistics

Three dimensional computational simulation for oil spill and related processes

Xiaobo Chao, Yufei Jia, Mustafa S. Altinakar, Yan Ding, and Tingting Zhu
University of Mississippi/National Center for Computational Hydroscience and Engineering

Studying the immediate and long-term impact of the Gulf oil spill on the biogeochemistry and microbial communities of coastal Louisiana wetlands

Robert L. Cook[1], Thomas S. Bianchi[2], E. Michael Perdue[3], Paulina Kolic[1], Gary King[4], Nelson Green[3], Yaoling Zhang[3], Richard Smith[2], Loice Ojwang[1], Caroline Schneider[1], Alexander S. Kolker[5], and Alex Ameen[5]
[1]Louisiana State University/Department of Chemistry, Baton Rouge, LA
[2]Texas A&M University/Department of Oceanography, College Station, TX
[3]Georgia Institute of Technology/School of Earth and Atmospheric Sciences, Atlanta, GA
[4]Louisiana State University/Department of Biological Sciences, Baton Rouge, LA
[5]Louisiana Universities Marine Consortium (LUMCON), Cocodrie, LA

Effects of the Deepwater Horizon oil spill on growth and mortality of brown shrimp in affected Louisiana estuary

Kim de Mutsert and Joris L. van der Ham
Louisiana State University/Department of Oceanography and Coastal Sciences

Simulations of coastal inundation, erosion, and water quality due to hazardous storms and hurricanes using integrated computational model
Yan Ding, Mustafa S. Altinakar, Xiaobo Chao, Yafei Jia and Sam S. Y. Wang
University of Mississippi/National Center for Computational Hydroscience and Engineering

Trace elements in BP crude oil
Daniel Duarte[1], Edward Overton[2], Amitava Roy[1], Gregory Merchan[3], and Henning Lichtenberg[3]
[1]University of New Orleans/Department of Physics
[2]Louisiana State University/Department of Environmental Studies
[3]Louisiana State University/J. Bennett Johnston, Sr., Center for Advanced Microstructures and Devices

Directional and continuous liquid drop collection for Gulf oil spill cleanup
Nicholas X. Fang, Evelyn N. Wang, and Cullen R. Buie
Massachusetts Institute of Technology

A Survey of Tabanid and Ceratopogonid populations along coastal Louisiana to establish baseline data for measuring the impact of the BP oil spill on tidal marsh communities (NSF-RAPID)
Lane Foil and Claudia Husseneder
LSU Agricultural Center/Department of Entomology

RAPID: water-based, natural polymer surfactants: Implications for Deepwater Horizon oil spill dispersions
Dawn Fox, Ryan Toomey, and Norma Alcantar
University of South Florida/Department of Chemical and Biomedical Engineering

Will diversity of macroalgae and macrocrustaceans on deep banks in the northern Gulf of Mexico be impacted by the Deepwater Horizon oil spill?
Suzanne Fredericq and Darryl L. Felder
University of Louisiana at Lafayette/Department of Biology, Lafayette, LA

Impact of the Deepwater Horizon oil spill on Blue Crab recruitment in the northcentral Gulf of Mexico.
Richard S. Fulford, Harriet Perry, Robert Griffitt, Dyan Gibson, and Darcie Graham
University of Southern Mississippi/Department of Coastal Sciences, Center for Fisheries Research and Development, Gulf Coast Research Laboratory, Ocean Springs, MS

RAPID Project: A comparative study of community impacts of the 2010 BP Oil Spill
Duane A. Gill, J. Steven Picou, and Liesel A. Ritchie
Oklahoma State University, University of South Alabama, and University of Colorado

Effects of the Deepwater Horizon oil spill on blue crab larvae
Erin Grey and Caz Taylor
Tulane University/Department of Ecology and Evolutionary Biology

Effects of the Deepwater Horizon oil spill on migratory shorebirds
Jessica Henkel, Caz Taylor, Bryan Sigel, and Thomas Sherry
Tulane University/Department of Ecology and Evolutionary Biology

Hematotoxicity of environmental pollutants in rats: munitions environmental degradate MNX and Louisiana Sweet Crude Oil
Sridhar Jaligama[1], Khalid A. El Sayed[2], and Sharon A. Meyer[1]
[1]University of Louisiana at Monroe/Department of Toxicology
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Ecosystem resilience of coastal marshes following a massive oiling event

Alexander S. Kolker[1], Alex D. Ameen[1], Tom Bianchi[2], Robert Cook[1], Pauline Kolic[3], Nelson Green[4], and Yaoling Zhang[4]
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[2]Texas A&M University
[3]Louisiana State University
[4]Georgia Tech University

Oyster responses to the deepwater horizon oil spill across coastal Louisiana: examining oyster health and hydrocarbon bio-accumulation
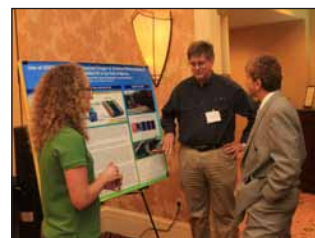
Jerome La Peyre and Sandra Casas
LSU Agricultural Center/Department of Veterinary Science, Baton Rouge, LA

Metal oxide nanogrids as photocatalysts for the decomposition of oil in water

Jusang Lee and P. I. Gouma
State University of New York Stony Brook/Department of Materials Sciences and Engineering

Use of SDOX® to provide dissolved oxygen to enhance bioremediation of near-shore spilled oil in the Gulf of Mexico

Larry Linquist, Scott Osborn, Ph.D., Grace Richardson, and Anna McCain
BlueInGreen, LLC, Fayetteville, AR

The impact of Deepwater Horizon oil spill on organic composition of the sea surface in the northern Gulf of Mexico

Zhanfei Liu[1], Jiqing Liu[1], Wayne Gardner[1], and Nathaniel E. Ostrom[2]
[1]Univ. of Texas at Austin/Marine Science Institute, Port Aransas, TX
[2]Michigan State University/Department of Zoology

NSF RAPID: Collaborative Research: Autonomous control and sensing algorithms for surveying the impacts of oil spills on coastal environments

Michael Malisoff[1] and Fumin Zhang[2]
[1]Louisiana State University
[2]George Tech University

Improving communication of oil spill research

Sunshine Menezes[1], Christopher D'Elia[2], Robert Goidel[3], Lisa K. Lundy[3], and Nancy Rabalais[4]
[1]University of Rhode Island Graduate School of Oceanography/Metcalf Institute for Marine & Environmental Reporting
[2]Louisiana State University/School of the Coast and Environment
[3]Louisiana State University/Manship School of Mass Communication
[4]Louisiana Universities Marine Consortium (LUMCON)

Quantifying the impact of the Gulf of Mexico oil spill on the health and productivity of Louisiana and Mississippi salt marshes: preliminary results

Deepak Mishra[1], Hyun Jung Cho[2], Shuvankar Ghosh[1], Nicholas Jackson[2], Philemon Kirui[2], and Chris Downs[1]
[1]Mississippi State University/Department of Geosciences and Northern Gulf Institute
[2]Jackson State University/Department of Biology
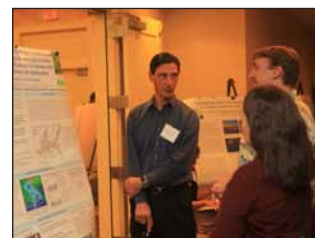
Nursery role of fringing salt marshes and submerged aquatic vegetation in coastal Alabama

Ryan M. Moody[1], Sara Kerner1, Lindsay Biermann[1], Just Cebrian[1,2] and Kenneth Heck, Jr.[1,2]
[1]Dauphin Island Sea Lab, Dauphin Island, AL
[2]University of South Alabama/Department of Marine Sciences, Mobile, AL

Natural-based absorbent for crude oil spill cleanup
Emeka Nonogbu, Uzi Mann, and Karlene A. Hoo
Texas Tech University/Department of Chemical
Engineering

Methods involving inorganic catalysis in the mitigation of harmful algal blooms and oil spills
Joonseok Oh, Keith T. Hollis, and Mark T. Hamann
University of Mississippi/Department of
Pharmacognosy and Chemistry & Biochemistry

Oxygen metabolism in the northern Gulf of Mexico region in the vicinity of the Deepwater Horizon oil spill
Nathaniel E. Ostrom[1], Hasand Ghandi[1], Ben Kamphuis[1], Sam DeCamp[1], Zhanfei Liu[2], and Wayne Gardner[2]
[1]Michigan State University/Department of Zoology and Environmental Science and Policy Program
[2]University of Texas-Austin/Marine Science Institute

Initial analyses of white blood cell distribution in alligator gar (Atractosteus spatula) and Gulf killifish (Fundulus grandis) from oil-exposed areas near Terrebonne Bay, LA
Lora Petrie-Hanson[1], Claudia Hohn[1], Peter Allen[2], and Stephen Pruett[1]
[1]Mississippi State University/Department of Basic Sciences
[2]Mississippi State University/Department of Wildlife and Fisheries

Coastal Alabama microbial responses to the Deepwater Horizon oil spill
Suja Rajan[1], Jessica Powell[1], Robert J. Martinez[1], Melanie J. Beazley[1], Yvette Piceno[2], Gary L. Anderson[2], Terry C. Hazen[2], Patricia Sobecky (co-PI)[1], and Behzad Mortazavi[3]
[1]University of Alabama/Department of Biological Sciences, Tuscaloosa, AL
[2]Lawrence Berkeley National Laboratory, Berkeley, CA
[3]Daupin Island Seat Lab, Dauphin Island, AL

Investigating the effects of the Deepwater Horizon oil spill on Louisiana's coastal salt marsh endemic reptiles
Corinne Richards-Zawacki and Danielle Drabeck
Tulane University/Center for Bioenvironmental Research

Effects of oiling and hydrologic remediation on baldcypress swamp elevation and ecosystem processes: a RAPID project in response to the Deepwater Horizon oil spill Incident
Brian J. Roberts[1] and Beth Middleton[2]
[1]Louisiana Universities Marine Consortium (LUMCON)
[2]USGS National Wetlands Research Center, Lafayette, LA

Ongoing "RAPID" oil spill research
Alan M. Shiller[1], V. Asper[1], C. Brunner[1], L. Guo[1], D. Joung[1], S. Joye[2], S. Lohrenz[1], P. Louchouarn[3], T. Wade[3], K. Yeager[1]
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[2]University of Georgia
[3]Texas A&M University, Galveston
[4]Texas A&M University, GERG

Affect of petroleum deposit geometry on biodegradation potential and long-term persistence
Gargi Singh, Amy Pruden, and Mark Widdowson
Virginia Tech/Department of Civil and Environmental Engineering, Blacksburg, VA

Integrated detection and oil sampling array in Louisiana estuaries
Geoff Sinclair, Nancy Rabalais, Maria Saurez, Jessica Czubakowski, Bruce Benoit, and Holly Hebert
Louisiana Universities Marine Consortium (LUMCON)

Tidal flushing through ISIS oil exclusion cylinders
Eric Sparks[1,2], Amy Langston[1], Ryan M. Moody[1], Just Cebrian[1,2] and Mark Woodrey[3,4]
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Three-dimensional oil spill detection with the techniques of eddy current flaw detection
Jack Stalnaker
University of Louisiana at Lafayette

Photochemical transformation of surface oil from the Deepwater Horizon spill
Matthew Tarr, Sarah M. King, Peter Leaf[1], Aisa Carter[2], Anastasia Whitney[2], and Elizabeth Balga[3]
University of New Orleans/Department of Chemistry and Advanced Materials Research Institute
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Community-level stressors, northern Gulf of Mexico
R. E. Turner, L. M. Hooper-Bui, L. Anderson, R. DeLaune, A. S. Engel, B. Fry, E. Overton, B. Sen Gupta, S. Warny, and J White
Louisiana State University

Deepwater Horizon oil exposure effects on marsh fishes in at-risk habitats: Integrated laboratory and field studies
Andrew Whitehead, Charlotte Bodinier, Nan Walker, Chet Pilley, Benjamin Dubansky, and Fernando Galvez
Louisiana State University/Biological Sciences

The impact of the Gulf Oil crisis on Whales: establishing a baseline of toxicology data in the Gulf
John Pierce Wise, Sr.[1,2,3,4], Iain Kerr[2,4], John Pierce Wise, Jr.[1,2,4], Catherine F. Wise[1,2,4], James Wise[1,2,4], Sandra S. Wise[1,2,3,4], Christy Gianios, Jr.[1,2,4], Matthew Braun[1,2,4], Ryan Duffy[1,2,4], Rob Leighton[1,2,4], Julieta Martino[1,2,4], Tania Li Chen[1,2,4], Carolyne LaCerte[1,2,4], Kellie Joyce[1,2,4], and Greg Wray[1]
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[2]Maine Center for Toxicology and Molecular Epidemiology
[3]University of Southern Main/Department of Applied Medical Sciences
[4]Ocean Alliance, Lincoln, MA

Photosynthesis at saltmarshes impacted by Deepwater Horizon oil spill – what it means in resilience of saltmarsh habitat
Wei Wu, Patrick Biber, Jennifer Frey, and Lina Fu
University of Southern Mississippi/Department of Coastal Sciences, Gulf Coast Research Laboratory, Ocean Springs, MS

NSF RAPID and NGI-BP: Response of benthic communities and sedimentary dynamics to hydrocarbon exposure in intertidal, neritic, and bathyal ecosystems of the northern Gulf of Mexico
K. Yeager[1], C. Brunner[1], L. Guo[1], P. Louchouarn[2], and K. Briggs[3]
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[2]Texas A&M University, Galveston
[3]U.S. Naval Research Laboratory

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Yuan, Lu	Southeastern Louisiana University
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Zou, Enmin	Nicholls State University
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Conference Agenda

Sunday, October 31, 2010

3:00-6:00   Registration & Poster Set-up

Monday, November 1, 2010

7:00-8:00   Registration & Poster Set-up; Continental Breakfast

8:00-8:45   **Plenary I**
Welcome & Introduction: Michael Khonsari
The Role and importance of Interdisciplinary Research: Thomas Russell, NSF Office of Integrative Activities

8:45-10:30   **Plenary II**
Respective researchers who have been involved in the aftermath of and response to the oil spill offer perspectives on ongoing and prospective collaborative opportunities. These wide-ranging presentations will provide context and impetus for breakaway Strand discussions to take place throughout the remainder of the Conference. Michael Khonsari, Moderator; Chris D'Elia (LSU); LuAnn White (Tulane); Vijay John (Tulane); Alice Clark (U Miss); Steve Mathies (LA Office of Coastal Protection & Restoration); Nancy Rabalais (LUMCON); Stephen Sempier (MS/AL Sea Grant)

10:30-10:45   Break

10:45-12:45 **Breakaway Strands**
Identification and Discussion of Collaborative Research Topics (1)
Following brief introductions from a Strand facilitator, each panelist will provide a 20-minute overview of collaborative research in the topical area from his/her perspective. A discussion will follow. Collectively these overviews and discussion will highlight collaborative research and priorities for partnerships within the research Strand.

Engineering Aspects and the Transport and Fate of Spilled Oil
Facilitators: Ed Overton, LSU; Lou Thibodeaux, LSU; Doug Blakemore, Chevron
Panel: Bhaskar Kura, UNO; Ning Zhang, McNeese; Balaji Ramachandran, Nicholls; Julius Langlinais, LSU

Coastal and Ocean Environments: Damage, Remediation and Recovery
Facilitators: Denise Reed, UNO; Andy Nyman, LSU; Steve Lohrenz, USM
Panel: Mark Zappi, ULL; John Pardue, LSU; Raj Boopathy, Nicholls; Vijay John, Tulane; Prabhakar Clement, Auburn; Russ Beard, Stennis, National Coastal Data Development Center

Human Communities: Disaster Management, Sustainability and Health
Facilitators: Jay Grimes, USM; LuAnn White, Tulane
Panel: LuAnn White, Tulane; Kamran Abdollahi, SUBR; Udaysankar Nair, UAH; Jonathan Ward, UTMB

Economics, Policy and Decision Support Systems
Facilitators: Sally Sleeper, RAND; Florenz Plassmann, Binghamton U
Panel: Joseph Mason, LSU; Ramesh Kolluru, ULL; Don Epley, USA; Mitchell Crusto, Loyola; Robert Collins, Dillard

12:45 - 1:45 Lunch with Speaker: John Hofmeister, Founder and CEO, Citizens for Affordable Energy and former CEO of Shell Oil. Moderator: Robert Twilley, ULL

1:45 - 3:00 **Breakaway Strands**
Identification and Discussion of Collaborative Research Topics (2)
Topic 2 will continue and further develop the theme of Topic 1. A new panel will provide 10-minute presentations followed by discussion.

Engineering Aspects and the Transport and Fate of Spilled Oil
Panel: Erez Allouche, LA Tech; Derek Williamson, UA; Ralph Portier, LSU; Lou Thibodeaux, LSU

Coastal and Ocean Environments: Damage, Remediation and Recovery
Panel: Mike Materne, LSU Ag Center; Caz Taylor, Tulane; Gary King, LSU; Andy Nyman, LSU

Human Communities: Disaster Management, Sustainability and Health
Panel: Paul Coreil, LSU Ag Center; Jeffrey Wickcliffe, Tulane; Marilyn Kilgen, Nicholls; Matt Lee, LSU; Janice Chambers, MSU

Economics, Policy and Decision Support Systems
Panel: Geoffrey Parker, Tulane; Lee Yao, Loyola; Mikel Petty, UAH; John Kiefer, UNO; Dek Terrell, LSU

3:00 - 3:30   **Priority Collaborative Research Topics Identified**
Led by the facilitators, Strand participants will list the Priority Collaborative Research Topics to be discussed in the succeeding session.

3:30 - 3:45   Break

3:45 - 4:30   **Priority Collaborative Research Topics Discussion**
Based on the Priority Collaborative Research Topics Identified, Strand participants will break into small groups to explore partnership opportunities.

4:30 - 5:30   **Collaborative Research Summary**
Each subgroup will produce a one-page Collaborative Research Summary for submittal by the end of the day to the Strand facilitator(s).

6:00 - 8:00   **Poster Session**

Tuesday, November 2, 2010

7:00 - 8:00   Registration; Continental Breakfast

8:00 - 8:30   **Plenary III**
Collaborative Research in NSF EPSCoR: Uma Venkateswaran, Program Director, NSF EPSCoR
Moderator: Michael Khonsari, LA EPSCoR

8:30 - 9:30   **Intra-Strand Priority Collaborative Research Topics: Summaries and Discussion**
For each Strand, facilitators and selected panelists will explain Collaborative Research Summaries from Day 1, analyzing opportunities and leading discussions of next steps.

9:30 - 10:45   **Intra-Strand Funding Opportunities**
For each Strand, NSF program officers will make presentations and lead discussions of federal funding opportunities related to collaborative research in the topical areas.

Engineering Aspects and the Transport and Fate of Spilled Oil Eduardo Misawa, CMMI/ENG

Coastal and Ocean Environments: Damage, Remediation and Recovery Donald Rice, OCE/GEO

Human Communities: Disaster Management, Sustainability& Health Tyrone Mitchell, CHE/MPS

Economics, Policy and Decision Support Systems Robert O'Connor, SES/SBE

10:45 - 11:00 Break

11:00 - 12:15 **Plenary IV: All-Strand Summary Reports**
For each Strand, facilitators and selected panelists will provide 15-minute summaries which focus on priorities for collaborative research and partnerships.

12:15 - 12:30 **Concluding Observations**
Robert Twilley, ULL