LEVERAGING SCIENCE AND ACADEMIC ENGAGEMENT DURING INCIDENTS

Coastal Response Research Center

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LEVERAGING SCIENCE AND ACADEMIC ENGAGEMENT DURING INCIDENTS

Spill Literature 1970-2018
Annual Scientific Journal Articles with “oil spill” in title via Web of Science

June 25 & 26, 2019
Bay Conference
Center Tiburon, CA

This workshop is a partnership between NOAA’s Office of Response and Restoration and the Coastal Response Research Center.
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## 1. Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AC</td>
<td>Area Committee</td>
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<tr>
<td>AOSTS</td>
<td>Alaska Oil Spill Technology Symposium</td>
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<tr>
<td>CARTHE</td>
<td>Consortium for Advanced Research on Transport of Hydrocarbons in the Environment</td>
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<tr>
<td>CESU</td>
<td>Cooperative Ecosystems Studies Unit</td>
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<td>CRRC</td>
<td>Coastal Response Research Center</td>
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<td>DFO</td>
<td>Department of Fisheries and Oceans (Canada)</td>
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<td>DWH</td>
<td>Deepwater Horizon Oil Spill</td>
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<td>ERD</td>
<td>Emergency Response Division (NOAA)</td>
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<tr>
<td>FIO</td>
<td>Florida Institute of Oceanography</td>
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<tr>
<td>FOSC</td>
<td>Federal On-Scene Coordinator</td>
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<td>GOMRI</td>
<td>Gulf of Mexico Research Initiative</td>
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<td>GOMURC</td>
<td>Gulf of Mexico Research Collaborative</td>
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<tr>
<td>HQP</td>
<td>Highly Qualified Personnel</td>
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<tr>
<td>ICCOPR</td>
<td>Interagency Coordinating Committee on Oil Pollution Research</td>
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<td>ICS</td>
<td>Incident Command System</td>
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<td>IMH</td>
<td>Incident Management Handbook</td>
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<td>MBO</td>
<td>Management Based Upon Objectives</td>
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<td>MER</td>
<td>Marine Environmental Response</td>
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<td>NCP</td>
<td>National Contingency Plan</td>
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<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
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<td>NRC</td>
<td>National Response Center</td>
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<td>NRS</td>
<td>National Response System</td>
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<td>NRT</td>
<td>National Response Team</td>
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<td>OR&amp;R</td>
<td>Office of Response and Restoration (NOAA)</td>
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<td>OSPR</td>
<td>Office of Spill Prevention and Response (California)</td>
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<td>OSRL</td>
<td>Oil Spill Response Limited</td>
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<tr>
<td>RIDEM</td>
<td>Rhode Island Department of Environmental Management</td>
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<td>RP</td>
<td>Responsible Party</td>
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<td>RRT</td>
<td>Regional Response Team</td>
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<td>SOSE</td>
<td>State On-Scene Coordinator</td>
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<tr>
<td>SSC</td>
<td>Scientific Support Coordinator</td>
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<tr>
<td>SSEER</td>
<td>Scientific Support for Environmental Emergency Response</td>
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<tr>
<td>SUS</td>
<td>Florida State University System</td>
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<td>UC</td>
<td>Unified Command</td>
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<td>UNH</td>
<td>University of New Hampshire</td>
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<td>URI</td>
<td>University of Rhode Island</td>
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<tr>
<td>USCG</td>
<td>United States Coast Guard</td>
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<tr>
<td>USEPA</td>
<td>United States Environmental Protection Agency</td>
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II. Acknowledgements

This workshop and report were supported by the National Oceanic and Atmospheric Administration’s Office of Response and Restoration (OR&R) and the Coastal Response Research Center (CRRC). The content for the workshop was developed in cooperation with NOAA OR&R and the following Organizing Committee members:

- Nancy Kinner, Coastal Response Research Center (CRRC), University of New Hampshire
- Scott Lundgren, NOAA Office of Response and Restoration (OR&R), Emergency Response Division
- Yvonne Addassi, California Office of Spill Prevention and Response (CA OSPR)
- Chris Barker, NOAA Office of Response and Restoration (OR&R), Emergency Response Division
- Carl Brown, Environment Canada, Department of Fisheries and Oceans (DFO)
- Carl Childs, NOAA Office of Response and Restoration (OR&R), Emergency Response Division
- Lisa DiPinto, NOAA Office of Response and Restoration (OR&R)
- Ken Lee, Department of Fisheries and Oceans Canada
- Steve Lehmann, NOAA Office of Response and Restoration (OR&R), Emergency Response Division
- Paul Schuler, Oil Spill Response Limited (OSRL)
- Steve Sempier, MS/AL Sea Grant
- Kevin Sligh, United States Coast Guard (USCG), Marine Environmental Response (MER)
- Ann Hayward Walker, SEA Consulting
- Chuck Wilson, Gulf of Mexico Research Initiative (GOMRI)

This workshop was facilitated by Dr. Nancy Kinner from the Coastal Response Research Center (CRRC; www.crrc.unh.edu). CRRC is known globally as an independent intermediary that brings all stakeholders to the table to identify, develop, and implement viable and trusted solutions to complex problems related to environmental disasters. CRRC has conducted 70+ workshops that bring together practitioners, researchers, and scientists of diverse backgrounds (e.g., industry, academia, government, NGOs).

We would like to thank each of the presenters for their participation in the workshop:

- Peter Gautier, USCG, Eleventh Coast Guard District
- Joshua Nicholas, CA OSPR
- Scott Lundgren, NOAA OR&R
- David Palandro, ExxonMobil
- Antonietta Quigg, Texas A&M
- Steve Murawski, University of Southern Florida (USF)
- Brian Haus, University of Miami
- Jordan Stout, NOAA OR&R ERD
- Ann Hayward Walker, SEA Consulting
- Monica Wilson, Sea Grant
- Yvonne Addassi, CA OSPR
- Peter August, University of Rhode Island (URI)
- Kristin Ludwig, U.S. Geological Survey (USGS)
- Bruce Hollebone, Environment and Climate Change Canada (ECCC)
- David Hollander, University of Southern Florida (USF)
- Jessica Garron, University of Alaska, Fairbanks (UAF)
A special thank you to (1) the Breakout Group Leads: Ben Shorr, Monica Wilson, Steve Buschang, and Yvonne Addassi; and (2) Melissa Gloekler, Kathy Mandsager, Quinn Wilkins and Rachel Fabian for their note-taking during the workshop.

We greatly appreciate the Romberg Tiburon Bay Conference Center, San Francisco State University for their hospitality and providing a beautiful meeting venue.

III. Introduction

On June 25th-26th, 2019, CRRC and NOAA OR&R co-sponsored a workshop at the San Francisco State University, Estuary & Ocean Science Center’s Romberg Tiburon Bay Conference Center, in Tiburon CA. The workshop titled “Leveraging Science and Academic Engagement During Incidents”, focused on the integration of academic resources and expertise into a conventional oil spill response.

The agenda for the workshop can be found in Appendix A. Fifty-six participants (Appendix B) represented federal, state and local agencies, academia, and industry.

The goal of this workshop was to provide focused discussion regarding lessons learned from academic engagement during oil spill response, with participants from industry, government and academia. CRRC sponsored workshops are conducted to promote interaction between all relevant stakeholders, for improved mitigation of future oil spills.

Workshop Objectives:

1. Develop best practices for advancing NOAA OR&R’s interaction with the academic community during response, enabled by relationships built during the preparedness phase.
2. Build relationships and foster understanding of the roles and responsibilities of the oil spill response/assessment scientific community and the academic community, including an understanding of each other’s strengths and limitations.
3. Develop mechanisms that facilitate access for academic research during oil spills.
4. Develop implementation recommendations and metrics for evaluating success.

The workshop consisted of an initial overview of the National Contingency Plan and Incident Command System for oil spills, a plenary panel providing an overview of spill response from multiple perspectives, case studies of academic engagement during spills, plenary presentations providing an overview of current academic engagement models, and three breakout group discussions. The plenary panel was comprised of five participants, each representing a major stakeholder during spill response, ranging from academic administration to the Federal On-Scene Coordinator (FOSC). An overview of this plenary panel can be found in Section V of the report, detailing the presentations from each of the panelists. Three case studies were presented to the plenary, detailing the degree and method of academic engagement in various contemporary oil spills (See Section VI). Plenary presentations consisted of eight different models currently used to leverage science and academic engagement during oil spills (See Section VII). Slides from each of the plenary presentations can be found in Appendix C.
Participants were arranged into four breakout groups (Groups A-D; Appendix D), and remained in these same groups for all three of the breakout group discussions. Breakout groups were tasked with: (1) reconciling responder imperatives with academic modes of operation, (2) identifying the current best practices or desired practices to address, (3) identifying mechanisms for facilitating academic site access to oil spills, and (4) identifying the path forward and implementation strategies of the proposed desired practices. The notes from the discussions can be found in Appendix E.

IV. National Contingency Plan and Incident Management for Spill Response Overview

Captain Mark Shepard, Commander of the National Strike Force, USCG, presented an overview of his experiences with the National Contingency Plan (NCP) and incident management. Captain Shepard explained the primary laws used to manage a response: the Clean Water Act (CWA), the Federal Water Pollution Act (FWPCA), the Oil Pollution Control Act of 1990 (OPA 90) and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). The National Contingency Plan (NCP) is a regulation codified in 40 CFR 300, requiring a general national response posture. The NCP established the National Response System (NRS), comprised of the National Response Team (NRT), National Response Center (NRC), 13 Regional Response Teams (RRTs), local Area Committees (ACs), state, local tribal and territorial governments, and regulated industries that may be responsible parties (RP). During spills where the oil travels across national borders, a Joint Response Teams (JRT) with neighboring countries is activated. The response priorities of 40 CFR 300.317 are: the safety of human life, stabilization of the situation including protection of property, response efforts that use all necessary removal tactics to effectively minimize adverse impacts, and concurrent activation of all applicable parts of the national response strategy. This framework enables response, with the goal of minimizing the adverse impacts and consequences of the incident, involving all relevant parties, while maximizing public confidence and stakeholder objectives. The operational framework for response is the Incident Command System (ICS), a tool for organizing, planning, leading and controlling response operations. This framework is based upon management by objectives (MBO) and the USCG Incident Management Handbook (IMH). One of the key components of ICS is a Unified Command (UC), consisting of the federal, state and RP on scene coordinators (FOSC, SOSC, RIPC, respectively). This results in one voice representing all stakeholders. With UC, no party gives up authority or jurisdiction, making the response a more powerful effort. The organization of this response framework can be seen in Appendix F, detailing a flow chart of response.

V. Plenary Panel: Overview of Spill Response

This section provides summaries of the presentations given by the plenary panelists on the topic of spill response. This plenary panel provided an overview of spill response, with five panelists representing various stakeholders. Each panelist discussed the roles, responsibilities, capabilities and capacity of their
represented position. After the panelists’ presentations, there was a plenary discussion as well as questions and comments.

**Rear Admiral Peter Gautier, USCG Eleventh Coast Guard District Commander**, shared his experience as an FOSC during response. The FOSC is the executive agent who executes the objectives of the national, regional and area committee contingency plans. The FOSC coordinates with the RP, and federal, state and local entities during a response. The FOSC strives to ensure the safety of responders and the impacted communities, while stabilizing and securing the source of pollution, and protecting environmentally sensitive areas. The FOSC uses all tools provided in the NCP, creating a unity of effort on-scene. Science is a major consideration of the FOSC. There is a great emphasis on weather forecasts and contaminant fate projections, commonly provided by NOAA and other scientists. Often, the FOSC must rely upon operational science to meet objectives during a spill response, especially during unique spill situations. When coordinating with academics during a response, the FOSC understands that they may want to conduct independent experiments, but needs to know the locations of this work for site-safety considerations. The FOSC also requests that academics share information gained with the UC before releasing it to the public or press. RADM Gautier stressed that scientists and responders can work together during an event if there is transparency and safety precautions, allowing both parties to meet their objectives.

**Lieutenant Joshua Nicholas, CA OSPR**, shared his experience as a State On-Scene Coordinator (SOSC) during response. He explained that an SOSC enables an organized, and coordinated effort at the state level to help bolster spill response. In California, the SOSC operates in marine and non-marine zones, allowing a perspective that crosses bioregions, waterways, elevations and partnerships. California has 163,000 square miles of land, 189,000 miles of rivers, and 327,000 miles of coastline with a large number of local governments and tribal partners. LT Nicholas has worked frequently with the USCG and USEPA. He noted that a California spill response, has a high level of-local involvement and a national audience. This often comes with media attention and politics that can serve as distractions during a response. LT Nicholas advocated developing science partnerships and exploring new technologies as part of pre-spill preparedness, to avoid challenges that may arise when building relationships during a response. It is important for partnerships to have been established with Area Planning Committees (ACs) and priorities shared before a spill to have a beneficial response. State and federal partners must bring forward concerns early on to local partners to improve response.

**Scott Lundgren, NOAA OR&R Chief of the Emergency Response Division (ERD)**, discussed the range of roles OR&R plays with respect to science. OR&R is charged with protecting and restoring coastal resources, as authorized under the CWA, CERCLA and OPA 90. OR&R’s three primary roles during response are: providing scientific support to the USCG to aid in response, and assessing damages to natural/trust resources and restoring them to their previous state, but for the spill. OR&R personnel are involved in ~200 cases per year where they provide support to the FOSC regarding fate, transport, chemistry, sensitive natural resources, and shoreline assessment. OR&R staff also participate in ACs, RRTs and the NRT as well as workshops and delivering training. OR&R answers five primary questions:
what happened?, what chemicals or oil spilled?, where is it going?, what is vulnerable?, and what can be done to best mitigate the impact?. OR&R coordinates with other natural resource trustees, and several interdisciplinary partners to bolster a response effort through the establishment of networks as part of preparedness. Lundgren highlighted the $2 billion in new scientific work following Deepwater Horizon, the resulting growth in the oil spill scientific community, and the role for NOAA in this domain under the NCP. He stressed that we need to be prepared for the worst case discharges and events, and that requires input and assistance from academic partners.

David Palandro, ExxonMobil, shared his experiences as a representative of a potential responsible party (RP) during a response. Palandro has experience in various sides of the industry, working as a senior aquatic and marine adviser, senior planning chief for response, and as the Florida SOSC during the Deepwater Horizon spill (DWH). He explained that oil and gas companies all have internal industry-response teams/resources prepared for spill response. These companies typically have roles within all parts of response including command posts, field roles and operations, and source control. These companies work closely with NOAA and USCG during response, with the same goal as their federal partners, to ensure the safety of responders as well as minimizing damage to the environment. Palandro polled the academics in the audience, asking if they are Incident command System (ICS) 200 and 300 level qualified. The lack of qualification highlighted the need for training so that academics can be involved in response. Palandro stressed the importance of building relationships prior to a response, explaining that if the RP does not have pre-existing connections with an expert prior to a response, they likely will not get a request to help. Palandro also stressed the importance of taking part in local AC meetings to bolster networks and gain valuable information before an event.

Antoinetta Quigg, Texas A&M University, discussed the point of view of a professor and university administrator during a response. Quigg explained that academics have three primary roles: teaching, research and service. A professor’s biggest challenges during a response are that oil spills are not conveniently timed to accommodate an academic schedule, and that he/she must balance the three distinct roles. Academia needs a group of people who are: trained in response, can collect samples, know the response vernacular, and have the ability to mobilize quickly. Academics often want to help, but either do not have the resources, or are not allowed on-site by the UC because of safety concerns or lack of necessary training. Relationships are crucial during response, and they must be established with responders before an event. Unlike professors, academic administrators are often part of incident command teams, albeit for different types of response (e.g., school shootings) and understand what it entails to be a part of incident command. The biggest challenge to administrators during response is to manage too many people attempting to volunteer during an incident. Many students are eager to help the response effort, but lack the proper preparation, safety equipment, and training. Hence, the administrator’s job is frequently focused on safety concerns of students, when they just want to get their research accomplished. Quigg hopes responders can keep an open mind with respect to academicians, realizing they do not train for responses all of the time; it is only a small part of what they do. She stressed the building of networks among academics, agency staff, and industry scientists before events, even when the funding is limited. The establishment of these networks will help the
effectiveness of response, as it is not a question of if another spill will occur, but when the next major spill will occur and academics will want to be engaged.

VI. Case Studies of Academic Engagement During Spills

Three case studies of academic engagement during oil spill response were presented to the plenary: DWH, Hercules, and Refugio including background on the event, mechanisms used to engage academics in the response and the roles academics played. The following section provides an overview of the presentations and subsequent discussion.

Case 1: DWH

Steve Murawski, University of South Florida shared his perspective on the DWH spill. He explained that academics were embedded in a number of response activities such as estimated flow rates of oil from the wellhead, well control, plume dynamics, and plume tracking. They provided advice on many technical issues. Academics were contracted for specific tasks in support of the National Incident Command and conducted independent data collection through various funding mechanisms (e.g., National Science Foundation RAPID grants).

Academic roles in injury assessment and oil spill preparedness have been evolving since the DWH spill and many lessons have been learned. He also noted that the Interagency Coordinating Committee on Oil Pollution Research (ICCOPR) has subsequently divided the spill-related research into four categories (Appendix G): prevention, preparedness, response and injury assessment. Through academic and responder coordination, research projects can be implemented as part of preparedness, rather than waiting for response. For example, he suggested that siting an oil production facility is extremely important in spill prevention and proper response, and could benefit from academic input on the best possible locations for drilling and the safest way to accomplish the project. During DWH, there was considerable input from the academic community regarding response and impacts, yet no formal communication mechanisms existed. The Gulf of Mexico University Research Collaborative (GOMURC), a multi-state university-based consortium, was created in the wake of the DWH, with the mission of collaboration to promote scientific knowledge, workforce development, and improved understanding of natural resource management decisions at state, regional, national and international levels. Academics have also been heavily involved in the Natural Resource Damage Assessment (NRDA) and some restoration projects.

Overall, the biggest lesson learned from DWH is that academics have an important role to play in consequential national emergencies because of their broad interdisciplinary expertise. If left to their own devices, academics can make mischief in a response without coordination with the FOSC. In order for these partnerships to be useful during response, they must be developed before a response occurs and exercised frequently.

After Murawski’s presentation, there was discussion of the liability and safety concerns when academics are in a response zone. A primary concern for academic researchers is the lack of access to the spill site
and surrounding environment because the UC is concerned about liability and safety. During the Refugio spill, a basic research access application was created that could be useful after refining and/or adding other questions. If there is a spill, a university’s office of research should be briefed on what its academic researchers can expect with respect to participation in the response or conducting research in the impacted area. General coordination between all parties needs to be bolstered, improving research access and ensuring unhindered response operations.

Case 2: CARTHE Consortium – Hercules Incident

Brian Haus, University of Miami, presented a case study on the Gulf of Mexico Research Initiative’s (GOMRI) CARTHE Consortium participation in the Hercules Incident. The Consortium for Advanced Research on Transport of Hydrocarbon in the Environment’s (CARTHE) is dedicated to predicting the fate of oil released into the environment to help inform and guide response teams, thereby protecting and minimizing damage to human health, the economy and environment. CARTHE focuses primarily on large scale drifter releases, with large air-sea expeditions collecting multi-sensor data over the same ocean patch, to better understand sub-mesoscale transport in the ocean’s surface waters. These drifter releases answer the three key questions: where the spilled hydrocarbons will go, how fast, and how much. Since the beginning of this project, drifter resolution and sampling rates have improved greatly, allowing for the creation of improved models.

The Hercules Incident occurred during an active period of CARTHE’s large-scale research in 2013, allowing rapid response of materials and people. A group of students was deployed on short notice, releasing 21 drifters in the affected area. The drifters were a visual tracking display of where oil would potentially move. Such information could enhance sampling procedures during response. The models assimilate probability of distribution over time, providing predictions of where material may go in the future. This could guide response, and in this specific case it guided a sampling program for PAH detection. The model was eventually paired with an atmospheric model structured for the Gulf, enabling analysis of the volatilization of constituents into the air. The estimates generated are validated on-site, providing a necessary validation method. CARTHE has achieved many advancements since its origin, serving as a model for groups who wish to rapidly deploy research during a response effort.

During a response, scientists and research vessel operators are now required to have special credentials to work in proximity to the impacted area which can significantly slow academic involvement. CARTHE has faced similar issues and suggests risk management and insurance agreements secured ahead of time to avoid potential loss of time during response. During the Hercules Incident, deployment was only determined by the time required to get personnel out to the site, allowing response within a day. This quick deployment was largely due to CARTHE’s existing relationships, insurance, location, and deployable teams/equipment.

Case 3: Refugio

Jordan Stout, a NOAA OR&R ERD SSC, provided a case study on the Refugio oil spill. During Refugio, NOAA conducted oil fate and transport modeling and submerged oil assessment, engaging academics in various roles. Engaging academics can be time consuming, especially for bigger spills that often prompt
lots of research interests. Since DWH, there have been many efforts to increase science partnerships in emergencies, which happened during the Refugio response.

With increased academic involvement, more management of the spill site was required to allow research on a “spill of opportunity”, without hindering response operations. To manage academics entering the response zone, a formal system was created for researchers to request site access.

Checklists included questions on the nature of the research project as well as proposed methods for accessing the site, safety considerations, credentials, and check-ins. The requests were managed by a liaison officer, screened for legitimate projects, and approved by the UC. The goal of these access requests was to minimize conflicts with response efforts, and ensure the safety of researchers attempting to enter the response zone. The system was a moderate success, primarily hindered by a lack of familiarity with this newly created approach. Research access requests can be refined, through addition of other questions and advertising the concept to boost familiarity.

VII. Presentations on Models for Engagement

Representatives from academia, government, and industry presented information on their specific models for leveraging academic engagement in spill response. Presenters were asked to cover nine key points: (1) a description of the model, (2) how the model is codified, (3) the protocol for activation/operationalizing, (4) whether a catalogue/directory of researchers exists, (5) the funding mechanisms or financial realities, (6) how the model supports operationally relevant decision-making, (7) how academics get involved, (8) how the model facilitates academic access, and (9) how the model addresses the timeframes of response, operational and command interface, bridging the cultures of response and academia, health and safety issues, and legal and liability issues. The following paragraphs provide a summary of each presentation.

Ann Hayward Walker, SEA Consulting Group, presented on the Science and Technology Advisors (S&T Advisors) model, which was recently approved by the Region 6 Regional Response Team and is now codified in the Region 6 Regional Contingency Plan. S&T Advisors represents a new capability in Region 6 to access subject matter experts (SMEs) during preparedness and response. This model provides regional guidance and facilitates engagement with academic and other experts. The concept is sufficiently generic to also be relevant in other regions, which lack specific agreements. It is non-prescriptive and scalable. The concept and description of this model was developed collaboratively over two years involving discussions with the USCG, State of Louisiana, academia (GOMRI-funded Coastal Waters Consortium and a Woods Hole Institute of Oceanography researcher), the Sea Grant Oil Spill Science Team, and a NOAA SSC. The model: 1) creates and describes an institutional format in regional and USCG district policy to engage with academia and other SMEs during preparedness and response; 2) provides value as an institutional reminder to prompt consideration of these resources that is especially important since USCG Sector Commanders (i.e., predesignated FOSCs), and SSCs have competing priorities for their time and attention and will focus on the more routine issues and procedures; and 3) clarifies general procedures regarding roles, training, activation, situational awareness and safety, information sharing, and funding. The primary purpose of this model is to provide a mechanism to facilitate, engage and manage expectations of academic researchers, and other SMEs, to apply their
scientific and technical knowledge and strengthen oil spill decision-making during preparedness and response. This model aligns with USCG headquarters policy guidance to create standards for regional practice. The model focuses on all the sciences - physical, social, health, and decision sciences. A questionnaire was developed in Survey Monkey to create a pre-incident directory of S&T Advisors in the region who are interested in oil spill response and/or research. The questionnaire was designed to be a low-burden approach for developing a directory of interested SMEs. It can be shared via a link and data exports the responses to a spreadsheet to facilitate organizing and managing the information provided. For this model, response expenses would need to be authorized by the FOSC in order to be reimbursed by the National Pollution Fund Center (NPFC).

Monica Wilson, Sea Grant Oil Spill Science Outreach Team, presented on “Boundary Organizations, Oil Spill Science and Response: Sea Grant Oil Spill Science Outreach Team”. Sea Grant is primarily NOAA and state supported, encompassing 33 university-based programs. Sea Grant funds research, extension, communications, education and legal programs. Sea Grant extension agents and specialists, knowledgeable on marine resources, work at the local, state, regional and national levels. Sea Grant extension agents and specialists are well versed in community outreach, and serve as designating county or parish agents, who are trusted resources within these communities. There are four Gulf of Mexico Sea Grant programs, which together responded to DWH in numerous ways including: funding immediate sampling activities; engaging with fishing, tourism and other communities; implementing peer listening trainings; supporting workshops in the Gulf region; and creating a clearinghouse of oil spill information. After DWH, GOMRI funded the four Gulf of Mexico Sea Grant programs to share the latest peer reviewed science with people whose livelihoods depend on the health of the Gulf of Mexico. The resulting Sea Grant Oil Spill Science Outreach Team is comprised of six members conducting outreach to elected officials, communities, and impacted areas. The team works regionally throughout the Gulf and nationally with Sea Grant programs throughout the U.S. They review publications and synthesize peer reviewed oil spill science information to share with diverse audiences via outreach publications, a website, seminars, and workshops. This outreach also includes bringing scientists to AC and RRT meetings, connecting with SSCs, implementing a national collaborative human health workshop series, coordinating with the response community, and presenting at national conferences. Sea Grant fosters two-way communication between response and academia, through outreach, engagement, and support. Wilson suggested that academia can have a greater role in response through the attendance in local ACs, and that response can contribute to research by sharing data gaps with academia and conducting trainings for scientists. The major challenges faced are communication and funding of projects. The communications gap is slowly narrowing. In recent years, Sea Grant has developed a list of target audiences, which includes the response community, academia, oil and gas industries.

Yvonne Addassi, CA OSPR, discussed the California framework for scientific access to spill sites. This framework was developed “on the fly” when researchers requested access to the Refugio Incident operations area. During this event, a liaison officer worked with the NOAA SSC to develop a Scientific Research Checklist describing the proposed work and desired access. This checklist requested information regarding: a summary of work and deposition of data; project duration and frequency of visits; project timeline; shore side, on water, diving and aerial access requests; personnel and vehicles
involved; proposed decontamination procedures; liability coverage through the academic institution; HAZWOPER certification; and supplies/equipment or payment requests from the response. After the submission of a completed checklist, a liaison officer vetted the researchers’ affiliations, evaluated conflicts between incident operations and proposed work, and summarized recommendations on General Message (ICS 213) for UC approval. Upon project approval, researchers coordinated directly with the Operations Section. Research personnel then received credentials as well as a safety briefing, and had to agree to comply with the Site Safety Plan before obtaining access. Approved requests were generally provided for continued access to existing research sites, and for opportunistic sampling, and evaluation of impacts of the spill. This framework allowed access for a variety of projects ranging from diving-based field studies, boat access for various sampling, and requests for samples of spilled oil for laboratory experiments. Some observations/considerations for the use of this framework include: 1) researchers with established projects in the area working with seeping oil generally possessed appropriate certifications, 2) mediating access requests can put a strain of liaison officers, and 3) the framework does not include a funding mechanism so researchers must leverage existing funding. Moving forward, Addassi hopes to build on connections made with academic institutions’ scientific diving and boat safety programs, to establish processes/agreements before an event. She also hopes to formalize a system for receiving, approving, and coordinating requests, with clear criteria for vetting of affiliations and projects, a process which could be tested and refined during exercises. If another Refugio-scale incident occurs, a separate liaison group may be established in planning or operations to handle incoming access requests. Addassi promoted workgroups in ACs to facilitate training opportunities and communication among scientific and response communities to streamline the process during an event.

**Peter August, University of Rhode Island (URI) Coastal Institute,** discussed the Scientific Support for Environmental Emergency Response (SSEER) framework. SSEER was created in response to the North Cape heating oil spill in Block Island Sound in 1996. The RP during this spill quickly contacted URI faculty to assist in the damage assessment, preventing the university from serving the state. The SSEER program attempts to integrate academics into response efforts, based upon previous challenges associated with the 1996 North Cape spill. The SSEER program is codified in a memorandum of understanding with the Rhode Island Department of Environmental Management (RIDEM), Office of Emergency Response. The purpose of this program is to improve environmental emergency preparedness in Rhode Island by enabling a state agency to deploy university resources to assess, reduce, or remediate threats to public health and safety in the environment. The SSEER program currently includes 95 individuals, and 15 organizations, with its roster updated annually. This program can be activated in a few hours (as opposed to the 1-2 month process typically required for a project in the state) through the submittal of a scope of work form and subsequent approval by the state. Funding for the SSEER program includes a $150,000 line of credit to URI from the state that can be tapped immediately, if needed, for an emergency event. Funding for longer term projects depends on the specific event, need and funding source. SSEER members are not typically on the front lines during an event, the USCG and UC keep them out of harm’s way, mitigating liability concerns. SSEER informs decision-making through lab analysis support services, decision consultation, and damage assessment. Academics are engaged through SSEER with annual trainings with emergency response personnel, and continued conversations between the program and state. One of the primary challenges SSEER faces as an academic program is the turnover
rate of faculty, staff and students; thus requiring ongoing communication with University leadership. The SSEER team agrees to many rules and protocols including: data ownership agreements, faculty not participating in press releases or media interviews, and compliance with chain of command requirements. Participants in the SSEER program have a sense of obligation to serve the state in times of crisis and to help protect the local environment.

Kristin Ludwig, U.S. Geological Survey (USGS), presented on the Department of the Interior’s (DOI) Strategic Sciences Group (SSG). The mission of the SSG is to support decision-making during a crisis by rapidly assembling teams of experts to assess the social, economic, and environmental cascading consequences of the event. Scenarios are used to identify actionable interventions to mitigate anticipated impacts. The SSG was established in 2010 as the Strategic Sciences Working Group and later codified as the SSG by Secretarial Order in 2012 within the Office of the Secretary of DOI. SSG staff report to a co-leader, who in turn reports to the Secretary of the Interior’s Science Advisor. Since its inception, the SSG has been officially activated for the DWH (2010), Hurricane Sandy (2013), and the Kilauea Eruption (2018). The following “triggering” criteria must be met for SSG activation: 1) an acute event of relatively defined duration; 2) an event for which the SSG can add value using a strategic approach; 3) an event with multiple, synergistic cascading consequences; and 4) an event with a high degree of risk or loss. During deployment, the SSG convenes a multidisciplinary team, drawing on experts from academia, government, non-profits, and the private sector. The SSG uses its network of over 20 professional societies to identify team members. Each SSG team is tailored to the specific crisis and is typically comprised of 12 experts, with approximately half coming from or familiar with the affected area. One of SSG’s best practices is the inclusion of many members of academia. The SSG has been able to engage academics from tenured professors to graduate students on short notice for all of its activations. One of the primary challenges the SSG has faced is that it is not part of UC, which can cause confusion during a response. However, this also can be advantageous in allowing the SSG to operate independently as a stand-alone “think tank.” Among some of the SSG’s lessons learned include the need for additional input from DOI and other stakeholders to narrow the scope of future deployments, and the importance of conducting briefings to local, regional, and federal agencies on site to share time-sensitive information. During the plenary discussion, it was suggested that the SSG connect with the National Association of Marine Laboratories.

Bruce Hollebone, Environment and Climate Change Canada, presented for Ken Lee, Fisheries and Oceans Canada, on the Canada Research Program. Hollebone explained that Canada has a great need for oil spill research, with risk of accidental releases of petroleum hydrocarbons expected to rise with increasing marine traffic, especially in the Arctic. The Canada Research Program is a multi-partner research initiative (MPRI), with a goal of establishing an integrated, global network to advance oil spill research in Canada and increase Canada’s level of preparedness and response capability. MPRI engages Canadian universities, global oil spill experts, industry, academia, indigenous and coastal communities, regulatory agencies, and response organizations to form a comprehensive group of individuals informing decision-making through collaborative research.

The focus of MPRI is to advance scientific knowledge to address major gaps in oil spill response and remediation strategies that will support the development, validation, and regulatory approval of
alternative response measures. The five main areas of research are: decanting and oily waste disposal, in-situ burning, spill treatment agents, oil translocation, and natural attenuation/bioremediation. Nearly all projects have significant funding for training students and other high levels of personnel, with a goal of establishing a network of highly qualified personnel (HQP). MPRI keeps a record of involved personnel involved in the network. The network of projects creates valuable training opportunities in academia and industry and fosters connections with key international organizations in oil spill research. Engagement occurs with the involvement of key clients and stakeholders that include representatives from the federal government, provinces and territories. This model is codified in the National Oceans Protection Plan, funded by cooperative research agreements.

David Hollander, University of South Florida, discussed the Florida Institute of Oceanography (FIO). There is a memorandum of understanding between USCG and FIO regarding academic and marine research contributions to the USCG Oil Spills and Hazardous Spills Research. FIO facilitates education and research in the marine and coastal environments. It is financially supported from funds allocated by the state legislature, fees charged for use of vessels/facilities, and administrator contracts and grants awarded through FIO. There are currently 21 full members of FIO, including the Florida State University System (SUS), private universities and institutes, state agencies, and nine other associate and affiliate member organizations. The purpose of FIO is for the research community of the Gulf of Mexico and southeastern Atlantic to assist USCG in their response to natural or anthropogenic emergencies. The USCG responsibilities to FIO include: contacting FIO in case of emergency or otherwise to identify subject matter expertise, ensuring the best scientific information is portrayed in media releases, working with the academic community to improve response to emergencies without compromising the USCG core mission, and notifying FIO of any relevant planning activities or expertise that may be of interest. FIO’s responsibilities to USCG include: assisting USCG in identifying subject matter expertise, and working with the USCG so that the best scientific information is portrayed and facts are correctly stated in media releases. The combined responsibilities between USCG and FIO include: providing trainings/overview on how the USCG manages a large oil spill, developing a plan of action on how academic communities would participate, and providing access to and understanding of the latest relevant research that may be unique to the Florida ecosystem. FIO will be conducting two upcoming workshops: (1) a modeling workshop to discuss state-of-the-art model, high resolution 3D models based on best scientific understanding of the marine environment under development within the academic community, and (2) a baseline workshop to review the current available chemical, biological and geological baselines around Florida, a plan will be developed on development and baseline sampling or other needs to move quickly in the event of an incident.

Jessica Garron, University of Alaska, Fairbanks, discussed the Alaska Oil Spill Technology Symposium (AOSTS). AOSTS is a unique Arctic opportunity for sharing knowledge and collaborations. The symposium includes a range of presentations with an Arctic focus on topics such as research and development, emerging technologies, agency initiatives and policy issues, incident management techniques, knowledge gaps, and operational work priorities. Aside from presentations, the symposium hosts expert panels, technology demonstrations, field demonstrations, discussions, and funding opportunities. The symposium is hosted in a collaborative environment, including academic, federal and industry
participants. This model is codified by addressing the science of oil in the ice, water and land environments of the Arctic. This event is pre-response event science (i.e., conducting research and discussions before a spill occurs). The outcomes of the symposium are operationalized through incorporation into drills/exercises, demonstrations outside of drills/exercises, and technical readiness level advancements. A true operationalizing protocol integrates training for responders on science, and researchers on operations, which this model attempts to accomplish. AOSTS keeps a catalogue of researchers and attendees via internal spreadsheets, updated after each event. The funding mechanisms for this symposium include a mixture of response organizations and citizen advisory groups. Directed funding is allocated for specific projects by specific sponsors. Traditional funding includes funding from NSF, DOD, DOI, DHS and endowments for opportunities for multidisciplinary and cross-cutting arctic research. AOSTS supports operationally relevant decision-making through establishing credibility of research, introducing what is available to different agencies, and creating a conversation space for facilitating the first steps of coordination. Academics are getting involved in AOSTS in a variety of ways such as conducting research projects (i.e., baseline and operational research) and providing real-time data.

VIII. Breakout Group Sessions

Workshop participants were divided into four groups for breakout sessions with a cross section of expertise in each group to represent local, state, and federal decision making. A list of participants in each group A-D can be found in Appendix E. During Breakout Session I, participants were tasked with reconciling responder imperatives with academic modes of operation. Groups A and B considered timeframes for responding; operational and command interface and bridging culture and experience between responders and academia. Groups C and D considered health and safety issues; financial realities and funding and legal and liability issues. After the breakout session, each group elected a reporter to share, in the plenary, the most important challenges developed from their group discussion. The original list of challenges identified by each breakout group can be found in Appendix E. The following paragraphs summarize the plenary reports.

Breakout Group Session I

Group A

**Timeframe** - Group A highlighted the disconnect between academic and response timeframes during an event. An operational response is on-going 24/7 to react to the particular spill or event, whereas the academic community, while flexible, is not necessarily available immediately. Academics work within the academic calendar, potentially making them unavailable to aid during response. Academics and responders may have different objectives and the timeframes of action during a response. Generally, the speed of response is very different than independent research.

**Operational and Command Interface** - One of the primary operational command interface issues highlighted by Group A is the lack of knowledge within academia of how ICS operates. Academics typically are not familiar with ICS structure, and specific roles such as an FOSC. Without a concrete
understanding of ICS, and their place in it, academics find it difficult to operate during response. Without continued meetings/trainings between responders and academia and the preparation of science teams pre-event, many issues can arise.

**Cultural Modes**-Group A identified many different modes for culture and experience between academics and responders. The culture of ICS is often foreign to academics. They are usually accustomed to being the principal investigators and leading their own independent projects and not being part of a larger command structure. There is also an inherent negative “perception” of industry to academics and vice versa, with distrust between the parties which hinders efforts of coordination. It is important to remember both industry and academics have experience that can benefit a response.

**Group B**

**Timeframe**- Group B was interested in identifying major timeframes for different types of events. The group delineated between chronic releases and onshore and far offshore spill events for response timeframes. Regardless of the timeframe of the event, the group thought that academics have problems interfacing because of administration concerns, funding, and university obligations. Industry has pre-staged supplies and personnel ready for response, where academics usually do not. Response often needs real-time data, whereas academics often need longer timeframes for data analysis.

**Operational and Command Interface**- The difference between operational and command interface modes were very clear to Group B, as response is very closely aligned to ICS structure and academics is not. Academic interface with response is highly variable on the work being conducted (e.g., direct response support, NRDA, independent research). There was also a clear disconnect between the standardization of methods, as the response community has clear standard methods (e.g., chain of command) and requires permitting and trainings for sampling and response, whereas academia has less standardization.

**CulturalModes**- Group B identified the different modes between responder and academic culture and experience. The group shared that in a response world everyone gets trained for legal issues, whereas academic trainings are very different catered towards their specific project needs. The goals between the two communities differ, as response is generally focused on safety and cleanup and academia is focused on high resolution data, publication and expansion of knowledge. There is also a large gap between the communities surrounding trainings, as academics are not required to complete many trainings for their normal position, and responders have constant required training.

**Group C**

**Health and Safety Challenges**- Group C thought it was important to stress the difference between academics joining the response as part of the UC, as opposed to academics doing independent research on a spill of opportunity. In response to health and safety issues, the group thought that responders are much more prepared than academics. Responders typically have extensive training, certifications and site safety plans, as well as familiarity with ICS. All of this promotes the emphasis on health and safety among responders. Academics typically do not have clear requirements for such trainings and safety precautions vary greatly between institutions.
Funding and Financial Challenges - There were many differences identified how the response and academic communities address financial realities and funding. For example, health and safety training can be an individual financial burden on academics, whereas responders often have their required trainings paid by their employer. Responders usually have clear avenues for funding during response, however academics have limited funding options and may take time to acquire funds. The availability of funds for academics usually depends on the timeframe of the project. Funding for academics is not readily available in the response timeframe. Without pre-existing contracts or agreements for response funding, it may be difficult to engage academics if they are not brought in by the RP or UC.

Legal and Liability Issues - Group C also had many concerns for the legal and liability issues surrounding academics in response. Responders are typically aware of their liability during response, with clear requirements for things such as chain of command, safety and data ownership. Academics pose a larger liability concern due to lack of training, use of new and novel techniques, unfamiliarity with chain of custody, and concern for student injury. There was an identified difference between universities for communication standards, whether academics are allowed to consult with media directly, or need to go through their communications office. The liability of academics sharing information was a concern, as responders have to go through ICS to release media statements. Group C thought most of these challenges originate from lack of training for academics.

Group D

Health and Safety Challenges - Group D highlighted a difference in prioritization of health and safety concerns in response between academic and the response community. Health and safety considerations are much stricter for technical specialists in ICS as opposed to researchers accessing a spill site. Typical spill response health and safety requirements are not explicitly understood by academics, creating a disconnect with responders. There is also variation between universities regarding health and safety training, whereas responders typically all have the same required trainings, creating a level of uncertainty in academic training.

Funding and Financial Challenges - Group D had similar concerns about financial challenges as Group C, sharing that academics are commonly inhibited by a lack of funding for response. If academics are brought into the UC, or aid an RP during response, funding will be available to them. If academics are conducting independent research, it may be difficult to acquire the funding necessary. The group thought funding was less of an issue, because if academics are aiding in a response or NRDA effort, there will eventually be avenues for funding.

Legal and Liability Challenges - Group D thought that academics need a clear understanding of the full scope of legal requirements, such as sample vs. evidence considerations, chain of custody requirements and possible future legal obligations. The group had a lot of data management concerns, highlighting that academics are often unaware that data and information may no longer be “owned” by the generator. The integrity of data and information from academics can be a concern, as the UC often has protected emails and data servers. Academics were also often surprised that their equipment can even be withheld if used during a response, highlighting a disconnect in legal preparedness.
Breakout Session II

Breakout Session II was held on the second day of the workshop. For this breakout session, participants were tasked with helping NOAA OR&R identify best practices, or the characteristics of best practices for academic participation in spill response, based on each group’s identified challenges in Breakout Session I. Groups were also asked to identify mechanisms that could facilitate access to spill sites and samples for academic researchers during oil spills. The original group notes for Breakout Session II can be found in Appendix E. The following section provides an overview of each group’s responses.

Group A

Group A had many ideas on the best practices associated with the engagement of academics. From a planning perspective, the group thought engagement needs to have a scalable framework, similar to that of SSEER. This framework should meet national needs, while being adaptive and flexible enough to accommodate emergent scientists. Responders need to consider researchers with whom they do not have existing relationships, who may have valid questions, resources, and research ideas. An ideal system/directory for researcher identification would be interoperable and searchable, with multi-region coordination, and include mechanisms which allow resources to be accessed from anywhere in the nation. Existing programs, such as Sea Grant, could be leveraged, building upon existing researcher networks and resources. This system could have identification of who is working on what topics, identification of SMEs, with a built-in vetting process. Participants should understand the ICS process, and have safety trainings, with a mechanism built in to identify these qualified personnel. Maintenance of this directory/system would require coordination with state, Sea Grant, and other entities and could be facilitated through annual meetings and paired with potential exercise drills with academics. A system could also be developed for academic outreach, networking, and training opportunities. During an event, responders could access this system and have a notification/activation process of requested academics.

Mechanisms for providing academic access during a spill must be transparent for both parties, allowing confidentiality. Access requested may be for fieldwork or samples. This mechanism could use existing avenues such as liaison officers, or SSCs for smaller spills. It should include a built-in screening protocol, to vet researchers’ credentials and the nature of their research similar to the Refugio framework/checklist. There should be alignment of research categories with those designated by ICCOPR for prioritization of research access. This mechanism should be paired with the development of safety plans and be under the purview of a deputy safety officer aligned with ICS. Potential coordination of assets (e.g., vessels) would facilitate efficient research and response efforts. From a legal perspective, considerations should be made for permits, to de-conflict with response efforts, liability and insurance. A legal review of the researcher’s access requests should be undertaken, to determine the level of liability involved in the research, and mitigate excess liability with access constraints. Data sharing should not necessarily be required, but requirements should be determined beforehand, especially if the information may aid response. Ultimately, increasing awareness of such a system and opening avenues to facilitate access will increase academic engagement in response.
**Group B**

Group B recommended that different levels of research, types of research (e.g., independent vs. response oriented) should be delineated in a research plan. This allows prioritization of research efforts requiring different timeframes for research, streamlining who is on site and when. There are issues with the amount of time it takes to make contracts and MOUs with universities. The best practice is planning ahead of time, pre-purchasing and staging resources, obtaining contracts, and understanding what research assistance may be needed during response (e.g., expertise, sampling, analysis). If the researchers know what is required ahead of time, they may be able to assist with baseline and historical information, potentially sharing unpublished data to help during the planning process. Having an established database or directory of expertise will aid in academic engagement, as responders will then have a source from which to seek help. The development of an institutional action plan for a range of environmental crises will help address timeframe issues. This plan could be similar to a university’s “severe weather plan”, detailing the key steps that the faculty and administration would have to take to prepare if a spill occurred.

For command interface considerations, academics need to have best practices dependent on the type of involvement. There should be standard methods in place, potentially included in action plans, including SOPs. A minimum set of criteria for various kinds of academic involvement should be developed, which details what the response and academic communities need for a response or independent research effort. There may be a need for oversight or leadership, even in independent research projects, to deconflict research endeavors with response. Trainings/certifications should be required as stated in the action plan, with minimums specified. Clarification of roles and responsibilities of all parties should be included in a detailed action plan to alleviate confusion. Mission statements for all efforts and entities should also be clarified in the action plan, as all of this will help with the vetting process. It should be clear whether there are needs for high- or low-resolution data, and the data are being used for actionable decision making or to address research questions.

The group stressed the need for transparency. Researchers need to clearly state the type of access needed (e.g., site, source oil), credentials, objectives and any other project related information. It is strongly recommended an action plan be produced, with a site access checklist similar to the Refugio spill. Safety needs to be a paramount requirement, to reduce legal and liability concerns. This group expressed the importance of pre-existing MOUs in order to streamline the process when a spill event occurs. A generic version of a checklist should be created and distributed, as each spill is unique. If academics and responders have access to these baseline requirements, it will be much clearer as to the information a researcher must provide during a specific event. A repository or application form for requesting source oil should be created and the processes to obtain the oil should be established. This would likely be under the auspices of the RPs, as this form can detail the allowed uses and other criteria required for access. A clear definition of liabilities, data management agreements, and ability to access confidential data must be determined on a case-by-case basis.

**Group C**

Group C suggested best practices to address health and safety concerns, highlighting the need for clear roles and training requirements defined pre-response. If an academic wants to get involved in a certain response or research role, there should be a clear definition of the trainings required before a spill
occurs. This resource could be contained in a table that clearly defines the training, safety, and liability requirements. There could be integration of an academic liaison at the state level to work with local or regional counterparts. Industry and federal officials need to know what expertise is available, and what qualifications/trainings SMEs have. Existing consortia and institutes could be points of contact for disseminating this information. Providing guidance at the NRT level would establish criteria for researchers and allow them to understand expectations. The more guidance and policies that are propagated by national authorities, the faster things will move at a university level. If the grants officer/administration can see the levels of trainings and safety required by the government beforehand, it will be easier for universities to facilitate these trainings to promote academic safety.

The best practice to counter the funding challenge is to establish agreements ahead of time, to be accessed during an event. Having a national level entity that can standardize contractual language and aid in the creation of agreements would be beneficial. ACs could consider the inclusion of academics in their planning processes. The integration of academics whose research is interdisciplinary in planning will help solve the challenges more expeditiously.

To address the issue of academic site access, the group thought it was important to have contacts with the SSC or similar state-level liaisons. A vetting process for project site and sample access should be established, overseen by the UC, with clear limitations and requirements described. Providing access to trajectory analysis, SCAT, ERMA, samples, and the site should be possible if requirements are met. The ability to access responder-gathered data could be an option to minimize access requirements, limiting the number of researchers at the site. A possible academic or research-related hotline could be created, in order to access the command post with an academic liaison facilitating the request for data. This suggested hotline could have a possible web companion component, with details of minimum requirements mechanisms to request access to the site or samples.

**Group D**

Group D stressed the need to cross-walk the health and safety trainings at universities with those required for response to identify potential overlap. A cross-walk will help streamline and clarify the trainings necessary to access a spill location. Researchers requesting access may not need the entire OSHA or 40-hour HAZWOPER training, but only parts of each. The cross-walk may reduce the number of trainings required for access to a site, and could create requirements specific to the research requested.

The group noted that independent research funding constraints do not necessarily affect the response effort. If an academic wants to engage in response or NRDA actions, funding avenues are typically available. Guidelines could be developed for routes of funding available at regional and local levels for research without immediate operational use.

Legal experts in the federal government should coordinate with their counterparts in academic institutions to delineate the responsibilities and liabilities in coordination with federal/regional/local stakeholders. Proactive coordination among response to academic communities will help solve most of these issues.

The group focused primarily on researchers requesting physical access to spill sites. Gaining access is a “two-way street” because academics and responders often need resources from each other. The
Refugio access template could be a useful tool, creating a comprehensive mechanism for all types of access requests. There should be clear restrictions on public communications, access to data prior to publication, safety considerations and other requirements. A third-party liaison that speaks both “languages” could be beneficial, to screen requests and data to determine if it may be beneficial to response. There is an identified need for transparency from both parties, detailing why research will or be allowed/useful. There also should be more significant involvement and support from trustees, having all stakeholders part of the response process.

**Breakout Session III**

Breakout Session III was the last session of the workshop, building upon ideas developed in Sessions I and II. The goal of this final breakout session was to develop implementation strategies for the best practices that were identified in Breakout Session II. Participants also ranked their proposed implementation strategies relative to ease of implementation. The solutions that were “low-hanging fruit” and “NOAA actionable” were shared in the subsequent plenary session. The follow sections are summaries of each group’s reports. The original notes from each breakout group are found in Appendix E.

**Group A**

Group A stressed the importance of identifying a “champion” to act as an initial success story/basis of implementing the best practices. The group believed the URI SSEER model is a good example for steps such as creating a directory of academics available to responders. This model can be adapted to other regions. Having regional champions will integrate both governmental and academic needs. These champions can engage at multiple levels (e.g., ACs, RRTs). The main issue with this model is the time required for champions to engage all parties, but the group stressed this would be worth the effort.

They believed that developing a matrix of trainings that would be required for different levels of involvement in response, similar to what is required for spill responders, would be extremely beneficial. Many groups identified the need for clarity in trainings required, to make academic engagement easier during response.

Models for rapid response and engagement should be explored, referencing the Center for Disease Control’s directory model, as well as the earthquake model, cooperative extension model, and cooperative ecosystems studies unit (CESU) model. One person or entity could be responsible for exploring existing models, providing brief summaries of the models, and proposing commonalities and best practices. If these models have established avenues for engaging academics, they should be built upon and applied to oil spills. Overall, the group believed leveraging existing resources such as Sea Grant/Land Grant could be beneficial in building infrastructure to engage academics in the future.

**Group B**

Group B focused primarily on the best practice of an action plan, similar to a severe weather plan, adapted for incidents and emergencies. The development of these plans will facilitate research during spills of opportunity. This requires obtaining initial support from university administration, writing the
plan, reviewing the process, implementing the plan, and communicating it across different departments in the university. A guidance document could be developed to aid in the creation of these action plans in different universities, with basic elements required for all. Once a plan is established, implementation may require an MOU or interagency agreement with the university, potentially leveraging existing agreements. A database or directory of expertise, with back-up personnel, would also be a large resource for engaging academics, as needed. Overall, academic engagement at AC meetings, and with other planning entities, will raise awareness of the technical capabilities of different institutions.

This group believed there is a need for more clarity of best practices on academic involvement. There are various degrees of academic engagement in response, such as independent research or response aid. To address the needs of the spectrum of academic involvement, a matrix could be created that defines the levels and requirements of engagement, and any constraints. Response has numerous standardized protocols that are different from those of academia. Instead of re-creating these protocols, industry and government guidance could be used to explain response protocols to academics. The compilation of response-specific best management practices, chain of custody requirements, and other information that may not be common knowledge to academics would be very beneficial.

Exercises/drills and trainings would be the most effective means to bridge the gap in culture and experience between academics and responders. The incorporation of academics in drills would allow them to become aware of the responder protocols and requirements, and in turn, responders would become more accustomed to academic engagement. Combined drills with interdisciplinary SMEs can create networks, minimize confusion, and engage various communities before a spill event occurs. A context section in action plans, contrasting advancements of basic and actionable science, may also clear up confusion, along with detailing roles and responsibilities. Multidisciplinary teams should be promoted for all endeavors, especially during trainings, because they will make deployment easier during an event.

**Group C**

Group C divided implementation into three primary steps. First, responder groups need to refine a required list of trainings, based upon specific academic roles and responsibilities during response. This list should be shared with Sea Grant and other entities for distribution regarding trainings needed by academics. Academics must actually complete the trainings, and receive any required certifications for the work they wish to conduct. The success metric for this implementation would be the number of training participants and academics qualified to aid in oil spill response.

The group noted it is important to assess the current gaps in response and use this knowledge to prioritize research funding. There are many existing avenues for funding, especially if sought pre-event. One of the main funding challenges involves the efficient use of research budgets. An academic review of existing documents that outline research gaps should be conducted, detailing future areas of focus. Academics could then incorporate comments into this gap analysis. With this prioritized research approach, funds can be used efficiently, and avoid unnecessary projects. Success metrics for this implementation could be the amount of comments received from academics on gaps identified and the subsequent funding received to close those gaps.
The group also thought is important for academics to engage and participate in local ACs. Academics could be invited to drills and trainings regularly, to engage with other parties involved in response. Academic involvement in the planning process is extremely important, and will help facilitate engagement during events.

**Group D**

Group D believed the most successful implementation strategy to bolster health and safety is a crosswalk to develop a nexus of training required of academics, to improve site-safety preparedness. A review of OSHA and USCG documents should be conducted, and followed by a refinement of identified trainings and requirements geared towards academic engagement in oil spills. An expansion of oil spill job categories and requirements, and how they may apply to academic involvement would be an important resource. There should be a clearly defined matrix of all requirements, including credentials, trainings, experience, responsibilities and roles. A success metric for this implementation would be number of universities and participants referencing the matrix.

A streamlining of funding vehicles and types of funding will promote the acquisition of funds for research activities. Clear conveyance of the funding mechanisms available, associated requirements, and applications, would greatly aid the acquisition of funds before and during an event. The group stressed the importance of obtaining financial agreements ahead of time, for rapid deployment during response.

This group also suggested the importance of AC involvement in order to better engage academics. The strengthening of networks between responders, academics, and other involved parties would streamline all aspects of response. These bonds can be strengthened through multi-disciplinary exercises and drills. The coordination efforts and drills should be continually built upon regularly to stay relevant, and continue engagement.

**IX. Potential Workshop Outcomes**

A set of ideal outcomes of this workshop were developed in a plenary session at the end of the workshop.

1. **Develop a Matrix Identifying Information Academics Need to Know About Response**

The matrix would aid in the facilitation of academic engagement during response. A key take-away in many of the breakout sessions was the realization that the academic community is often hindered by a lack of understanding of the requirements needed to participate in a response. A gap was identified in academic understanding of roles and responsibilities prescribed by ICS. The matrix would identify necessary trainings for various positions in spill response, aiding the academic community in response preparedness. It would also identify standard chain of custody requirements, sampling and analytical methods for response and NRDA ephemeral data. To better understand the legal constraints of academic participation in response, the matrix could detail the liabilities for faculty/staff/students, data management agreements, and the ability to access/use confidential data. The matrix will help the academic community better prepare for involvement in response.
2. **Guidance Document for Organizational Action Plans**

A guidance document could assist academic institutions in creating organizational action plans for spill response participation. This guidance document would help universities and other organizations create action plans, similar to existing weather-related action plans, to aid in oil spill response. The document would reference existing models that facilitate academic engagement, such as SSEER and the checklist, developed for the Refugio spill, building upon the successful components of these models. The document could include standardized operating procedures to aid in the rapid deployment and efficiency of academic involvement during an event. It could detail contractual language for the creation of pre-spill agreements (e.g., MOUs), for organizational involvement in response, NRDA, and non-response related research. These pre-existing agreements would aid in the identification of potential financial constraints, and avenues for funding during response. Non-response related research with a spill of opportunity should be aligned with ICCOPR categories. The guidance document would also aid in identification of minimum certifications and trainings required, cross-walking response and university/organizational health and safety trainings. An activation process for involvement could be included, potentially including a campus liaison, to facilitate deployment of the action plan during an event. To align with UC standards, protocols for communication and outreach during an event should be explained, minimizing potential conflicts of information in media releases. A mechanism could be developed to facilitate access for site, sampling and source oil, building upon the Refugio checklist and including input from the breakout sessions. The guidance document recommendations could be scalable to different size events, and potentially include a range of environmental crises.

3. **Directory of Academic Researchers**

A comprehensive directory of academics could be developed to promote engagement during events. This directory of academics would include information such as areas of expertise, location, equipment available, and documentation of trainings/up-to-date certifications held. Such a directory would enable the response community to identify academics who may be assets to a response effort. This directory should be searchable, allowing identification of personnel with specific expertise and resources. This directory should be interoperable between organizations, and multi-regional in order to be a comprehensive source of information. An activation process could be included, likely providing contact information, upon request. To keep this directory up-to-date, annual updates and meetings should be held to add emergent scientists, and maintain relevant data. To promote continued interaction between the response and academic community, academic liaisons should become involved with RRTs, promoting the use of this directory and academic resources.

4. **Involvement/Relationship with Area Committees/State and Federal SSCs**

Academic involvement/relationships with ACs/RRTs and state and federal SSCs should be cultivated. If academics become socialized with these entities, they will have more experience with the response community, and relationships will be built that can be leveraged during an event. Many of the breakout sessions highlighted this involvement, as it allows academics to familiarize themselves with the response community.

5. **Establish Working Group to Continue Discussions and Foster Implementation**

A working group could be created to continue discussions and foster implementation. This working group could be coordinated with academic councils, and would identify other organizations to be
involved (e.g., Bureau of Safety and Environmental Enforcement (BSEE)). This working group would strive to minimize cultural differences between the response and academic communities through the development of relationships and implementation of products. Organizations such as Sea Grant and Land Grant could be leveraged for socialization of products nationally. The working group could potentially identify regional champions (e.g., URI), tasked with promoting academic leveraging during spills through coordination with regional response communities. This working group should focus on identifying how to keep academics engaged during periods of no spills, continuing development of relationships and bolstering preparedness and response. A one-page information sheet could be developed summarizing the findings of this workshop for distribution and engagement to aid in the continued conversation between responders and academics.

X. Possible Short-Term Actions

1. Review and Update Existing Lists of Scientists Across AC Plans

These lists are required in AC Plans by statute. NOAA OR&R can make recommendations regarding existing lists of scientists. For areas without such a list, a proposed path forward could be recommended. A comparison could be done between the OSHA table of spill operation roles and research/science roles.

2. Awareness of Academic Engagement During Spills

An entity such as the Sea Grant Oil Spill Outreach Team could develop a factsheet on academic engagement during spills. This factsheet could be used as a basis for discussions within ACs and RRTs on academic engagement and its role during a spill. An informational slide on academic engagement could be added to the OSC Crisis Management, Science of Spills and FOSC Refresher courses.

3. Areas/Regions with Existing Engagement Models

The ACs and RRTs that have existing models for academic engagement should be encouraged to arrange continued connections between the responders and academics at applicable conferences and meetings. This will keep those models vibrant in times when there are no spills.

4. Academic Liaisons for Each RRT

One possible mechanism for facilitating coordination between responders and academics would be to have a designated academic liaison for each RRT, if the regional team was willing to pursue that option.

5. Enhanced Methods for Academic Engagement During Response

The availability of standardized methods pre-event would facilitate academic engagement during a response. For example, the checklist developed for the Refugio response could be refined into a standard “Research Request Application” form for use by the UC during spills. A list of the required trainings and/or certifications for academics could also be developed. In addition, a set of standard operating procedures (SOPs) for response could be made available, so that academics would have access to them prior to and during a spill.
XI. Appendix

A. Workshop Agenda

B. Workshop Participants

C. Workshop Presentation Slides

D. Breakout Group Participants

E. Notes from Breakout Group Discussions

F. National Response System Family of Plans

G. ICCOPR Research Categories
LEVERAGING SCIENCE AND ACADEMIC ENGAGEMENT DURING INCIDENTS

Appendix A

Workshop Agenda
LEVERAGING SCIENCE AND ACADEMIC ENGAGEMENT DURING INCIDENTS

June 25 & 26, 2019
The Bay Conference Center, Tiburon, CA

AGENDA

Tuesday, June 25, 2019

0800  Registration

0830  Welcome & Overview
      Scott Lundgren, NOAA Office of Response and Restoration, Emergency Response Division
      Nancy Kinner, Coastal Response Research Center

0845  National Contingency Plan and Incident Management for Spill Response Overview
      CAPT Mark Shepard, U.S. Coast Guard, Commander of the National Strike Force

0900  Plenary Panel: Overview of Spill Response (Roles, Responsibilities, Capabilities, Capacities)
      RADM Peter Gautier, Eleventh Coast Guard District Commander, Federal On-Scene Coordinator
      LT Joshua Nicholas, State On-Scene Coordinator, CA Office of Spill Prevention and Response
      Scott Lundgren, NOAA Office of Response & Restoration and Scientific Support Role
      David Palandro, ExxonMobil, Responsible Party Role
      Antoinetta Quigg, Texas A&M University, Academic Role

1000  Case Studies of Academic Engagement During Spills
      Case 1: DWH - Steve Murawski, University of South Florida Institute of Oceanography
      Case 2: CARTHE Consortium – Hercules Spill, Brian Haus, University of Miami (remote)
      Case 3: Refugio - Jordan Stout, NOAA Emergency Response Division, SSC

1045  Break

1100  Plenary: Overview of Current Models
      1. Description of Model
      2. How is this model codified?
      3. What is the protocol for activation/operationalizing?
      4. Is there a catalog/directory of researchers?
      5. What is the funding mechanism or financial realities?
6. How does this model support operationally relevant decision-making?
7. To what end are academics getting involved? To help with the response or access for data collection for their own research that will improve a later response? Share knowledge (both responders & researchers) for improving response overall?
8. Does the model facilitate academic access? Note best practices and/or challenges.
9. Does the model address any of the issues listed in Breakout Group 1 below?

“Science and Technology Advisors”, Ann Hayward Walker and Mike Sams, RRT Reg. 6 (remote)

“Boundary Organizations, Oil Spill Science and Response: Sea Grant Oil Spill Science Outreach Team”, Monica Wilson, Sea Grant

“California Framework”, Yvonne Addassi, CA Office of Spill Prevention and Response

“Scientific Support for Environmental Emergency Response (SSEER)”, Peter August, University of Rhode Island (URI) Coastal Institute

“DOI Strategic Sciences Group”, Kristin Ludwig, U.S. Geological Survey (remote)

Canada Research Program, Ken Lee, Fisheries and Oceans Canada (remote)

University of South Florida, FIO, David Hollander

Alaska Oil Spill Technology Symposium, Jessica Garron, University of Alaska, Fairbanks

1215  Lunch

1315  Current Models, Continued
1430  Overview of Breakout Group / List discussion questions

1445  Break

1500  Breakout Session I (mixed group of participants)

Reconciling responder imperatives with academic modalities:
1. Topic 1:
   a. Timeframes for Responding
   b. Operational and Command Interface
   c. Bridging Culture and Experience Between Responders and Academia
2. Topic 2:
   a. Health and Safety Issues
   b. Financial Realities and Funding
   c. Legal and Liability Issues

1630  Overview of Day 2 Activities

1645  Adjourn
**Wednesday, June 26, 2019**

0830   Recharge & recalibrate

0845   Group Report Outs

0945   Breakout Group Session II:
   1. Characteristics of best practices for NOAA ORR academic participation in spill response
   2. What mechanisms could facilitate access for academic researchers during oil spill?
   
   *(Groups take a Break when needed)*

1130   Group Reports from Breakout Session II

1215   Lunch

1300   Breakout Group Session III:
   1. Recommendations for implementation strategies
   2. Metrics for evaluating success of best practices for NOAA ORR

1415   Break

1430   Group Reports from Breakout Session III

1515   Plenary Discussion

1600   Closing comments including points of agreement & moving forward

1630   Adjourn

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**Specific objectives of the workshop include:**

- Develop best practices for advancing NOAA ORR interaction with the academic community during response, enabled by relationships built during the preparedness phase.
- Build relationships and foster understanding of the roles and responsibilities of the oil spill response/assessment scientific community and the academic community, including an understanding of each other’s strengths and limitations.
- Develop mechanisms that facilitate access for academic research during oil spills.
- Develop implementation recommendations and metrics for evaluating success.
Appendix B

Workshop Participants
LEVERAGING SCIENCE AND ACADEMIC ENGAGEMENT DURING INCIDENTS

June 25 & 26, 2019
The Bay Conference Center, Tiburon, CA

PARTICIPANTS

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Appendix C

Workshop Presentations
Leveraging Science and Academic Engagement During Incidents

June 25 & 26, 2019
Tiburon, CA

A partnership between
NOAA ORR’s Emergency Response Division and Coastal Response Research Center

Logistics

- Fire Exits
- Restrooms
- Cell Phones/Email: “Let It Go”
- Breaks: (coffee, tea, soda, water, snacks)
- Bring your own water bottle to refill
- Meals: $30 per person (menu in packets)
- Packet contents
- Logistical Questions: See Kathy Mandsager or me
Coastal Response Research Center

- Partnership between NOAA’s Office of Response and Restoration and the University of New Hampshire
- Since 2004
  - UNH Co-Director - Nancy Kinner
  - NOAA Co-Director - Benjamin Shorr
- CRRC in UNH School of Marine Science and Ocean Engineering (SMSOE)

Overall CRRC Mission

- Conduct and oversee basic and applied research and outreach on spill response and disaster preparedness
- Transform research results into practice
- Serve as hub for spill and disaster response R&D
- Facilitate workshops bringing together ALL STAKEHOLDERS to discuss spill issues and disaster preparedness/response
Leveraging Science and Academic Engagement Workshop

Purpose and Overview

Scott Lundgren
Chief, Emergency Response Division
NOAA Office of Response and Restoration

Thanks

Organizing Committee

- Nancy Kinner, CRRC, UNH
- Scott Lundgren, NOAA ORR ERD
- Yvonne Addassi, CA OSPR
- Chris Barker, NOAA ORR ERD
- Carl Brown, Canada ECCC
- Carl Childs, NOAA ORR ERD
- Lisa DiPinto, NOAA ORR
- Ken Lee, Canada DFO
- Steve Lehmann, NOAA ORR ERD
- Paul Schuler, OSRL
- Steve Sempier, MS/AL Sea Grant
- Kevin Sligh, USCG MER
- Ann Hayward Walker, SEA Consulting
- Chuck Wilson, GOMRI
Thanks

Important Contributions

• California Dept. of Fish and Wildlife, Office of Spill Prevention and Response

• Gulf of Mexico Research Initiative

• RADM Peter Gautier, Commander 11th Coast Guard District

• Panelists and Presenters

• You!

Drivers and Mandates
13,833 papers with "Oil Spill" as topic, 1,172 in 2018 30% more papers in the last 8 years compared to prior 40 years.

Early Needs for Science Engagement

- Argo Merchant, 1976: “The DOC/NOAA response in providing scientific investigations was invaluable to the OSC during the actual response efforts and in providing public information.” ... "Each OSC should be assigned a scientific advisor ... for the duration of the response action to interface with the scientific community on scene... Argo Merchant Oil Spill On-Scene Coordinator’s Report 1977

- SSCs, including coordination with scientific community then included in the U.S. National Contingency Plan (40 CFR 300.145)
Challenges and Successes in a SONS-Scale Event

“Biggest challenge during the Gulf oil spill was whole of science.”
— ADM Paul Zukunft, confirmation testimony for USCG Commandant

“Academia provides us the luxury to move slowly with the goal of perfection”
— Dr. Chris Reddy, How Science Failed During the Gulf Oil Disaster

“[During a crisis] peer review is the biggest problem with academia”
— Juliette Kayyem, Asst. Sec. DHS during the DWH response

“…the three science teams [critical to quantify and control the Macondo well] included individuals from academia, government, and industry. Each team was created de novo to meet a specific need. Teams advised the NIC, who made decisions about response efforts…”
— Dr. Marcia McNutt, USGS Director, DWH Flow Rate Technical Group Lead (McNutt et al. in PNAS, 2012)

Expectations and Mandates

• NCP 300.145 Special teams … (c) Scientific Support Coordinators (SSCs) may be designated by the OSC … as the principal advisors for scientific issues, communication with the scientific community…

• NCP § 300.185 Nongovernmental participation…. (a) Industry groups, academic organizations, and others are encouraged to commit resources for response operations. Specific commitments should be listed in the RCP and ACP, [Planholders] must be able to respond to a worst case discharge to the maximum extent practicable, and shall commit sufficient resources to implement other aspects of those plans…. (b) … The SSC may act as liaison between the OSC/RPM and such interested organizations.

• FWPCA Amendment 33 USC 1321 (j)(4)… Each Area Committee Shall… (v) compile a list of local scientists, both inside and outside Federal Government service, with expertise in the environmental effects of spills of the types of oil of transported in the area, who may be contacted to provide information or, where appropriate, participate in meetings of the scientific support team convened in response to a spill…
Examples of Incident Engagement Frameworks

- RRT Region 6 Science and Technology Advisor
- Boundary Organizations: SeaGrant Oil Spill Science Outreach
- California Framework
- Rhode Island Scientific Support For Environmental Emergency Response
- Department of Interior Strategic Sciences Group
- Canada Research Program
- USCG / Florida Inst. Oceanography MOU
- Alaska Oil Spill Technology Symposium
- Incident-Specific solutions:
  - Science Liaison/Tables (multiple incidents);
  - DWH Flow Rate Technical Group, Operational Science Advisory Team, Joint Advisory Group

Workshop Objectives

- Develop best practices for advancing NOAA ORR interaction with the academic community during response, enabled by relationships built during the preparedness phase.
- Build relationships and foster understanding of the roles and responsibilities of the oil spill response/assessment scientific community and the academic community, including an understanding of each other’s strengths and limitations.
- Develop mechanisms that facilitate access for academic research during oil spills.
- Develop implementation recommendations and metrics for evaluating success.
Meeting Products

- Copies of slide presentations
- Workshop report
- All materials posted on CRRC website

Coastal Response Research Center

https://crrc.unh.edu/academic_science
Workshop Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tr>
<td>0830</td>
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</table>
1045  **Break**

1100  **Plenary: Overview of Current Models**

1. Description of Model
2. How is this model codified?
3. What is the protocol for activation/operationalizing?
4. Is there a catalog/directory of researchers?
5. What is the funding mechanism or financial realities?
6. How does this model support operationally relevant decision-making?
7. To what end are academics getting involved? To help with the response or access for data collection for their own research that will improve a later response? Share knowledge (both responders & researchers) for improving response overall?
8. Does the model facilitate academic access? Note best practices and/or challenges.
9. Does the model address any of the issues listed in Breakout Group 1 below?

- Reconciling responder imperatives with academic modalities:
  - **Topic 1:**
    - Timeframes for Responding
    - Operational and Command Interface
    - Bridging Culture and Experience Between Responders and Academia
  - **Topic 2:**
    - Health and Safety Issues
    - Financial Realities and Funding
    - Legal and Liability Issues

"Science and Technology Advisors", Ann Hayward Walker and Mike Sams, RRT Reg. 6 (remote)

"Boundary Organizations, Oil Spill Science and Response: Sea Grant Oil Spill Science Outreach Team", Monica Wilson, Sea Grant

"California Framework", Yvonne Addassi, CA Office of Spill Prevention and Response

"Scientific Support for Environmental Emergency Response (SSEER)", Peter August, University of Rhode Island (URI) Coastal Institute

"DOI Strategic Sciences Group", Kristin Ludwig, U.S. Geological Survey (remote)

Canada Research Program, Ken Lee, Fisheries and Oceans Canada

University of South Florida, FIO, David Hollander

Alaska Oil Spill Technology Symposium, Jessica Garrow, University of Alaska, Fairbanks

1215  **Lunch**
1315 Current Models, Continued
1430 Overview of Breakout Group / List discussion questions
1445 Break
1500 Breakout Session I (mixed group of participants)
   Reconciling responder imperatives with academic modalities:
   1. Topic 1:
      a. Timeframes for Responding
      b. Operational and Command Interface
      c. Bridging Culture and Experience Between Responders and Academia
   2. Topic 2:
      a. Health and Safety Issues
      b. Financial Realities and Funding
      c. Legal and Liability Issues
1630 Overview of Day 2 Activities
1645 Adjourn

Wednesday, June 16, 2019
0830 Recharge & recalibrate
0845 Group Report Cuts
0945 Breakout Group Session II:
   1. Characteristics of best practices for NOAA ORR academic participation in spill response
   2. What mechanisms could facilitate access for academic researchers during oil spill?
    (Groups take a Break when needed)
1130 Group Reports from Breakout Session II
1215 Lunch
1300 Breakout Group Session III:
   1. Recommendations for implementation strategies
   2. Metrics for evaluating success of best practices for NOAA ORR
1445 Break
Facilitation Pledge

- I will recognize and encourage everyone to speak
- I will discourage side conversations
- I commit to:
  - Being engaged in meeting
  - Keeping us on task and time
- Stop me if I am not doing this!
Participation Pledge

- Be Engaged
  - Turn off cell phones and computers, except at breaks
- Listen to Others
- Contribute
- Speak Clearly: We will need to repeat questions for those on WebEx
- Learn from Others
- Avoid Side Conversations

Participant Introductions

- Name
- Affiliation
- Job
- Reason for participating in workshop
Breakout Session I

- Reconciling responder imperatives with academic modalities:
  - Topic 1:
    - Timeframes for Responding
    - Operational and Command Interface
    - Bridging Culture and Experience Between Responders and Academia
  - Topic 2:
    - Health and Safety Issues
    - Financial Realities and Funding
    - Legal and Liability Issues

Breakout Session II

- Characteristics of best practices for NOAA ORR academic participation in spill response

- What mechanisms could facilitate access for academic researchers during oil spill?
Breakout Session III

- Recommendations for implementation strategies
- Metrics for evaluating success of best practices for NOAA ORR
National Contingency Plan and Incident Management for Spill Response Overview

Captain Mark Shepard
Commander, National Strike Force
Commanding Officer, National Strike Force Coordination Center

Leveraging Science and Academic Engagement During Incidents
June 25-26, 2019 – The Bay Conference Center, Tiburon, CA

Strategic Framework for Preparedness & Response

Clean Water Act (CWA)
Federal Water Pollution Control Act (FWPCA)
Oil Pollution Act (OPA 90)

Response
Planning and Preparedness
Enforcement

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
(aka Superfund)

National Oil & Hazardous Substances Pollution Contingency Plan (NCP)
Regulation at 40 CFR part 300 implementing oil/hazmat response authorities
NCP Establishes the National Response System (NRS)

- NRS comprised of...
  - National Response Team (NRT) (15 Federal Agencies)
  - National Response Center (NRC)
  - 13 Regional Response Teams (RRTs) – Regional Contingency Plans
  - Federal On-Scene Coordinators (FOSCs)
  - Area Committees – Area Contingency Plans (ACP)
  - State, Local, Tribal, Territorial Governments (e.g. SOSC, LOSC)
  - Regulated Industry (e.g. RPIC) – Contingency Plans (VRP & FRP)
  - Special Teams (including Scientific Support Coordinator (SSC))
  - Joint Response Teams w/neighboring countries

Response Priorities

40 CFR 300.317

1. Safety of human life.

2. Stabilization of the situation including protection of property.

3. Ensure response efforts use all necessary containment & removal tactics to effectively respond/minimize adverse impacts.

4. All parts of national response strategy should be addressed concurrently.
Goal of Spill Response

Minimize . . .
the Adverse Impacts and Consequences
of the Incident

and . . .
Maximize . . .
Public Confidence
&
Stakeholder Satisfaction

Operational Framework for Response

• Incident Command System (ICS) - tool for organizing, planning, leading and controlling response operations
  • Based upon Management By Objectives (MBO)
  • USCG Incident Management Handbook (IMH) 2014 (available on App Store (free), or USCG Homeport)

• Key components:
  • Unified Command (UC) consisting of representatives from FOSC, SOSC, and RPIC
  • SSC and/or Scientific Support Coordinator advisors to UC
  • Integrated Command and General Staffs including Assisting, Cooperating, Coordinating Agencies
  • Planning Cycle
  • Incident Action Plan (IAP) that operationalizes established Contingency Plans
  • Shared Priorities and Objectives
  • Incident plans and procedures
Basic Organization
(Expanded Organization see IMH 20-4)

Questions?
Final Note - sometimes you need to build a new scientific approach or solution driven-by or using the Best Available Science and Technology (BAST)
Case Study 1: Deepwater Horizon

Leveraging Science and Academic Engagement During Incidents
June 25-27, 2019
Tiburon, CA

Outline

• Academic Roles in the Response Phase of DWH
• Evolving Academic Roles in Injury Assessment & Oil Spill Preparedness (fighting the next war.....)
• Lessons Learned from many perspectives.....
Categories of Recommendations for Further Investment

Add-in a category for original siting decisions

Adding Siting Decisions as a Category especially for Ultra-deep wells

Based on ICCOPR 2015
**Roles of Academics Played in DWH – Response Phase**

**Academics Imbedded in a Number of Government-Sponsored Mechanisms**

- *Ad Hoc* Response Teams, under authority of the National Incident Command (NIC)
  - Interagency Solutions Group (IASG) “Whole of Government” approach
    - Spawned seven sub-groups responsible for various activities:
      - e.g., Flow rate Technical Team (FRTT): Well Control, Flow Rate Estimation
      - Joint Analysis Group (JAG): Plume dynamics, SSDI monitoring
      - Plume tracking and Shut-in Monitoring (L. Mayer, UNH)

- Academics Empaneled to Give Advice on Technical Issues
  - e.g., *Deepwater Horizon* Dispersant Use Meeting, May 26-27, 2010 (sponsored by UNH)

- Academics Contracted for Specific Tasks in Support of the NIC
  - e.g., Biodegradation studies, measurements of flow rate at the well head

- Academics Collecting Data Independently through various Funding Mechanisms
  - NSF RAPID Grants, Re-Purposing of scheduled activities, funding from state sources

**This Presented Initial Coordination and Messaging Issues**

To Address the Coordination Issue, three workshops/listening sessions occurred During DWH

(1) University of South Florida
(2) Mississippi State University
(3) Tulane University (in the Chapel)

Considerable input from the academic community regarding response and impacts, yet no formal mechanisms existed for coordinated government, industry and academic responses, nor a funding mechanism in OPA-90 to rapidly entrain scientific expertise

From this lack of mechanism, GOMURC was Formed.....
**Gulf of Mexico University Research Collaborative**
Currently comprised of 80 institutions in the Gulf

**Mission:**
GOMURC is a multi-state university-based research consortium collaborating to promote scientific knowledge, workforce development, and understanding that informs natural resource management decisions at state, regional, national and international levels.

**Strategic goals:**
1) Science for Recovery and Sustainability- work to ensure Gulf ecosystem restoration and resource management are based on the best-available science information and practices;
2) One Gulf Network- engage scientists, engineers and educators from across all bordering Gulf nations; and
3) Next Generation- educate and train the experts required to handle the science and engineering needs for future generations

---

**Beyond the Initial Response.....**

Considerable Investment in DWH Impact Assessment/Recovery and other Research Affecting siting, preparedness, and Response

Academics heavily involved in NRDA-sponsored Injury Assessment and Resource Recovery via Trustee Implementation Groups (TIGS) =7 (5 states, region-wide, Open Ocean)

$1 billion in funding primarily directed to the academic community from GoMRI (Gulf of Mexico Research Initiative) and the National Academy of Sciences Gulf Research Program (GRP)
The ultimate goal of the GoMRI will be to improve society’s ability to understand, respond to and mitigate the impacts of petroleum pollution and related stressors of the marine and coastal ecosystems, with an emphasis on conditions found in the Gulf of Mexico. Knowledge accrued will be applied to restoration and to improving the long-term environmental health of the Gulf of Mexico.

Much of the GoMRI-sponsored research bears on response...
Planning using Scenarios of Future Deepwater Spills

What about a Spill off Cuba?

Table 20.3  (A) Rank table from least to most impactful (1–4, color coded green to red), for the tested scenarios and variables. (B) Rank (Pearson) correlation coefficients between the different variables in terms of scenarios’ ranks, color coded from blue (negative) to red (positive)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Sediment mass</th>
<th>Beached mass</th>
<th>Shoreline length</th>
<th>Oiled area</th>
<th>Toxic area</th>
<th>Oiled volume</th>
<th>Toxic volume</th>
<th>Min Biomass</th>
<th>Years to Min</th>
<th>Biomass Change</th>
<th>Mean</th>
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</thead>
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<tr>
<td>DB Cont.</td>
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<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2.2</td>
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<td>DB Fall</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
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<td>2</td>
<td>2</td>
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<td>3</td>
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<td>DB AL3</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1.9</td>
</tr>
</tbody>
</table>
How Well Does SSDI Work?

One of the Really Important Unresolved Questions from *Deepwater Horizon*

Lessons Learned & Evolving Roles for Academics

- Academics have important roles to play in consequential national emergencies because of their broad disciplinary expertise (there are experts on virtually everything out there...)
- If left to their own devices they can make mischief....
- The Lack of a single point of contact for the “community” has largely been solved with GOMURC and other mechanisms
- In order for these partnerships to be effective in emergencies, they need to be used and exercised
Back-up Slides
<table>
<thead>
<tr>
<th>Science/Technology Priority</th>
<th>Deep Water Oil and Gas Requirements Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A-siting</td>
</tr>
<tr>
<td>Improved water column oceanography (surface, pelagic,</td>
<td>Exceptional</td>
</tr>
<tr>
<td>ultra-deep current flow rates, ambient conditions)</td>
<td></td>
</tr>
<tr>
<td>Improved 4-D oil spill transport</td>
<td>High</td>
</tr>
<tr>
<td>&amp; weathering models</td>
<td></td>
</tr>
<tr>
<td>Risk-Based Siting Models</td>
<td>Exceptional</td>
</tr>
<tr>
<td>Social and economic</td>
<td>High</td>
</tr>
<tr>
<td>dependency and spill impacts on communities</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Science/Technology Priority</th>
<th>Deep Water Oil and Gas Requirements Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A-siting</td>
</tr>
<tr>
<td>Modeling factors controlling MOSSFA intensity/distribution</td>
<td>Low</td>
</tr>
<tr>
<td>Deep oil reservoir characteristics (oil type, depth,</td>
<td>Exceptional</td>
</tr>
<tr>
<td>temperature, pressure, GOR, rock and sediment strata,</td>
<td></td>
</tr>
<tr>
<td>etc.)</td>
<td></td>
</tr>
<tr>
<td>Enhanced sub-surface situational awareness capability</td>
<td>Medium</td>
</tr>
</tbody>
</table>
### Science/Technology Priority

<table>
<thead>
<tr>
<th>Deep Water Oil and Gas Requirements Categories</th>
<th>A-siting</th>
<th>B-prevent</th>
<th>C-prepare</th>
<th>D-response</th>
<th>E-injury</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relationship between SSDI and fate of oil constituents including VOCs</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>Low</td>
<td>Exceptional</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Relationships between SSDI and surface applications of dispersants</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>High</td>
<td>Exceptional</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Field-Based SSDI Experiments</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>High</td>
<td>Exceptional</td>
<td>High</td>
</tr>
<tr>
<td><strong>“Spill of Opportunity” SSDI Measurements (droplet sizes)</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>High</td>
<td>Exceptional</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Lab-based high pressure/low temperature experiments with and w/o dispersants</strong></td>
<td>N/A</td>
<td>Low</td>
<td>High</td>
<td>Exceptional</td>
<td>Medium</td>
</tr>
</tbody>
</table>

### Science/Technology Priority

<table>
<thead>
<tr>
<th>Deep Water Oil and Gas Requirements Categories</th>
<th>A-siting</th>
<th>B-prevent</th>
<th>C-prepare</th>
<th>D-response</th>
<th>E-injury</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chronic vs. acute toxicity studies and protocols specifically for deep biota</strong></td>
<td>Low</td>
<td>N/A</td>
<td>N/A</td>
<td>High</td>
<td>Exceptional</td>
</tr>
<tr>
<td><strong>Assess historical recovery rates of various resources exposed to previous spills and mitigation techniques</strong></td>
<td>High</td>
<td>N/A</td>
<td>N/A</td>
<td>High</td>
<td>Exceptional</td>
</tr>
<tr>
<td><strong>Evaluate recovery rates of various biota in laboratory and mesocosm experiments</strong></td>
<td>Low</td>
<td>N/A</td>
<td>Low</td>
<td>Medium</td>
<td>Exceptional</td>
</tr>
</tbody>
</table>
Accidents Happen at a Greater Rate offshore
In the USA > 500 million barrels of "produced water" were discharged in 2017
Est, 14,000 barrels of crude

The First Comprehensive Baseline for oil contamination in Fishes

**General Vision for CARTHE:**

*Transport modeling from the first mile to the last mile...*
**Highlights of Near-Surface Research by CARTHE**

**Basic Questions:** Where will the oil go? How fast? How much?

**Methods:** Large air-sea expeditions with multi-sensor data over the same ocean patch

---

**CARTHE’s Most Practical Application**

**Hercules Gas-Oil Leak (2013) – Drifters Deployed in a Real Response Event**

(Romero et al., JGR Oceans, 2016)
Langrangian Coherent Structure analysis

Surface drifters deployed near the Hercules 265 site (blue dots), the evolution of attracting LCS (red curves), and the boundary of a coherent Lagrangian eddy (green curve) extracted from altimetry-derived currents. (Romero et al., Figure 6)
Massive Deployments Using A New Compact Biodegradable Drifter Allowed Us to Observe The Ocean’s Surface Uninterrupted for Months Under ALL Conditions

- Details published: Novelli et al., JTECH, 2017
- Patented and made commercially available: Pacific Gyre
- Selling at 300 drifters/year, a dozen countries so far
- Air-deployment capability in progress
Drifters vs Crude Oil at Ohmsett: Novelli, Boufadel, O zgokmen, in progress…

Tracking Fronts From Research Vessel: X-Band Radar

Antenna at 12.5m; 9.4 GHz; 7.5m resolution; 3 km radius

Radar–Drifter Comparison

Agreement with 4 cm/s, 12 degrees (Lund et al., JTECH, 2018)
How Fast Do Substances Move at the Air-Sea Interface?

Challenging measurement... Laxague et al., GRL, 2018: 4 times faster at 1 cm than at 10 m!

Mapping Frontal Features Using 1 m Aerial SST (J. Molemaker's work):
Drifter Deniers:
“Drifters do not drift like oil, so it is unclear that they are useful...”
Lagrangian Submesoscale Experiment LASER: 1000 drifters deployed around DwH site (D’Asaro et al, Proceedings National Academy Sciences, 2018)

Modeling and aerial SST guided deployments:

Collapse from the size of a city to the size of a conference room; 1 million-fold area reduction!

CARTHE in the Urban Zone:

Port/riverine outflows, Miami Beach pumping, nuclear reactor in the Bay… coastal areas under stress!!

Citizen science to increase awareness about coastal currents and pollution
Refugio Pipeline Spill: 
an Academic Engagement Opportunity

Jordan Stout
NOAA Scientific Support Coordinator

Office: (510) 437-5344
Cell: (206) 321-3320
24-hour Spill Line: (206) 526-4911
E-mail: jordan.stout@noaa.gov
NOAA’s Refugio Response Support

- Oil fate & transport
- Submerged oil assessment
- Weather forecasting
- Chemistry support
- Wildlife Operations
- Resource at Risk / protection priorities
- Endangered Species Act consultations
- Applied Response Technologies (ARTs)
- RRT-9
- SCAT Support
- Engaging academics
- Liaison & JIC Support
- Data management
- ERMA
- Remote sensing & UAS
- Supported science “seminars” for the UC
- And, of course, a whole lot of NRDA...
Engaging Academics/Researchers

Big/visible spills prompt lots of research interest
- Platform A blowout – 46 scientific papers w/in 2 years
- Exxon Valdez – 165 papers w/in 2 years
- Deepwater Horizon – 989 papers w/in 2 years, 8,113 papers over 8 years

Since Deepwater Horizon, efforts to increase science partnerships in emergencies

How to balance the research value from “spills of opportunity”, ensure safety & not hinder the Response?

Refugio - Academic Engagement

Researcher site access requests (w/Liaison Officer)
Provided for ephemeral sampling on legitimate projects by researchers not otherwise engaged in the Response or NRDA. Not a funding mechanism.

Source oil
A few liters of source oil were obtained & stored by NOAA for later distribution among researchers. Some limitations on projects that could receive oil. Required vetting by agency attorneys (e.g. USCG & Trustees). Issues / constraints may vary by incident.

Science Seminars for the UC
NOAA ERD and UCSB scientists gave informal, lunchtime talks on:
- Natural seeps
- Oil fate & transport
- Connection between platforms & local seep activity

Informal updates to several DWH researchers off-site
Researcher Access Request

Managed by Liaison Officer:
- Screen for legitimate projects (not evaluate quality of science)
- De-conflict with Response
- Obtain sign-off by UC

Checklist included:
- General nature of project
- Method of site access
  - Shoreside
  - On-water
  - Dive operations
  - Aerial
- Safety considerations (PPE, safety plan & briefs, decon, etc)
- Credentialling & check-in

Scientific Research: Checkoff in accompanying General Message (GEM):
Please provide a summary of proposed research with and the expected site and personnel of research. Include location, Reference of site visit, and timelines of the project.

- What will the research be about (Include all that apply):
- On-shore
- On-water
- Aerial

- Please list all personnel doing the research and provide contact information.
- Will researcher provide their own PPE?
- Will researcher influence the response to accommodate their equipment?
- Do they have their own liability coverage through their academic institution?
- Are there issues with access?
- Are there issues with law enforcement or DoD?

- Are all staff involved in the project WILDLIFE certified?
- Did the researcher receive any equipment and/or supplies from the response?
- Define researcher's existing payment from the response? If so, please provide estimated start and stop dates.

- Please include a description of vehicles (boat, etc.) and, including deployinguncharming (UPS).
- If the project is approved by the Incident Command:
  - Contact the you have.
  - The incident commander is also in the safety plan containing the site safety plan (SFP). If you are not part of it:
  - Tell all appropriate responders implementing the project.

Questions?

NOAA
Emergency Response Division
www.response.restoration.noaa.gov

Jordan Stout
NOAA Scientific Support Coordinator
Cell (206) 321-3320
Mobile (206) 526-4911
E-mail joordan.stout@noaa.gov
Needs Addressed

1. Apply academic/scientific knowledge to strengthen oil spill decisions
   - Science subject matter experts (SMEs) = physical, health, decision, social
   - Need also being addressed in Virginia
   - Also, new appendix CGD8 coastal ACPS: Environmental Health Support During Emergency Response

2. Institutional way to prompt consideration during response & manage expectations
   - SSCs nearing retirement, FOSCs multi-missions

3. Align with USCG policy guidance to create regional practice

4. Nothing prescriptive
Workshop Questions

- Description of “Model”
- How is this model codified?
- What is the protocol for activation/operationalizing?
- Do you have a catalog/directory of researchers?
- What is the funding mechanism or financial realities?
- How does this model support operationally relevant decision making?
- Share knowledge (both responders & researchers) for improving response overall? To what end are academics getting involved? To help with the response or access for data collection for their own research that will improve a later response?
- Does your model facilitate academic access? Note best practices and/or challenges.
- Does the model address any of the issues listed in Breakout Groups?

Description of “Model”

- Draft concept was GOMRI-funded under the Coastal Waters Consortium, presented to RRT 6 for consideration/finalization
- Adaptable, scalable
- Develop response capability during preparedness
  - Directory
  - Procedures
  - Plan input
  - Exercise participation

Contents (6 pages)

1. Purpose
2. Background
3. Overview
4. Preparedness-specific guidance
5. Response-specific guidance
6. Situational awareness and safety
7. Information sharing
8. Funding
Codification of the “Model”

- Appendices 41 and 42 of the Region 6 Regional Contingency Plan (3/19)
- This has become part of Region 6 oil and hazmat spill policy

NOTE: Second specialist was also drafted for consideration “Seafood Liaison Specialist,” is Appendix 42, e.g., collaborate with Sea Grant Fishery Extension Agents

What is the protocol for activation/operationalizing?

- **During response**
  - The FOSC or NOAA SSC identifies need for S&T advisors from the academic community, other organization.
  - Can respond via phone or on-scene, e.g., incident command post
  - Prefer to ascertain interest and knowledge BEFORE a significant incident occurs via directory
Do you have a catalog/directory of researchers?  

- **See handout**
  - “SME Support for Informing Oil Spill Planning and Response Decisions”

- Ready-to-use method to develop a directory of SMEs
  - Incorporated review comments by multiple practitioners and researchers

- Design criteria: “low burden” method using Survey Monkey

---

**CONTENTS**

- 19 questions
- Expertise section categories, with additional subheadings:
  - Human populations
  - Oceanography and geology
  - Oil pollutant/chemistry
  - Habitats
  - Biological resources
  - Dispersants, other chemicals and ISB
  - Other specialties
  - Pollutant/oil tracking and monitoring

---

To be determined – who will manage?

---

Example Q5: How willing would you be to participate in science meetings during an incident, either at the incident command post or offsite?

![Percentage of Respondents](chart.png)

- Very Willing: 22.22%
- Fairly Willing: 48.15%
- Somewhat Willing: 18.52%
- Hardly Willing: 7.41%
- Not at all Willing: 3.70%
Example Q9: I am only interested in research activities; I do not wish to provide input to spill decision making.

- Oil Pollution Act of 1990 (OPA 90)
- Oil Spill Liability Trust Fund (OSLTF)
- National Pollution Funds Center (NPFC) assures adequate funding for the FOSC to respond and that the polluter pays for the response.

- When *authorized by the FOSC*, **response expenses** can be reimbursed by NPFC.
- Written authorization must be received prior to incurring reimbursable expenses.
How does this “model” support operationally-relevant decision making?

- Recognizes that academia provides, potentially, greatest number of S&T subject matter experts
  - Other SMEs too, e.g., fisher local knowledge, chemical manufacturers for HAZMAT
- Facilitates S&T engagement. Examples:
  - Site-specific currents affecting the movement, distribution, and entrainment areas of floating oil
  - Local knowledge about resources at risk, e.g., area, seasonal, and life stage distribution of marine life
  - Activities that contribute to the understanding of actual injury, e.g., NRDA
  - Investigate issues of importance to response, mitigation, injury, and recovery, but may not be immediately relevant to the current emergency, providing funding from within or outside the response is available.

Additional Considerations

- Share knowledge (both responders & researchers) for improving response overall?
  - Yes
- To what end are academics getting involved?
  - Formal engagement in Virginia for geographic-specific plans, training and full scale Area Exercise (Sept. 10-13, 2019)
  - Limited distribution of questionnaire to date
- To help with the response or access for data collection for their own research that will improve a later response?
  - Yes, Questions 11, 17, 19 + expertise categories
Does your model facilitate academic access?

• Yes
  • Defines regional, generic policy space to facilitate activating resources when needed
  • Guidance, not prescriptive or restrictive

• Best practices and/or challenges?
  • Best Practices
    • Will know better after September exercise in Virginia
  • Challenges
    • Implementation and management of directory questionnaire – someone interested in long term maintenance and sharing?

Does the model address any of the issues listed in Breakout Groups?

• Timeframes for Responding - Yes
• Operational and Command Interface - Yes
• Bridging Culture and Experience Between Responders and Academia - Yes
  • Via pre-spill collaboration, ICS training, flexible (recognizes teaching commitments)
  • Fulfills “Broader Impacts” considerations, e.g., National Science Foundation
• Health and Safety Issues - Yes
• Financial Realities and Funding - Yes
• Legal and Liability Issues – Yes
  • Information Sharing and Safety sections
Boundary Organizations, Oil Spill Science and Response:
Sea Grant Oil Spill Science Outreach Team

Monica Wilson & Steve Sempier

Leveraging Science and Academic Engagement During Incidents
Tiburon, CA
June, 2019

Description of Sea Grant Model

• NOAA and State support
• Nationwide network of 34 programs
• University-based programs
• Application
  • Two-way communication
  • Trust
  • Non-advocacy
  • Science to application
  • Boundary organization

Science Serving America’s Coasts

gulfseagrant.org/oilspilloutreach
Deepwater Horizon

• Sample activities
  • Engage with fishing and tourism communities
  • Peer listening trainings
  • Meetings, workshops, trainings
    o Four months
    o 83 events
    o At least 6,400 participants

Deepwater Horizon

• Clearinghouse of oil spill information (website)

• Research
  • Research needs survey
  • Directory of research underway
  • Planning, facilitating, and presenting

• Fisheries-based support within Incident Command
Oil Spill Science – Outreach Team

Chris Hale
Emily Maung-Douglass
Steve Sempier
Tara Skelton
Missy Partyka
Monica Wilson

Two-Way Exchange
Response/Academia

Sharing peer-reviewed, published science

- Science seminars, workshops, & input sessions
- Science outreach publications
- Researcher/Responder workshop series
- Bringing scientists to AC meetings RRT meetings
- Connect SSC to Sea Grant programs and academics
- NAS/SG collaborative workshop series
- Regional meetings
- SETAC, bring in response
- National conferences
Bridging Academia and Response

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Number in Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Aransas, TX</td>
<td>April 14, 2015</td>
<td>35</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>February 6, 2017</td>
<td>58</td>
</tr>
<tr>
<td>Biloxi, MS</td>
<td>October 26, 2017</td>
<td>56</td>
</tr>
<tr>
<td>Mobile, AL</td>
<td>November 13, 2017</td>
<td>35</td>
</tr>
<tr>
<td>St. Petersburg, FL</td>
<td>April 24, 2019</td>
<td>30</td>
</tr>
</tbody>
</table>

What role can academia play in response?
• Attend local Area Committee Meetings
• Help communicate/share science, maintain transparency

How can response contribute to research opportunities?
• Share data gaps
• Provide response training for scientists

Challenges
• Funding
• Communication

Solutions/Tools/Strategies
• Made data and surveys available
• Share science with industry, state, and local agencies

Thank you!
Questions?

Monica Wilson
monicawilson447@ufl.edu

Steve Sempier
stephen.sempier@usm.edu
➢ Workshop series
➢ Bringing scientists to AC meetings RRT meetings
➢ Connect SSC to Sea Grant programs and academics
➢ NAS workshops
➢ Regional meetings
➢ SETAC, bring in response
➢ National conferences

Sea Grant/GoMRI Oil Spill Outreach Program

• First large privately funded, regional Sea Grant effort in the Gulf of Mexico
  • Four specialists devoted to oil spill science
  • Initial two year investment

• Program Goal
  • Two-way transfer of information
    • Share oil spill science with target audiences
    • Identify target audience needs
  • Evaluation

• New grant cycle 2016-2020

[gulfseagrant.org/oilspilloutreach]
Opportunities for Sea Grant/OR&R

 Focus: Oil spills and Health, Economic, and Social Impacts
 Structure (not a seminar)
  • Presentations
  • Discussion
  • Interaction
 Focus
  • Preparing communities for future events
  • Regional relevance
  • National relevance

NOAA and Sea Grant

 Sea Grant has many partnerships through NOAA
 Provide extension-related services
  • Coastal Storms Program
  • Sentinel Site Program
  • National Water Center

[Images and logos]
Potential Roles in Preparedness

- Joint academic/response work
  - AC presentations
  - RRT presentations
  - Build bridges between academia and response

- Transfer response-related research needs

- Communications-related support
  - Joint publications, figures, presentations

- Extension work for ICCOPR

- Additional science seminars

Potential Roles in Response

- Sharing information with JIC
  - Audience questions inform JIC
  - Relaying information out of IC
  - Less formal way to get trusted information out

- Fisheries liaison (RRT 6); DWH

- Link to local community and business leaders (share information directly)

- Sea grant team visits other regions being impacted
Gulf of Mexico Research Initiative

• $500M, non-penalty funds
• 10 years
• Independent research board
• Gulf of Mexico Alliance
• Five themes
  • Movement
  • Chemistry
  • Environment
  • Technology
  • People

gulfseagrant.org/oilspilloutreach
California Framework for Scientific Access to Spill Sites

Leveraging Science and Academic Engagement During Incidents
The Bay Conference Center, Tiburon, CA
June 25, 2019

Yvonne Najah Addassi
Preparedness Branch Chief
Office of Spill Prevention and Response

California Framework: The Process

• Developed “on the fly” when researchers requested access to the Refugio Incident operations area
• Liaison Officer worked with NOAA SSC to develop a Scientific Research Checklist describing the proposed work and access desired

✓ Summary of work and deposition of data
✓ Duration, frequency of visits, and project timelines
✓ Shore side, on water, diving operations, aerial access requests
✓ Personnel and vehicles involved
✓ Proposed decontamination procedures, availability of PPE
✓ Liability coverage through academic institution
✓ HAZWOPER certification
✓ Supplies/equipment or payment requests from response
California Framework: The Process

- Liaison Officer vetted researchers’ affiliations, evaluated conflicts between incident operations and proposed work, summarized recommendations on General Message (ICS 213) for Unified Command approval
- Upon project approval, researchers coordinated directly with Operations Section
- Research personnel received credentials and safety briefing, agreed to comply with Site Safety Plan before starting work
- Approved requests were generally for continued access to existing research sites, opportunistic sampling, evaluation of impacts of spill – but model can accommodate operationally relevant studies

California Framework: Approved Projects

- Diving-based field studies
  - Ongoing sampling for SB Coastal Long Term Ecological Research Program and Reef Check California monitoring
  - Previously scheduled BOEM-funded field experiment investigating rock crab behavior near submarine power cables
  - Mapping eel grass beds
- Boat access
  - Extensive environmental sampling by USGS organic geochemistry group
  - Assessments of marine snow, oil mineral aggregation, and other sinking mechanisms
  - Benthic and water column video transects and testing low-cost micro-ROV viability
- Requests for samples of spilled oil for laboratory experiments by researchers at various academic institutions
California Framework: Considerations

• Researchers with established projects in the area had experience working with seep oil, possessed appropriate certifications
  • Those without HAZWOPER had to acquire training or have restricted access to operations area
• Mediating requests put some strain on Liaison Officers
  • Lacked first-hand knowledge of research institutions, legitimacy of “research-adjacent” groups
  • Handling intense local interest and research requests stretched capacity
• Does not include funding mechanism; researchers leveraged existing funding

California Framework: Moving Forward

• Build on connections made with academic institutions’ scientific diving and boating safety programs, establish processes/agreements
  • Workgroups in ACPs could facilitate training opportunities and communication among scientific and response communities
• Formalize a system for receiving, approving, coordinating requests
  • Initial requests could be handled through Liaison, and a Research Coordination Unit established in Planning if there is sustained interest from researchers
  • Clear criteria for vetting of affiliations and projects
  • Process could be tested/refined at exercises
THANK YOU!
SSEER
Scientific Support for Environmental Emergency Response
Rhode Island Department of Environmental Management &
University of Rhode Island Coastal Institute

2000 - Present

Peter August, URI Coastal Institute
Judith Swift, URI Coastal Institute
Amber Neville, URI Coastal Institute
Greg Bonyne, URI Environmental Data Center
James Ball, RI DEM
Steve Lehmann, NOAA Emergency Response Division
https://ci.uri.edu/ventures/sseer/

The Model

Jim Ball, DEM Emergency Response

Unified Command
USCG, RIDEM, RP
(NOAA: Science Advisor)

Judith Swift, Director
Amber Neville, Coordinator
Peter August, Field Manager
Greg Bonyne, GIS & Drone Manager

SSEER Roster
Why SSEER?

- RI heating oil stock low
- Eklof Marine tug and North Cape barge sent to RI
- Transporting 3.9 million gallons heating oil
- > 50 knot winds, 8’ seas & dense fog
- Tug Scandia catches fire
- Tug and barge run aground @6:00 PM, dark and stormy
- 825,000 gallons of heating oil enter Block Island Sound
- Surf and wind rapidly disperse oil in BI Sound and water column
- RP: Eklof Marine
  Trustees: NOAA, RI DEM, USFWS
- RP quickly contracts URI faculty to assist in damage assessment
- URI faculty engaged by RP unable to serve State

How is Model Codified?

Memorandum of Understanding
Between the University of Rhode Island Coastal Institute and
The Rhode Island Department of Environmental Management
for Scientific Support of Environmental Emergency Response

Purpose Background Roles POC
Activation Services Costs

2015 – 2020
https://ci.uri.edu/files/SSEER_2015_MOU.pdf
SSEER Activation

Process...in hours, not days

1. CI Director notified by DEM ER Director
2. SSEER declared operational
3. CI & DEM identify essential disciplinary targets
4. Assign target Leads and associated personnel
5. Field Mgr & Leads ID needed equipment/resources
6. Leads complete scope of work
7. Leads employ MOU fixed rates for all personnel
8. Leads complete budget projection
9. SSEER Coordinator reviews and submits budgets
10. DEM Coordinator approves budgets
11. Leads are provided an account to charge
12. Field Manager deploys teams

Roster

95 Individuals & 15 Organizations

Disciplines
- Wildlife biology
- Chemistry
- Shellfisheries
- Ornithology
- Archaeology
- Geology
- Human ecology
- Policy
- Marine ecology
- GIS, drone recon
- Hydrodynamics
- Fisheries
- Law enforcement
- Oceanography
- Communications
- Marine mammals
- Plant ecology

Updated Annually  Available Online
Funding

$150,000 “line of credit” available to URI via RI State Purchasing for immediate use (work for hire)

Longer term funding depends on event, need, and funding source (i.e., grants)

No overhead on work for hire

Operational Decision-making

- SSEER activated by RIDEM Office of Emergency Response (ER)
- SSEER reports to On-scene State Coordinator, Jim Ball, RIDEM ER
- SSEER serves as a Natural Resource Damage Assessment resource
- SSEER provides instant expansion of GIS and mapping capacity
- SSEER vessels and analytical chemistry helpful in ER phase
Engaging Academics

- Training: annual with Emergency Response personnel
- Commitment: academic community wants to help
- Challenge/Opportunity: turnover of faculty, staff, students
- Standards: SSEER team agrees to rules & protocols
  - Data ownership
  - Embargoed: one voice w/ press
  - Chain of Custody
- Challenges
  - ICS training
  - Drills
- Research
  - Untested
Multi-Partner Research Initiative (MPRI)

The Initiative provides $45.5 million over 5 years (2018-2022) to draw upon the expertise and experience of oil spill experts in Canada and abroad.

Kenneth Lee
Ecosystem Science Directorate
Fisheries and Oceans Canada

Canadian Needs for Oil Spill Research

- Risk of accidental releases of petroleum hydrocarbons is expected to increase with increases in marine shipping traffic, especially in the Arctic,
- Anticipated increases in exploration & production of offshore oil and gas, and
- Potential increases in pipeline and rail transport along coastal regions,
- National policy gap regarding alternative response measures, e.g., dispersants
Multi-Partner Research Initiative (MPRI)

**GOAL:** To establish an integrated, global research network to advance oil spill research in Canada and enhance Canada’s level of preparedness and response capability

**FOCUS:** To advance scientific knowledge to address major gaps in oil spill response and remediation strategies that will support the development, validation and Canadian regulatory approval of Alternative Response Measures (ARMs).

**PRIORITIES:** Set in a top down fashion and aligned with recommendations of the Royal Society of Canada (RSC) 2015 Report on Behavior & Environmental Impacts of Crude Oil Released into Aqueous Environments as well as Transport Canada’s Tanker Safety Expert Panel Report

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**Multi-Partner Research Initiative (MPRI)**

**TRAINING THE NEXT GENERATION:** Nearly all projects have significant budgets for training of students and other levels of personnel (develop cadre of highly qualified personnel – HQP)

**NETWORKING:** Oil spills are a global concern. The MPRI network of projects will create valuable training opportunities in academia and industry and foster and connections with key international organizations in oil spill research

**ENGAGEMENT:** Involvement of key clients and stakeholders that include representatives from the Federal Government, Provinces and Territories, Indigenous Groups, the Oil and Gas Industry, regulators, operational oil spill response organizations, academia, fisheries groups NGO’s, and international research organizations
**Research Areas in MPRI: Alternative Response Measures (ARMs)**

The MPRI program is focused on six key areas of research to increase Canada’s response tool-box:

- Decanting and oily waste disposal
- In situ burning
- Spill treating agents
- Oil translocation
- Natural attenuation / Bioremediation
- Crosscutting Expertise

**ARMs** - complement conventional mechanical clean-up techniques while offering a net environmental benefit

About 35 funded projects; some project summaries can be found: [https://www.dfo-mpo.gc.ca/science/environmental-environnement/mpri/index-eng.html](https://www.dfo-mpo.gc.ca/science/environmental-environnement/mpri/index-eng.html)

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**Workshop Questions**

- **Description of “Model”** Research program to inform ARM policy development, strengthen oil spill preparedness and response
- **How is this model codified?** In national Oceans Protection Plan
- **What is the protocol for activation/operationalizing?** None currently
- **Do you have a catalog/directory of researchers?** MPRI to develop cadre of Highly Qualified Personnel (HQPs)
- **What is the funding mechanism or financial realities?** Cooperative research agreements (match required)
Workshop Questions cont’d

• How does this model support operationally relevant decision making? Designed to inform response questions and concerns about ARMs; many field studies
• Share knowledge (both responders & researchers) for improving response overall? YES To what end are academics getting involved? FULLY To help with the response or access for data collection for their own research that will improve a later response? YES
• Does your model facilitate academic access? YES
• Does the model address any of the issues listed in Breakout Groups? SOMEWHAT, especially Bridging Culture and Experience Between Responders and Academia

Research Collaboration with Practitioners and User Communities

• Project leads typically Canadian universities
• Global oil spill experts in government, industry and academia
• Indigenous and coastal communities
• Regulatory agencies
• Response organizations
• Most are multi-year
• Next 3 slides on example projects
Oil Translocation Participants

- Concordia University - Chunjiang AN (co-lead)
  - Ashutosh BAGCHI
  - Zhi CHEN
  - Samuel LI
  - Biao LI
  - Catherine MULLIGAN
- Owens Coastal - Ed OWENS (co-lead)
- Polaris Applied Sciences - Elliott TAYLOR
- SLRoss - Ian BUIST, James McCOURT, David COOPER
- NJIT - Michel BOUFADEL
- NRC/McGill - Charles GREER/Lyle WHYTE
- S3 - Gary SERGY
- SINTEF - Liv-Guri FAKSNES
- WCMRC - Scott WRIGHT
- First Nations - TBD (depends on Task 4 site selection)

Natural Attenuation Theme Projects (5)

- 5.06,07: Natural biodegradation of oil substrates and impacts of oil droplet size and aggregates on a predictive model development. Greer/Whyte/Boufadel, McGill University, Canada and New Jersey Institute of Technology (NJIT), USA
- 5.03: Baseline monitoring of hydrocarbon contaminants and microbial genomics along the Kivalliq transportation corridor. Stern/Sinclair, University of Manitoba, Canada
- 5.04: In situ and ex situ investigation of oil biodegradation potential in Arctic marine environments. Rysgaard/Vergeynst, Aarhus University, Denmark
- 5.08: Natural attenuation and trajectory forecasting of marine spilled dilbit in Chinese/Canadian waters. Zhang, Memorial University of Newfoundland, Canada
- 5.05: Controlled experimental oil spill in Canadian waters to evaluate remediation strategy readiness. Whyte/Greer, McGill University, Canada
Cross-cutting: ARMs Toxicology

- Essential aquatic toxicology data collection using non-standard species with customized methods and biological endpoints
- Huntsman Marine Institute conduct toxicology studies for all MPRI researchers
  - With: McGill University; University of New Brunswick; University of Manitoba; New Brunswick Innovation Foundation; Oil Spill Recovery Institute and SL Ross; Environment and Climate Change Canada

ADDITIONAL BACKGROUND SLIDES
CANADIAN CONCERNS WITH THE POTENTIAL RELEASE OF PETROLEUM IN THE MARINE ENVIRONMENT

- Spills from tankers at sea have declined
- The risk of accidental releases of petroleum hydrocarbons is expected to increase with increases in marine shipping traffic (including the Arctic), anticipated increases in exploration & production of offshore oil and gas, and potential increases in pipeline and rail transport along coastal regions

Arctic Sea-ice Cover is Decreasing

Between 1990 and 2015 the distance traveled by ships in Arctic Canada approximately tripled

Some models predict a completely ice-free Arctic as early as the end of this century


OPP/MPRI SCIENCE OUTCOMES & IMPACTS

- Improvement of global oil spill preparedness and response regimes by enhancement of science-based decision making
- Greater public confidence in the Government’s ability to respond to and remediate oil spills
- Development, commercialization and application of oil spill response strategies
- Leveraged research will reduce duplication of effort between industry, academia and government agencies
- Enhance research capability, quality of advice and coordination within the Government of Canada
- Education of highly qualified personnel (HQPs) in oil spill research

SPILL TREATING AGENTS (STAs)

Products that change the behaviour of spilled oil in the environment to facilitate response and clean up

- Research to understand and predict the effectiveness and potential environmental impacts (toxicity, sinking of oil due to interactions with suspended particles, etc) of STAs under Canadian environmental conditions.
- All projects and program areas will be using a curated set of oil types to ensure cross comparisons between projects and ARMs.

Keywords: Dispersant effectiveness, subsurface blowouts, plume behaviour/churn flow, photo-oxidation, oil droplets, oil particle interactions, surface transport, shoreline cleaning agents, bio-based agents, oil spill reconnaissance
OIL TRANSLOCATION

- An oil spill clean-up strategy based on the facilitation of oiled material transport from one environmental compartment to another that may include the enhancement of oil particle interactions
- Facilitates its physical recovery or enhances natural processes to break down the oil

Natural and Accelerated Translocation of Oil from Shorelines

- Oil flocculation, aggregation, and dispersion are a suite of natural dispersion processes that translocate oil stranded on shorelines into the marine environment
  - equivalent to chemical dispersion of surface oil slicks
- If we understand and can communicate these translocation processes and pathways, we can significantly improve explanations and advice for the end users (strategists, planners, regulators, managers, and the public) on better ways to treat (in particular remote) oiled shorelines in Canada
OIL TRANSLOCATION

• What are the operational conditions that support the transport of stranded oil to coastal waters via the formation of oil-mineral aggregates that can enhance natural processes to both disperse and biodegrade residual oil?

• Conduct shoreline mesocosm studies to address knowledge gaps to allow for more strategic decision making regarding intervention or non-intervention responses.

• This work will provide more options to enable to accelerated attenuation and weathering of oil spilled near or on ice, effects of tidal forces and also understanding oil/particle interactions and the formation of oil-suspended particle aggregates.

Keywords: oil particle interactions, shoreline characterization, guidance documents

NATURAL ATTENUATION

• Studies to determine inherent natural attenuation capacity under different environmental conditions (water and sediment) at different geographical locations (Atlantic, Pacific and Arctic) across Canada are now being conducted under OPP’s the Multi-Partner Research Initiative.

Keywords: Biodegradation potential, arctic baseline/response, field studies, diluted bitumin, bioremediation, in situ microcosms
Fuel Oil Spills on Arctic Beaches

- Naturally occurring environmental microorganisms (mostly bacteria) are able to degrade shipping fuel as a food source.
- We know this happens in southern latitudes, but what happens in the Canadian high Arctic is not known.
- Biodegradation of fuel in Arctic seawater and on land has been studied, but beaches are largely overlooked.
- However, beaches are unique environments
- To address this question, Dr. Lyle Whyte and Team (McGill U.) are planning a small-scale fuel spill on a representative Arctic beach.

What can Microbial Genomics offer Oil Spill Response?

- A biological line of evidence to augment physical and chemical measures
- Genomics can also be used to demonstrate the metabolic potential of an area
- The effectiveness of during remediation
- Whole environmental assessment
- Assist in identifying if termination criteria (i.e. habitat recovery end-points) have been met
Genomic Analysis

Sample material
soil, water, air, biological

Extraction of NAs

RNA

DNA

Meta transcriptomics
- functional
- taxonomic
- active genes
- expression

RT-PCR Amplicons
16S, 18S, ITS
- active taxa

Amplicons
16S, 18S, ITS
- taxonomy

Metagenomics
- all genes
(taxa, function)
- genome
assembly

Bacteria that dominate in the presence of oil +/- dispersant

Alteromonadales
Colwellia
Marinobacter
Oceanospirillales
Oleispira
Thalassilithus
Flavobacteriales
Polaribacter

Alteromonadales
Marinobacter
Oceanospirillales
Alcanivorax
Thalassilithus
Flavobacteriales

Alteromonadales
Marinobacter
Oceanospirillales
Alcanivorax
Thalassilithus
Oleispira
Memorandum of Understanding
Between the United States Coast Guard and Florida Institution of Oceanography
Regarding the Academic and Marine Research Contribution to the USCG Oil Spill and Hazardous Material Response

Established June 29, 2019

About Florida Institution of Oceanography
• The FIO is the state of Florida designated oceanographic organization for facilitating education and research in the marine and coastal environments.
• Financial support comes from funds allocated by the state legislature, fees charged for use of vessels and facilities, and charges to administer contracts and grants awarded through FIO (BP-FIO 10M, RESTORE- Center of Excellence)
• The University Marine Consortium that make up FIO’s membership is currently comprised of 21 full members, including the Florida State University System (SUS), private universities and institutes, state agencies (FDEP, FWC), and 9 other associate and affiliate member organizations that collectively unite more than 800 marine scientists across the State.
Codification and Purpose

Purpose: The purpose of the USCG-FIO MOU is to set forth terms by which the marine research community in the Gulf or Mexico and the Southeastern Atlantic, through FIO, can assist the USCG in their response to a natural or anthropogenic emergency.

AUTHORITY. This agreement is authorized under the provisions of 14 U.S.C. § 93(a)(4), which authorizes the Coast Guard to coordinate and cooperate with other government agencies, and private agencies, in research and development activities, relating to the performance of any Coast Guard function; and 14 U.S.C. § 141, which authorizes the Coast Guard to provide certain assistance to federal, state and local entities. Further, this agreement is in accord with the Memorandum of Understanding that establishes FIO as a State University System Academic Infrastructure Support Organization for the State of Florida.

USCG Responsibilities

i. The USCG will contact FIO in the case of an emergency or otherwise, in order to identify subject matter expertise

ii. The USCG will work with FIO to ensure the best scientific information is portrayed and the facts are correctly stated in media releases

iii. The USCG will work with the academic community to improve response to emergencies without comprising the USCG core mission or impinging on academic freedom

iv. The USCG will notify FIO of any relevant planning activities or exercises that may be of interest
FIO Responsibilities

I. Assist the USCG in **identifying subject-matter expertise** as requested to participate in planning, exercises or actual emergency response.

II. Work with the USGS to **ensure that the best scientific information is portrayed and the facts are correctly stated in the media releases**. Notwithstanding, the foregoing FIO members will retain their right to conduct research and independently publish, communicate and disseminate research results, finding, date and conclusions without restraint or prior approval.

III. Notify USCG of **any relevant research, forums, or symposiums** that may be of interest for planning and exercises.

Combined USCG and FIO Responsibilities

- To improve understanding, the USCG will work with FIO members to **provide training/overview on how the USCG manages a large oil spill.**

- To develop a plan of action on how the academic community would participate. This providing the USCG with access to, and understanding of, the latest relevant research that may be unique to the Florida ecosystem.
USCG and FIO: Hold Two Workshops

• Modeling Workshop:
  – To discuss the state-of-the-art models that are under development in the academic research community and how these would be useful to the USCG in the GoM/SE Atlantic and in the event of an oil spill

  – High-resolution 3D models based on best scientific understanding of the marine environment are under development within the academic community. Selected FIO members and other participants from the federal government

• Baseline Workshop:
  – To review the current available (physical, chemical, biological and geological) baseline information around Florida, assess what is still needed, and to discuss how to obtain these data

  – A plan will be developed on development and baseline sampling or other needs to move quickly in the event of an incident

  – Include selected FIO member and other participants from the federal government
The Alaska Oil Spill Technology Symposium: Research and Collaboration in Action

Jessica Garron
Science Team Lead¹, Senior Science Consultant²

¹Alaska Center for Unmanned Aircraft Systems Integration
²Office of the Vice Chancellor for Research

The Questions
1. Description of Model
2. How is the model codified?
3. What is the protocol for activation/operationalizing?
4. Is there a catalog/directory of researchers?
5. What is the funding mechanism or financial realities?
6. How does this model support operationally relevant decision-making?
7. To what end are academics getting involved? To help with the response or access for data collection for their own research that will improve a later response? Share knowledge (both responders & researchers) for improving response overall?
8. Does the model facilitate academic access? Note best practices and/or challenges
9. Does the model address any of the issues listed in Breakout Group 1 below?
What is the Alaska Oil Spill Technology Symposium (AOSTS)?

- Uniquely Arctic opportunity for knowledge sharing and collaborations
- Introduction \(\rightarrow\) Deep Dive
- Presentations about
  - research developments & emerging technologies
  - agency initiatives & policy issues
  - incident management techniques
  - knowledge gaps
  - operational work priorities
- Even years in Alaska
  - Alternate years to Chevron-OSPR
  - Anchorage and Fairbanks take turns hosting
- Thematic
- Things we learn other places that might work in the Arctic (ear-to-ground)
What makes AOSTS Unique?

• Arctic specific themes (Animals, Cultural Resources, Remote Sensing)
• Expert panels (Dispersants, ESF-10, DWHOS)
• Technical demonstrations
• Field demonstrations
  • Mobile command posts
  • Skimmer technologies
  • Under ice detection and recovery
• Lots of space and time for collaboration and discussion
• Funding opportunities

Kevin Kennedy, ppralaska@gmail.com
How is the model codified?

Modified from Daling et al., 1990, A. Allen
What is the protocol for activation/operationalizing?

- Pre-event science
- Operationalization via,
  1. Incorporation into drills/exercises
     e.g. UAS protocol for spill response (ICS) integration
  2. Demonstration outside of drills/exercises
     - Laboratory, test tanks, non-oiled field sites
  3. Technical Readiness Level advancement

A true operationalizing protocol integrates training for responders on the science, and researchers on the operation.
BSEE Technical Readiness Levels

<table>
<thead>
<tr>
<th>TRL</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Basic principles observed or reported</td>
</tr>
<tr>
<td>2</td>
<td>Technology concept and speculative application formulated</td>
</tr>
<tr>
<td>3</td>
<td>Technology proof of concept demonstrated</td>
</tr>
<tr>
<td>4</td>
<td>Technology prototype demonstrated in laboratory environment or model scenario</td>
</tr>
<tr>
<td>5</td>
<td>Technology prototype tested in relevant environments</td>
</tr>
<tr>
<td>6</td>
<td>Full scale prototype demonstrated in relevant environments</td>
</tr>
<tr>
<td>7</td>
<td>Integrated technology tested on a large scale or in open water</td>
</tr>
<tr>
<td>8</td>
<td>Final integrated system tested in real or relevant environment</td>
</tr>
<tr>
<td>9</td>
<td>Final integrated system deployed in real spill environment</td>
</tr>
</tbody>
</table>

Panetta & Potter, 2016

Is there a catalog/directory of researchers?
Is there a catalog/directory of researchers?

- Spreadsheet of contacts
  - Speakers
  - Participants
- Organizer fielding
- Small pond

What is the funding mechanism or financial realities?
Financial Realities

Oil Spill RESEARCH Funding

• Directed funding
  • Specific projects, identified by specific sponsors, awarded to specific AOSTS-affiliated researchers/collaborators, with specific anticipated outcomes
    • Finite projects
    • Finite budgets
    • E.g. OSE II

• Traditional funding
  • NSF, DOE, DOD, DOI, DHS, endowments
  • Opportunity for multi-disciplinary and cross-cutting research
    • Operational mandates reduce knowledge co-production opportunities
    • E.g. Navigating the New Arctic opportunity from NSF
Oil Spill Eater II (OSEII)

Dr. Mary Beth Leigh, lead researcher
mbleigh@alaska.edu

- Listed on NCP schedule, but what is it?
  - Terpinols - plant-derived alcohols, lilac/pine scent
  - Long-chain alkanols – emollients, precursors for surfactants, derived from palm or petroleum

- What is impact of OSEII on crude and marine diesel biodegradation?

Financial Realities
Oil Spill RESEARCH Funding

- Directed funding
  - Specific projects, identified by specific sponsors, awarded to specific AOSTS-affiliated researchers/collaborators, with specific anticipated outcomes
    - Finite projects
    - Finite budgets
    - E.g. OSE II

- Traditional funding
  - NSF, DOE, DOD, DOI, DHS, endowments
  - Opportunity for multi-disciplinary and cross-cutting research
    - Operational mandates reduce knowledge co-production opportunities
    - E.g. Navigating the New Arctic opportunity from NSF
Co-producing Arctic Marine Spill Detection, Fate, and Response Strategies with Bering Strait Communities (proposed to National Science Foundation)

- 3 million over 3 years
- Project team brought together by AOSTS
  - Garron – Knowledge co-production, UAS pilot training/certification, observational network creation, evaluation
  - French-McKay – Modeling bunker fuel, diesel, crude oil in mixed ice conditions
  - Mölders – Atmospheric modeling of hydrocarbon transport
  - Leigh – Biodegradation community and rates
  - Barnes – Community infrastructure assessment to support response
  - USCG, NOAA, AKDEC, The Network

How does this model support operationally relevant decision-making?
How does the AOSTS model support operationally relevant decision-making?

*Walking the long path of credibility*

- Introductions to what is out there
  - You don’t know what you don’t know
- Speaker choice
  - Science in plain English
- Creates the conversation space
  - Facilitating the first step
  - D-m need to reach out after exposure to new idea
  - Researchers need to reach out to d-m for research needs
  - Researchers need to strive for upper level TRLs
- Sweet-spot vs. engaged collaborations

To what end are academics getting involved?
To what end are academics getting involved?

• Physical science
  • Collecting sterile, documented, chain-of-custody defensible, samples
    • Biodegradation, toxicology, chemical processes and signatures
• Baseline vs. operational research
• Need a next generation
  • Most oil spill research students are just following funding
• Knowledge share-out at AOSTS

• Real-time data provisions
  • Scientist providing and interpreting real-time data (often remote-sensing data sets)
    • Satellite, airplane, UAS, AUV platforms

Does the model facilitate academic access?
Does the AOSTS model facilitate academic access?

YES!

- Two-way street for researchers and operators
  - Both have access to each other through AOSTS
- Not a green light, but a conversation starter
- Do not actually know if it increases access during an Arctic oil spill

Lifecycle of an Oil Spill Research Question
Does the model address any of the issues listed in Breakout Group 1 below?

Does the model address any of the issues listed in Breakout Group 1?

- **Topic 1**
  - Timeframes for responding
    - Yes, logistical challenges of the Arctic are presented and solutions identified at AOSTS, but not necessarily in support of academic access
  - Operational and Command interface
    - Yes, in teaching researchers what ICS is and how they can support d-m during a response
  - Bridging culture and experience between responders and academia
    - Yes, bringing all parties into the same room to have a shared discussion of problems and solutions (on-site credibility boost)

- **Topic 2**
  - Health and safety issues
    - Yes, especially in regards to air and water exposure pathways; could do better
  - Financial realities and funding
    - Yes, (see previous slide on funding) provides a venue for new funding opportunities to be announced and teams formed to address them
  - Legal and liability issues
    - Yes, through long-term data set collection and analyses; could do better
Thank You
Jessica Garron
Jigarron@alaska.edu
907-455-2035
Appendix D

Breakout Group Participants
<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead: Ben Shorr</td>
<td>Lead: Steve Buschang</td>
<td>Lead: Monica Wilson</td>
<td>Lead: Chuck Wilson</td>
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<tr>
<td>Yvonne Addassi</td>
<td>Jessica Garron</td>
<td>Kathleen Jennings</td>
<td>CDR JoAnne Hanson</td>
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<tr>
<td>LT Josh Nicholas</td>
<td>Bryand Duke</td>
<td>Greg Hall</td>
<td>Greg McGowan</td>
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<tr>
<td>Peter August</td>
<td>Robert Dickey</td>
<td>CAPT Mark Shepard</td>
<td>Laurie Sullivan</td>
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<tr>
<td>Emily Hein</td>
<td>Carys Mitchelmore</td>
<td>David Hollander</td>
<td>Joe Katz</td>
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<td>Igor Mezic</td>
<td>Evan Variano</td>
<td>Carter Ohlmann</td>
<td>Steve Murawski</td>
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<td>Antonietta Quigg</td>
<td>Carl Childs</td>
<td>Kyra Mills</td>
<td>Laura Basirico</td>
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<td>Chris Barker</td>
<td>Jordan Stout</td>
<td>Lisa DiPinto</td>
<td>Steve Lehmann</td>
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<td>Scott Lundgren Maria</td>
<td>Victoria Broje</td>
<td>John Tarpley</td>
<td>Ericka Hailstocke-Johnson</td>
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<td>Hartley</td>
<td>Kelly Wilson</td>
<td>David Palandro</td>
<td>Paul Schuler</td>
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<td>Ann Hayward Walker</td>
<td>ADM Peter Gautier</td>
<td>Bruce Hollebone</td>
<td>Tom Jordan</td>
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<td>Greg Buie</td>
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</table>
Appendix E

Breakout Group Outcome Notes
<table>
<thead>
<tr>
<th>Category</th>
<th>Combined Response Framework and Academic Modality</th>
<th>Implementation strategies</th>
<th>Ease of Implementation (e.g., low hanging fruit, med, hard)</th>
<th>Qualitative metrics to evaluate success of best practices primarily for low hanging fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Timeframes</td>
<td>Response operational periods (e.g., 12 hr vs. 24 hr response)</td>
<td>Planning: (1) Create scalable framework (e.g., SSEER model and other national models); (a) adaptable/ flexible framework to include emergent scientists (b) Common data model: simple, scalable, consistent/standardized framework (e.g., maintain set of data standards to allow systems to be interoperable between regions, common elements); (c) searchable system; (d) multi-state/region coordination/place holder mechanism</td>
<td>Identify champion on the academic and government side, engaging at NRT, RRT and area committee levels</td>
<td>Hard</td>
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<tr>
<td></td>
<td>Responder availability is 24/7 vs. academic availability which is flexible but not on-call. Academic schedules, length of response/time-window impacts engagement</td>
<td>(2) Identify subject matter experts, include vetting process (e.g., fishermen that know local currents, academic, govt. representative); leverage SeaGrant</td>
<td>Increase awareness and emphasis of academic engagement in liaison officer training.</td>
<td>Hard</td>
</tr>
<tr>
<td></td>
<td>Independent research vs. speed of response</td>
<td>(3) understanding to work within ICS, ICS and safety training.</td>
<td>Update existing document using review group (Jordan's Form) and provide copies</td>
<td>Low</td>
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<tr>
<td></td>
<td>Knowledge Exchange/Specialists Expertise</td>
<td>(4) maintenance of directory (e.g., annual meetings to update directory and maintenance of ongoing readiness, include new faculty/staff).</td>
<td>Identify other organizations that should be brought into discussion (e.g., RP, BSEE, ICS program managers (Dana Tulis)</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Additional Expertise</td>
<td></td>
<td>(1) using post-workshop survey to identify other organizations that should be involved</td>
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<td></td>
<td>Discrete Expertise</td>
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<td></td>
<td>Scaling-Up Expertise</td>
<td>(5) exercises, drills and outreach</td>
<td>Matrix of training requirements for spill engagement (build off of existing tables, such as HAZWOPER, ICS)</td>
<td>Low</td>
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<tr>
<td></td>
<td>Scaling up academic capacity</td>
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<td></td>
<td>Technical support (e.g., equipment, assets)</td>
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<td></td>
<td>Data Management from academic expertise (e.g., collection, processing, display)</td>
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<tr>
<td></td>
<td>Response data analysis and decision making for actionable (e.g., map extent and asset deployment) vs. long-term academic</td>
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<td></td>
<td>NRDA (Injury relevant) and academic ephemeral data collection on same scale precision</td>
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<tr>
<td></td>
<td>Responder rotation (e.g., 2 weeks) vs. academic continuous/long-term data collection</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Issue of short-term data sharing during response</td>
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</tr>
</tbody>
</table>
### 2. Operational and Command Interface

<table>
<thead>
<tr>
<th>Pre-establish relationship; vetting process to establish scientific merit.</th>
<th>Response: (1) notification process/activation process, explore CDC directory model, earthquake model, leverage Cooperative Ecosystems Studies Unit (CESU) model (engage with Gary Machlis)</th>
<th>Explore CDC directory model, earthquake model, leverage Cooperative Ecosystems Studies Unit (CESU) model (engage with Gary Machlis)</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-trained (e.g., ICS training)/education of ICS, UC and response framework. Routinely engage academics (e.g., smaller spills/exercises). Solution: Use existing channels (area committee meetings)</td>
<td>(2) availability of resources, Orientation of academics to PREP, spill management team and exercises, RP pre-training</td>
<td>Orientation of academics to PREP, spill management team and exercises, RP pre-training</td>
<td>Low</td>
</tr>
<tr>
<td>Contingency plans to include emergent challenges/emergent academics (after response).</td>
<td>(3) qualifications, One-pager for external communications to summarize academic engagement</td>
<td>One-pager for external communications to summarize academic engagement</td>
<td>Low</td>
</tr>
<tr>
<td>Federally funded research/development (FFRDC) should relationship be to NRT, who would be corollary to RRT. Local relationship with academic/universities at Area Committee</td>
<td>(4) cyber security and data management, Develop expertise data model, based upon existing models, to include subject matter experts (potential expansion into, local resources, NGOs, etc.). Develop scope with area committees, RRT subcommittee specializing in science and technology. Socialization of expertise data model with area committee, RRTs</td>
<td>Develop expertise data model, based upon existing models, to include subject matter experts (potential expansion into, local resources, NGOs, etc.). Develop scope with area committees, RRT subcommittee specializing in science and technology. Socialization of expertise data model with area committee, RRTs</td>
<td>Med</td>
</tr>
<tr>
<td>Contracting challenges (issue with timeframe); Pollution removal funding authorization (PRFA). Academics may want to work as contractors vs. through universities</td>
<td>Leverage SeaGrant/Land Grant/NOAA OCM/state resources infrastructure to create connection with academic communities. Include in SeaGrant omnibus.</td>
<td>Leverage SeaGrant/Land Grant/NOAA OCM/state resources infrastructure to create connection with academic communities. Include in SeaGrant omnibus.</td>
<td>Med</td>
</tr>
<tr>
<td>SILK/Prime contractors for specific data collection (sub-contracting)</td>
<td>Benchmarks (compare) from multi-state/jurisdictional compacts (mutual aid across states)</td>
<td>Benchmarks (compare) from multi-state/jurisdictional compacts (mutual aid across states)</td>
<td>Med</td>
</tr>
<tr>
<td>Some universities won’t sign contract that limits publishing authority (e.g., right to publish)</td>
<td>Working group to maintain momentum (e.g., meeting at existing conference, Clean Gulf)</td>
<td>Working group to maintain momentum (e.g., meeting at existing conference, Clean Gulf)</td>
<td>Med</td>
</tr>
<tr>
<td>Multi-agency coordination with multiple levels (e.g., through SSC or environmental unit leader)</td>
<td>Outreach to NRT, ICCOPR, SCAA, SAG, ITAC, NASEM; potential session at existing forums (Clean Conference Series, IO3C 2020, GoMOSES 2020)</td>
<td>Outreach to NRT, ICCOPR, SCAA, SAG, ITAC, NASEM; potential session at existing forums (Clean Conference Series, IO3C 2020, GoMOSES 2020)</td>
<td>Med</td>
</tr>
<tr>
<td>Build in science meetings within ICP</td>
<td>Orientation for academics and technical training</td>
<td>Orientation for academics and technical training</td>
<td>Med</td>
</tr>
<tr>
<td>Build in science teams across agency/academia/RP</td>
<td>DHS preparedness program, build from workshops to drills to exercises</td>
<td>DHS preparedness program, build from workshops to drills to exercises</td>
<td>Med</td>
</tr>
</tbody>
</table>

### 3. Culture & Experience

| Paradigm: support response rather than supporting academic research. Not PI, need to fit into command structure | | | |
Individual research vs. operational research. Will action help with the immediate response, not future response

Foreign nature of ICS, National contingency plan

Solution: FOSC guide to share operational science

Response: relying on advisors to make decision; academic: data collection/science to support decision-making

Develop academic expertise; once funding goes away, how to maintain resources to sustain knowledge

Response/academic tension with sharing data/collection near-term vs. interpretations of data longer-term for publication

Perception by academics of industry and industry of academics motivations and perspectives

---

Mechanisms to facilitate access for independent research during spill

| Site (soil, water, air, organisms) | (1) Transparent and fair process for response evaluation for independent researcher | (2) Identify liaison officer/unit to facilitate evaluation of research (could be done remotely); train liaison officer/assistant liaison officer and/or SSC; (3) Screening protocols/vet research and credentials; see ICCPR for alignment of research needs to prioritize access, (4) researcher needs to address safety training, safety plans (potentially use deputy safety officer); understanding of ICS (5) permits, deconfliction, liability and insurance; (6) define area of response to avoid interference with response action; coordinate with response for potential use of response assets (e.g., avoid contamination). (7) Contractual and legal assessment (8) Sharing of data *Placeholder in incident management handbook.* |
| Samples | | |
| Source Oil | work out legal issue ahead of time |
| Response Data/Products | |
| Credentials TWIC and Mariner | |
| Response Credential | |
### Response Framework | Academic Modality | Characteristics of Best Practices | Implementation strategies | Timeline/ease of implementation; prioritize (low-hanging fruit, medium, hard.) | Qualitative Metrics for evaluation of success of best practices. How do we know if it was successful? (if appropriate)

**Shoreline can be longer (weeks to months); on-water is short time frame (days to weeks) unless chronic release**

| academic administration bureaucracy makes lengthy & difficult to interface contracting mechanism for academia (MOU) with local response agencies. Database/registry/points of contacts of interested academic expertise (who maintains). | Plan of research and using Spill of Opportunity. Pre-existing contracting mechanism for academia (MOU) with local response agencies. Database/registry/points of contacts of interested academic expertise (who maintains). | Step 1 Action Plan: 1. Buy-in from administration. 2. Writing. 3. Legal approval. 4. Implementing the plan - communicating it out. Step 2 Possible MOU with agencies (examine existing agreements) Revisit SAN for elements that would fit in RCP/ACP (regional/area). Including development of an active directory of expertise.

NOTE: leverage with national association (i.e., Assn of Marine Laboratories, SETAC, American Biological Society, CEEUSU). Build into ACP. | Step 1 - med
Step 2 - med/hard
SAN - assessing elements would be easy
Directory development would be med

**Response community can assign repurpose staff quickly; mobilization time is hours; mobilization can be within hours if under contract**

| Setting aside academic obligations/administration/funding to impede response; mobilization time can be weeks | Have a back-up staff expertise. Need research plan for spill of opportunity. Develop an institutional action plan for environmental disaster opportunities. | see action plan | med

**Has prepositioned supplies (i.e., booms, dispersant)**

| Academia does not have pre-prepared supplies/resources front ended (include in the Action Plan). | See Action Plan. Researchers need supplies/resources front ended (include in the Action Plan). | see action plan | med

**Real-time data is needed (for speedy advice)**

| Time is needed for analysis | Researchers need to know what information/knowledge is needed if supporting response. Researches have baseline/historical information. Academia engages in the planning phase (i.e., Area Committee meetings, RRT meetings, share unpublished data). Education as well as two-way communication between academics and responders. | Easy

**Command and controlled environment (NCP); Reporting under ICS**

| Variable depends on academic interface with response: 1. direct support on response; 2. focus on NRDA; 3. independent academic | Need to have clarity on Best Practices based on type of academic involvement. | Easy

**Needs to have clarity on Best Practices based on type of academic involvement.**

| Develop a matrix depicting minimum requirements for participating as 1. advisor, 2. response, 3. independent. | Easy

**Matrix is developed.**

**Increased visibility and participation.**

**Attend and present at meetings.**

**Easy**
<table>
<thead>
<tr>
<th>Response community has standardization of methods; Chain of custody/quality control</th>
<th>no standardization of methods; permitting for sample collection (and training/protocol); IRB/IAUC requirements</th>
<th>Include in Action Plan. Standardize SOPs (standard operating procedures) methodology, approved minimum set of criteria. Similar to NRDA standards. Independent researchers use best practices/current state of science so their data can be used publicly.</th>
<th>Compiling agency and industry guidance for best practices for conducting key standardized methods (see NRDA and NOAA manual)</th>
<th>med/hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training and legal issues are covered due to their job position.</td>
<td>Academia does not necessarily have the training this under position.</td>
<td>Include training in Action Plan (be sure to cover all academic engagement)</td>
<td>Recommend/encourage /invite academics to be pre-prepared by taking training classes, participating in spill drills etc. Prepare a training matrix (safety, ICS, Hazwoper etc.)</td>
<td>easy</td>
</tr>
<tr>
<td>Command and control culture</td>
<td>Academic freedom</td>
<td>Clarify role and responsibilities in response in Action Plan.</td>
<td>Include in Action Plan</td>
<td>easy</td>
</tr>
<tr>
<td>Employer obligated to set a safety standard/training</td>
<td>Who requires ICS/hazwopper training; all of ICS is not applicable. What is the absolute requirement of training needed to work on a spill?</td>
<td>Include in Action Plan.</td>
<td></td>
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</tr>
<tr>
<td>Safety, clean up oil, and minimize damage</td>
<td>publications, service, expanding basic knowledge; Taking advantage of low-probability event (oil spill opportunity)</td>
<td>Mission Statement (university service) can be included in Action Plan. We each have unique roles. Understand and respect the different cultures and roles.</td>
<td>Share the Action Plan across/within the University. (institutional action plan) Include this in the Action Plan and share. Improve and address multi-faceted question with a variety of team members; maximize your resources</td>
<td>same</td>
</tr>
<tr>
<td>Generalist and big picture</td>
<td>More focused on specific topic</td>
<td>Encourage researchers collaborate into interdisciplinary teams to get big picture information/data.</td>
<td>easy</td>
<td>Teams are formed. Fully described in Action Plan. Optimize resources.</td>
</tr>
<tr>
<td>Focused on the data needed for decision-making (rapid and low resolution and big picture)</td>
<td>Large amount of data, but only small aspect is useable in response now, but useful in future</td>
<td>Capture this context in the Action Plan (advancement of science vs, actionable intelligence) for response.</td>
<td>Include in the Action Plan: 1. short term, snap shot data and 2.long term, rigorous, analyzed data for future publication). Provide real-time, existing, gathered/needed data if available.</td>
<td>easy</td>
</tr>
<tr>
<td>Response Community is immediate results driven.</td>
<td>Academia is question/hypothesis driven.</td>
<td>see above</td>
<td></td>
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<tr>
<td>Invested in preparedness and readiness</td>
<td>not invested in preparedness</td>
<td>Academics need to be involved in planning and preparedness and action plan.</td>
<td>Recommend/encourage /invite academics to be pre-prepared by taking training classes, participating in spill drills etc.</td>
<td>easy</td>
</tr>
<tr>
<td>Mechanisms to facilitate access for researchers purpose during spill</td>
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<tr>
<td>Access Needed and would vary depending on requirements: Site. Samples. Source Oil. Information.</td>
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<td>MOU is needed.</td>
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<tr>
<td>Currently there is a mechanism to prevent research access. Also not required regulatory.</td>
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<tr>
<td>Action Plan</td>
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<tr>
<td>Site access checklist by response authorities; includes safety (credential checks), not hinder the response, manage process. Research access checklist and consider making it available in advance. (See Jordan’s example)</td>
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<tr>
<td>Repository for requesting source oil, dispersant etc. (ex. Collect oil from pipe prior to closure)</td>
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<tr>
<td>Liability release is needed.</td>
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<tr>
<td>Source oil checklist (i.e., nature of project, not shareable to others/research) similar to a data use agreement.</td>
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<td>Information access to confidential response data - ? Approved on case by case basis. If researcher works as part of the response, researcher would automatically get access. Fine-tune the specific information required.</td>
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<tr>
<td>Recommendation: when possible collect source samples and store for potential research interests.</td>
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<tr>
<td>Create academic science liaison for independent academic researchers using checklist at Incident Command level. Responsible for 1. initial checklist, 2 track data collection, 3 coordinate different academia, 4 approval process</td>
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<tr>
<td>Category</td>
<td>Best Practices</td>
<td>Implementation Strategy</td>
<td>Ease of Implementation (e.g., low hanging fruit, medium, hard)</td>
<td>Qualitative metrics to evaluate success of best practices primarily for low hanging fruit</td>
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<td>-------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1. Health &amp; Safety Issues</td>
<td>Role based information to be shared by regulators. (ICS 100,200,700,800 free trainings). Involvement/outreach with area committee. Proactive outreach to and from academics prior to events with the state/industry. (Academic liaison). Checklists. Area training. Institutes and consortia. Understanding of the scientific requirements. Establishment at the national level, a consensus document, clear expectations from the UC. National Response team (NRT).</td>
<td>1. Responder group cleans up required list of training based upon roles and requirements 2. Share the developed list with the participants of the workshop 3. Share list with Sea Grant and like entities for distribution, for example in the IMH. 4. Academic researchers take required training.</td>
<td>1. Low hanging fruit 2. Low hanging fruit 3. Low hanging if with universities, medium-hard if codified 4. Low hanging fruit</td>
<td>Number of individuals trained (Enhanced communication in peacetime)</td>
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<tr>
<td></td>
<td>Academic engagement</td>
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<tr>
<td></td>
<td>Explicit ICS Training requirements for academics. Table/schedule for purpose/role based expectations.</td>
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<tr>
<td>2. Financial Realities &amp; Funding</td>
<td>Funding agreement mechanisms worked in peacetime.</td>
<td>1. Avenue for funding arrangements built into MOUs/contracts/grants/master agreements 2. Creation of guidance document through exercises, meeting, workshops.</td>
<td>1. Medium 2. Hard</td>
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<td></td>
<td>Understanding of knowledge gaps from response, used to prioritize reasearch funding.</td>
<td>1. Academic review of existing documents that outline data gaps such as (ICCOPR,BSEE, etc.) 2. Incorporating comments into gap analysis 3. Closing gaps with more research</td>
<td>1. Low hanging fruit 2. Hard (slow) 3. Hard</td>
<td>1. Volume of comments received from academics</td>
</tr>
<tr>
<td></td>
<td>Use the area planning process to facilitate pre-plan contractual relationships with academia. Identify funding to facilitate. Research done in peacetime.</td>
<td>1. Local area committee engagement that could lead to ACP participation. 2. Invited participation by academics in drills/exercises 3. Attend and present at conferences as well as other engagements, Get involved in planning committees for conferences with the intent of increasing academic responder engagement. (IOSC, Clean Gulf, etc.) 4. Engagement in response, research and planning through regulatory agencies (BSEE, EPA, USCG, etc.)</td>
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</tbody>
</table>
| What are the contract mechanisms we can utilize? | 1. Local area committee engagement that could lead to ACP participation.  
2. Invited participation by academics in drills/exercises  
3. Attend and present at conferences as well as other engagements, Get involved in planning committees for conferences with the intent of increasing academic responder engagement. (IODC, Clean Gulf, etc.)  
4. Engagement in response, research and planning through regulatory agencies (BSEE, EPA, USCG, etc.) |
| Setting the expectations from response and academic communities. Clear responsibilities and liabilities during a response. Scenario-based workshops. Consistency between institutions. Consistency in terminology. Possibility of national grants office. | 1. Reach out to national associations of grants officers for advice |
| 3. Legal & Liability Issues | 1. Early engagement  
2. Processed through numerous offices (e.g., grants, finance, legal, IP)  
3. Exercises tied to contracting/finance |
| 1. Reach out to national associations of grants officers for advice | 1. Medium |
| Academics need to know the Area Plan/vessels response plan. What happens during a response. Involvement in the permitting process. | 1. Local area committee engagement that could lead to ACP participation.  
2. Invited participation by academics in drills/exercises  
3. Attend and present at conferences as well as other engagements, Get involved in planning committees for conferences with the intent of increasing academic responder engagement. (IODC, Clean Gulf, etc.)  
4. Engagement in response, research and planning through regulatory agencies (BSEE, EPA, USCG, etc.) |
| Investigate deep water spill interactions | Research pre-event to identify the best practices for deep water spills. Publish the findings. Have a workshop to discuss the findings. |
| Inform ICOPAR and BSEE of findings for further research and funding. | 1. Provide review and comment of documents |
Overview

1. Local area committee engagement that could lead to ACP participation.
2. Invited participation by academics in drills/exercises
3. Attend and present at conferences as well as other engagements, Get involved in planning committees for conferences with the intent of increasing academic responder engagement. (IOSC, Clean Gulf, etc.)
4. Engagement in response, research and planning through regulatory agencies (BSEE, EPA, USCG, etc.)

Mechanisms to facilitate access for research purposes during spill

| Identification of national or states SSC/liason officer. Vetting process within unified command for access considerations, and clear limitations. |
| Framework embedded in ACP. |
| *Not only access to field/spill, need access to model results and data/SCAT* |
| Developing personal relationships prior to spills for access |
| Use ERMA, providing non-public, operational access. Rethinking data available on the public ERMA. |
| Data sharing agreements and standards |
| System for request submittal of certain data available in ERMA |
| Entity to obtain samples, not necessarily the academic directly. |
| Hotline with academic liason officer. Regular updated calls, allowing provision and requesting of data. Web companion to hotline. |
|-------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| 1. Health & Safety Issues           | Differences in health and safety priorities between response and academic communities | Spell response health and safety requirements are not explicitly understood by academics | Develop a cross-walk that provides a menu to training required on the response side and training researchers already have or could do in advance - what are the equivalencies? | - Review OSHA/USCG Marine Oil Spill Guidance Document/NIOSH guidance and expand to apply to spill response scientists by job category  
- Case studies of university & logistical programs  
- Develop a matrix that identifies training requirements with job responsibilities  
- NRT to make recommendations | Low hanging fruit (within a year) (P,F)                                           | Recommendations posted to the NRT web site  
Researchers show up to response with appropriate training  
Universities adopt process for certification of adequacy of training (P,F) |
| Health and safety concerns for technical specialists in ICP are different than for researchers accessing the operations area | Health and safety requirements in academic institutions may be rigorous but not sufficient to meet HAZWOPER requirements | Response Health and Safety Officer could work in preparedness with academic institutions on the development of model researcher safety. | Framework for determining what in-time training academics would need to do their research. Burden is currently on academia to understand this. | Academic institutions should have a safety officer who can develop pre-scripted safety plans for the type of work that academics could do during spills |                                                                                   |                                                        |
| Academic Health & Safety Officer    |                                                                                   |                                                                                   |                                                                                                  |                                                                                                  |                                                        |                                                        |
| 2. Funding Issues                   | For science to either meet an operational need or to inform the NRDA process, money is available through Unified Command or agency representatives | In order to get funding for research that meets an operational need or will inform the NRDA process, academics must enter into a relationship with either the FOSC or a trustee agency | Response community work toward streamlining the funding vehicles, including routes of funding, limitations associated with funding. | Academic research plan must include a health and safety plan that is approved by the Safety Officer | Low hanging fruit (~ a year)                          | Web sites are visited  
Outreach efforts are occurring |
| Funding gap for response-level research, i.e. how to have a better response next time |                                                                                   |                                                                                   |                                                                                                  |                                                                                                  |                                                        |                                                        |
| 3. Legal & Liability Issues         | May lose confidentiality if contracting with a public university                  | Concept of outside work (outside the scope of normal job) and still utilizing university resources (equipment, lab space, records retention, people). Side hustle 1099. | Identification of academic legal counsel and liability issues for individuals and the organizations doing research during response worst case scenario legally, what has happened in the past, what are concerns, indemnification | Develop a process by which the information can be made readily available, post on appropriate web sites (e.g. NRT, ECCOPR, NOAA, state) with FAQs, support guidelines, info clearinghouse for academics; also provide information in real-time on spill-web sites  
- Lean forward toward standing agreements  
- Academia provide institutional concerns that might limit ability to respond  
- Facilitate understanding of concepts through outreach from response community to academics, institutions |                                                                                   |                                                        |
<p>| Responsible party legal obligation to shareholders. | Contracts through the university |                                                                                   |                                                                                                  |                                                                                                  |                                                        |                                                        |
| Universities may have issues with confidentiality agreements |                                                                                   |                                                                                   |                                                                                                  |                                                                                                  |                                                        |                                                        |</p>
<table>
<thead>
<tr>
<th>Understanding that you are in a data and information management agreement, including equipment and final reports.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insurance and liability of hiring as an outside consultant and using university equipment.</td>
</tr>
<tr>
<td>Substantive downstream or future legal requirements that may not be funded or reimbursed, including students and expert liability issues associated with samples arriving with (or without) chain of custody and proper retention and other follow-on.</td>
</tr>
<tr>
<td>Process by which reimbursement needs to be done (proper invoicing, documentation, etc.).</td>
</tr>
</tbody>
</table>

### 4. Other

Researchers have lots of baseline data, but there is not often a clear process for bringing information to the response. During preparedness, outreach from responders to academics and the reverse. Continue to develop forums and processes by which information exchange can happen (e.g., area committees, symposia, conferences). Engaging academics in preparedness must include efforts at the institutional level, not just with individual researchers in response areas of operation. Development of plans with institutions where streamlined points of contact can be made available to response in real time; must be broader than individual contacts among individuals; should be institutionalized. Strengthening regional consortia and networks of academics for preparedness and response. Responders need to develop a process by which academics will be engaged during response; this needs to happen in preparedness. Engagement before spills with researchers and their legal representatives and administrators regarding potential opportunity costs. Response community needs to reach out to academic institutions develop a central point of contact. Once a researcher is engaged by a response, they must invest in being involved in preparedness.

<table>
<thead>
<tr>
<th>P = political</th>
<th>F = financial</th>
</tr>
</thead>
</table>

Medium; timeframe ongoing.
Mechanisms to facilitate access during spill

The Refugio model - going through Liaison Officer, using checklist. Regardless of model, needs to have standardized process of approval through Unified Command, site safety plan awareness/compliance. Researchers provide information/data back in real-time that may have operational relevance (“see something, say something”). Include how information can be reported out/communication policy (social media). Needs to be a process to address access to source oil, response-generated samples, or data. Academic advisor who can liaise with response.

Transparency from Unified Command about why access to operations area is restricted or what may change in the future.

Discussion and process with academia and states/trustees regarding set aside sites along shorelines.
Appendix F

National Response System Family of Plans
Basic Organization
(Expanded Organization see IMH 20-4)
Appendix G

ICCOPR Research Categories
## Interagency Coordinating Committee On Oil Pollution Research

### Research Categories

<table>
<thead>
<tr>
<th>Prevention</th>
<th>Preparedness</th>
<th>Response</th>
<th>Impact Assessment &amp; Restoration</th>
</tr>
</thead>
</table>
| - Human Error Factors  
- Offshore Facility and Systems  
- Onshore Facilities and Systems  
- Waterways Management  
- Vessel Design  
- Drilling  
- Rail & Truck Transportation  
- Pipeline Systems | - Pre-spill Baseline Studies  
- Information Management and Decision Systems | - Structural Damage Assessment and Salvage  
- At Source Control and Containment  
- Chemical and Physical Behavior Modeling  
- Oil Spill Detection and Surveillance  
- In- and On-water Containment and Recovery  
- Shore Containment and Recovery  
- Dispersants  
- In-situ Burning  
- Alternative Countermeasures  
- Oily and Oil Waste Disposal  
- Bioremediation | - Environmental Impacts and Ecosystem Recovery  
- Environmental Restoration Methods and Technologies  
- Human Safety and Health  
- Sociological and Economic Impacts |

ICCOPR Oil Pollution Research and Technology Plan, September 2015. Table 4-1. Standing Research Areas assigned within the four research Classes.