2016 NRPT: Oil Spill Response Options for the Flower Garden Banks National Marine Sanctuary

Coastal Response Research Center (CRRC)

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Addressing Public Concerns During Spill Response

June 28 - 29, 2016
Florida Fish and Wildlife Research Institute
St. Petersburg, FL

A WORKSHOP REPORT

COASTAL RESPONSE RESEARCH CENTER
Acronyms
ACM Area Committee Meeting
ACP Area Contingency Plan
CAFE Chemical Aquatic Fate and Effects Database
COTP Captain of the Port
CRRC Coastal Response Research Center
DDO Dispersants and Dispersed Oil
DEP Department of Environmental Protection
DRC Gulf of Mexico Disaster Response Center (ORR)
DWH Deepwater Horizon Oil Spill (also known as MC-252 and Macondo)
ERD Emergency Response Division (ORR)
ESA Endangered Species Act of 1973
ESI Environmental Sensitivity Index
FIO Florida Institute of Oceanography
FOSC Federal On Scene Coordinator
FWC Florida Wildlife Conservation Commission
FWRI Fish and Wildlife Research Institute
GOM Gulf of Mexico
GoMRI Gulf of Mexico Research Initiative
GRP Geographic Response Plans
ICS Incident Command System
ISB In-situ Burning
JIC Joint Information Center
MMMA Marine Mammal Protection Act of 1972
MOU Memorandum of Understanding
MSDS Material Safety Data Sheets
NGO Non-Governmental Organization
NIMS National Incident Management System
NMFS National Marine Fisheries Service (NOAA)
NOAA National Oceanic and Atmospheric Administration
NRPT NOAA Regional Preparedness Training
OPA 90 Oil Spill Pollution Act of 1990
ORR Office of Response and Restoration (NOAA)
OSC On-Scene Coordinator
OSHA Occupational Safety and Health Administration
RP Responsible Party
RPI Research Planning Inc.
SAB Save All Birds
SHPO State Historic Preservation Office
SSC Scientific Support Coordinator
UC Unified Command
USCG United States Coast Guard
USF University of South Florida
USFS United States Forest Service
UW University of Washington
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Introduction

On June 28-29, 2016, the Coastal Response Research Center (CRRC)\(^1\) and the National Oceanic and Atmospheric Administration (NOAA) Gulf of Mexico Disaster Response Center (DRC) co-sponsored a NOAA Regional Preparedness Training (NRPT) workshop at the Florida Fish and Wildlife Research Institute (FWRI) in St. Petersburg, FL entitled “Addressing Public Concerns during Response... sorting fact from fiction during response.” The workshop focused on understanding the public’s desire to be informed during a response and the need to plan for and execute an effective public communications plan during a potential oil spill.

Following the workshop, CRRC and DRC conducted a one-day training on June 30, 2016, on risk communication and the use of social media during a response which was open to all workshop participants. Fifty three workshop and training participants (Appendix A) represented federal and state agencies, industry, response organizations, academia, and non-governmental organizations (NGOs).

This workshop was the third in the NRPT series to provide a focused training activity to enhance Gulf of Mexico (GOM) regional preparedness across NOAA line offices and among key state, federal, and other stakeholders. The overall goal of the NRPT workshops was to better understand coastal disasters: the human and natural resources at risk, the roles and responsibilities of the different response agencies, the science that drives decision-making, and the importance of public outreach.

The first workshop was held in Galveston, TX on May 25-26, 2016, and focused on preparedness, planning and improvement of response to a potential oil spill threatening the Flower Garden Banks National Marine Sanctuary. The workshop examined response options such as dispersant use and \textit{in-situ} burning (ISB), while developing the framework for an environmental tradeoff analysis to evaluate response options. The workshop also provided the opportunity for the spill response community to build relationships with the Sanctuary staff, understand the role each group plays in a response, and create a common understanding of the issues at the regional level. The second workshop, held in Mobile, AL on June 8-9, 2016, focused on preparedness, planning and improving response to an oil spill occurring during a natural disaster (e.g., flooding from a tropical storm). Additionally, the workshop explored the roles and responsibilities under the \textit{Robert T. Stafford Disaster Relief and Emergency Assistance Act} (Stafford Act) and the \textit{Oil Pollution Act of 1990} (OPA 90).

\(^1\) A list of acronyms is provided on Page 1 of this report.
Workshop

Introduction
Nancy Kinner (CRRC), Charlie Henry (DRC), and Kathleen O’Keife (Florida Fish and Wildlife Conservation Commission (FWC)), provided the welcome and introductions for the workshop. Charlie Henry provided background information about the NRPT workshops series and goals. The workshop focused on addressing public concerns and improving communication during oil spills. The workshop goal was to improve responders’ knowledge of the current state-of-science and their ability to communicate to the public about the response, including dispersant use, seafood safety, fisheries impacts, and public health.

The workshop consisted of plenary presentations and three breakout sessions. Plenary presentation topics included: oil spill response options, shoreline response, natural resources in the region, public health, tourism, and interaction of science and the response community. The workshop examined potential response options such as the use of dispersants, ISB and mechanical recovery, and the type of decision process used by the Unified Command (UC) during a spill. With this understanding of how response technologies would be used during a spill scenario, breakout groups examined the type of information that the public would want to know in four areas: (1) response technologies, (2) shoreline protection and restoration, (3) natural resources, and (4) human dimensions. In addition to identifying the types of questions that the public would like to have answered, the breakout groups discussed what information is known or unknown and how best to address public concerns during three breakout sessions.

The agenda for the workshop is located in Appendix B.
Plenary Sessions
During the initial day of the workshop, a series of plenary speakers discussed the types of response strategies and technologies that might be employed during a spill offshore and at the shoreline. The speakers provided background information and set the stage for the spill scenario that would be used by the breakout groups to discuss potential public concerns and how to best address those concerns. The plenary speakers provided a summary of their presentations below. Slides for the presentations are in Appendix C.

Overview of Scenario
Brad Benggio (NOAA Office of Response and Restoration (ORR), Emergency Response Division (ERD)) provided an overview of the workshop scenario which was based on an oil spill offshore of Tampa Bay, including: when and where the spill occurred; the type and amount of oil spilled; the oil properties and chemistry (including fate and effects); forecast movement (i.e., trajectory) of the oil; and resources at risk. The scenario developed for the workshop was a 50,000 gallon spill, 36 miles offshore of Tampa Bay (Figure 1), during July 2016. The oil was a domestically produce crude oil being shipped offshore. The countermeasures available included: dispersants, ISB, mechanical recovery, and shoreline cleanup.

Figure 1. Map of Tampa Bay. The black star is the location of the 50,000 gallon spill, 36 miles offshore of Tampa Bay, developed for the workshop spill scenario.
The area response plans include Environmental Sensitivity Index (ESI) maps, Geographic Response Plans (GRP), Tidal Inlet Protection Strategies, and the digital Area Contingency Plan (ACP).

There is significant information available with respect to identifying important environmental resources. There are ESI maps developed for the Tampa Bay Estuary (Figure 2) that document species, important habitats species occurrences, and economic and recreational resources.

Figure 2. Environmental Sensitivity Index map of Tampa Bay include fine-grained sand beaches (blue line), mangroves (red), tidal flats (yellow), patchy seagrass (light green), and continuous seagrass (dark green).

The spill scenario impacts include affected habitats of seagrasses (1,060 acres), mangroves (120 acres), and turtle nesting beaches (11.25 linear miles). Affected animals include, but not limited to:

- Diving birds
  - Least tern (threatened)
- Shore birds
- Waterfowl
- Wading birds
  - Snow egret
  - Roseate spoonbill
- Gulls and terns
- Reptiles
  - Green sea turtle (endangered)
  - Loggerhead sea turtle (threatened)
- Mammals
  - West Indian manatee (endangered)
The spill scenario, as with more recent environmental disasters, would be subject to greater public scrutiny due to the expanded use of social media. As part of the exercise, it was important to discuss information management and, in particular, how to interact with the potential social media feeds that would occur as a result of the spill. Because of the greater public awareness associated with other recent spills there will be a need to develop strategies to provide timely information on the response, protect natural and economic resources, and address public health concerns.

**Overview of Oil Spill Response Technologies**

Charlie Henry (NOAA DRC) provided an overview of oil spill response technologies. The Scientific Support Coordinator (SSC) must be able to answer a series of five questions when attempting to determine the best course of action during a spill response:

1. What was spilled and how does it change over time?
2. Where is it going (e.g., as affected by wind, tides)?
3. What is at risk in terms of environmental resources?
4. What are the potential impacts to those resources?
5. How do we mitigate the potential impacts? In evaluating the best options for mitigating impacts, it is important to do no more harm than good.

There are several fundamental principles in determining an oil spill response strategy which include:

- Protecting human life,
- Controlling the source,
- Containing the oil at or near the source,
- Protecting sensitive habitats/environments,
- Recovering the spilled oil,
- Minimizing environmental impact from the spill, and
- Enhancing natural recovery (mitigation).

**Mechanical Recovery**

The objective of mechanical recovery is to contain spilled oil as close to the source as possible and minimize impacts. Mechanical recovery systems entail the use of booms and skimming systems that contain and remove the oil. Mechanical recovery is difficult to effectively operate in open water conditions where sea-state, wind, remoteness of location and currents can challenge the effectiveness of the systems.

**Dispersants**

Dispersants were first used in large quantities during DeepWater Horizon (DWH) in the GOM during 2010. They can be applied to reduce the overall impact of a large oil spill to the environment as a whole (i.e. mass movement of oil on to shoreline habitats such as beaches, marshes, mangroves etc.). The use of dispersant requires potential tradeoffs; it increases potential risks to water column biota in order to reduce potential injury to surface water and nearshore and shoreline natural resources.

**In Situ Burning (ISB)**

ISB was also used extensively during the DWH spill. The use of the technology must consider potential effects related to air quality and the environmental resources down wind or down current from the burn area. ISB results in a significant amount of smoke and particulate release; so prevailing winds must be...
evaluated to reduce impacts to humans and other resources. The location of important benthic resources, hard bottoms, fish and shellfish habitats and transport mechanisms must be considered when determining where the residual from a burn might ultimately sink to the bottom.

Oil and chemical spills are unplanned and uncontrolled events. The job of a spill responder is to: protect life; establish control of the spill if it can be done safely; and prevent or reduce environmental damage. It is a matter of using the best judgement and experience from past oil spills to make the best possible choices for a response given the available information and resources for responding to the spill.

**Shoreline Protection and Cleanup**

Jacqui Michel (Research Planning Inc. (RPI)) provided an overview of shoreline protection and cleanup, including chemical counter measures. The following questions were used to frame the presentation on shoreline response and restoration:

- What are the response options available?
- How do we select the best combinations of options?
- What tools are available to help our selections?
- What are realistic expectations of response and restoration effectiveness?
- What tradeoff considerations should be considered for each countermeasure?
- How do we best communicate these options and tradeoffs to the public?

The tools used to answer these questions include ESI maps and databases; GRPs, and NOAA Emergency Response Division guides and Chemical Aquatic Fate and Effects (CAFE) database which includes properties, toxicity, degradation rates.

Public concerns about shoreline protection are: 1) expectations that the oil can be effectively contained and recovered by booming or other on-water tactics (i.e., the public wants to put booms “everywhere”); and 2) the response wants the public to know that they are doing something, even if it is not effective. Public issues during shoreline cleanup arise from concerns that any oil has an effect and thus must be removed. The public believes that technology should be able to remove all the oil. Instead, responders must carefully evaluate response methods to make sure that they do an effective cleanup and not cause more harm.

A response team uses an active, iterative consultation process with resource managers to ensure that the response minimizes environmental impacts while meeting appropriate cleanup endpoints that drive the shoreline cleanup. The response community should engage the public in the process so they understand and accept the response strategy. As an outcome of the workshop, effective communication strategies that will enhance the public’s understanding, “involvement”, and acceptance of chosen cleanup countermeasures and endpoints should be developed.

**Natural Resources**

Nancy Thompson (Florida Keys Marine Lab) provided an overview of natural resources with a focus on the importance of fisheries and protected species to the FL economy and how it relates to potential public concerns. Commercial and recreational fisheries support over 160,000 jobs statewide and contribute almost $50 billion annually to the FL economy. Florida’s west coast, where the scenario spill
occurs, ranks #1 in recreational fishing in the number of recreational trips and value. The shrimp fishery, which occurs largely in the GOM, had a value of $702 million in 2014. It is the single most valuable commercial fishery in the United States. The other major fisheries along Florida’s west coast target groupers and snappers. The primary recreational species include groupers and snappers, mackerels, drum, blue crabs and shrimp.

Estimates of the value of protected species are largely based on their importance to ecotourism programs including sea turtle nesting, beach walk, and manatee viewing at aggregation sites. For example, in SC, on one nesting beach, the value of nesting sea turtles was estimated to be almost $50 million per year. Florida conducts similar walks and is the primary nesting area for sea turtles in the GOM and Western North Atlantic which presumably makes FL’s sea turtle ecotourism value even greater. It has been estimated that manatee viewing in Citrus County alone brings in $8-9M per year through ecotourism.

The impact of an oil spill or any other natural or man-made event is determined by the location and extent of the event, the species present, and the life stages occurring during the spill. For example, the life cycle of shrimp is dependent on the water quality and the flow of freshwater into the estuaries. Fresh water is critical to their growth and productivity. Thus, a spill that might impact the quality of that freshwater could be critical to productivity of that population and the overall fishery. Sea turtles nest on beaches and hatchlings migrate into offshore waters where they may spend years before returning to coastal waters to feed. Both sea turtles and blue fin tuna are highly migratory and use the entire GOM and may move in and out of the Atlantic Ocean and Caribbean as well.

The seasonal distribution of living marine resources, and the current life stage, the habitat and the resource requirements at the time of the spill will result in the amount of impact and provide the context for addressing concerns of the public and stakeholders. The range of concerns could include:

- “How safe is the seafood to eat?”
- “Can I get seafood for my store/restaurant?”
- “Can I fish? If not, when can I fish?”
- “Where can I fish?”
- “Will the management of important commercial or recreational fish species change?”
- “What can I do to help?”

**Public Health**

Robert Dickey (University of Texas Marine Science Institute) provided a public health overview. Petrochemical spills in the marine environment provoke many public concerns about hazards to human health and degradation of the environment. Such concerns include the safety of oil exposed seafood and beaches. Analysis of seafood and beaches in the aftermath of DWH indicated that public health risks from exposure to harmful crude oil residues returned to pre-spill levels soon after the oil spill had dissipated. However, public confusion, disquiet and socioeconomic recovery were in part prolonged by an abundance of conjecture competing with communications of factual, technically accurate information. Implementation and communication of official response strategies and health risk assessments also triggered anxieties about uncertainties in toxicological knowledge, related risk
information and jeopardy of vulnerable populations. Long after the oil spill had dissipated, concerns persisted about residual oil buried in beach sand and lingering submerged oil mats that could remobilize and present future exposure risks.

From a public health protection perspective, the DWH response revealed deficiencies in communication strategies; local-scale demographic and baseline human health data; benchmark environmental contaminants data; toxicology of crude oil components; and, integration of human and environmental health status and trends. The science underpinning disaster response is rarely unconditional, and communicating uncertainties in the midst of definitive information can undermine risk messaging if not well prepared and expertly performed. The development of such knowledge bases and communication skills will help improve the effectiveness of responses, risk communications and outcomes for future large-scale disastrous events.

Other Impacts
There was a plenary session addressing other impacts including tourism, volunteers, and interactions between the scientific and response communities.

Tourism
David Downing (Visit Clearwater St. Petersburg) provided an overview of FL tourism, the impacts of DWH on the tourist industry and the lessons learned. FL tourism is a $9 billion industry and on a yearly basis, approximately 15 million people visit the state. Pinellas County is the largest tourist area in Florida. The panhandle was the area projected to be the most impacted by the spill; however, the Tampa Bay area and southward was also impacted significantly with 50,000 job losses. Local Floridian tourists, being psychologically affected, did not frequent the beaches. Prior to DWH, the tourism industry was just coming out of recession which made it difficult to assess the actual dollar loss on the DWH impacts.

As might have been expected following the spill, there was political grandstanding which may have been well-intentioned, but it resulted in bad publicity for all of the coastal locations. For example, BP, as part of their efforts to help Gulf coast communities, developed promotional material for television and other venues. Materials included images of the BP brand on beautiful beaches and it was requested to remove these materials because people were associating the beaches with BP.

To improve tourist visits, the tourism industry, working with local partners in hotel tourism industry, advertised an “oil free guarantee” for rooms. While the “free night” program was not established with the large international chains, local partners implemented the program via the Visit St. Petersburg Clearwater affiliation. Another key factor to the survival of the Gulf coast tourism was that Miami and other communities on the east side of the state, less affected by the spill, could have taken advantage of poor business in the GOM and Tampa Bay. Fortunately, the State worked together on promoting the tourist industry as a whole.

Volunteers
Lee Fox (Save All Birds (SAB)) provided an overview of volunteers during an oil spill. SAB is an example of a highly effective organization which can mobilize and organize a pre-trained group of volunteers under
the direction of a small cadre of employees. By developing protocols for all operating procedures in advance and conducting pre-spill training programs for its volunteers, SAB has the ability to respond rapidly and effectively to spills. SAB has a network of 17 committees that spread the workload and ensure all tasks are covered.

SAB identified four stages for a successful oiled wildlife response program:

- Preparation including preplanning and training,
- Mobilization to a site including all support logistics,
- Rescue and release, and
- Demobilization and final documentation.

One of the reasons for the effectiveness of SAB is their preplanning and organization. This pre-planning includes providing instructions for media releases and addressing inquiries about rescue operations.

**Interactions Between Scientific and Response Communities**

Steve Murawski (University of South Florida (USF)) provided an overview on the interactions between the scientific and response communities. The interaction between the scientific community and responders has been proven to be an important asset to address environmental unknowns and improve response. The 2012 *Memorandum of Understanding (MOU) Between USCG and Florida Institute of Oceanography (FIO) Regarding the Academic and Marine Research Contribution to USCG Oil Spill and Hazardous Material Response Plans* provides for the following:

- Allows USCG to utilize marine science institutions to provide scientific expertise to address issues raised during a response,
- Allows for a coordinated public message,
- Allows universities and their researchers to retain the right to publish with no requirement to consult with the USCG before developing publications,
- Requires the development of a plan to establish this coordination, and
- Identifies the need for FIO and USCG to increase research funding to support oil spill response and for the joint development of priorities for research funding.
Breakout Sessions

The objective of the breakout sessions was to understand the needs and requirements of risk communication during a spill response using the offshore scenario as a means of focusing the breakout groups on potential public concerns that could arise during an incident. Specifically the breakout groups were asked to focus on:

1) Understanding and communicating with the public about their concerns (e.g., dispersant use, seafood safety, fisheries impacts, public health, tourism),
2) Developing an understanding of the knowns, uncertainties and disagreements surrounding the complex issues involved in a response,
3) Understanding the most effective ways to transmit information to public that addresses their needs, and
4) Understanding the state-of-science of risk communication during oil spills.

Following the Plenary Session the workshop participants were divided into four Breakout Groups:
- Response Technologies Group focused on the use of ISB, dispersants and mechanical recovery and how to inform the public about their use,
- Shoreline Protection and Restoration Group discussed the technologies for protecting the shoreline and coastal resources and how to inform the public about their use,
- Natural Resources Group identified the important natural resources and habitats in the region, with an emphasis on fisheries and seafood issues, and how to effectively relate the potential impacts to the public, and
- Human Dimensions Group discussed public health, tourism and volunteers’ concerns and how to provide the best information to concerned citizens effectively.

There were three breakout sessions that were organized to answer the following questions:
- Breakout Session I – What will the public want to know or ask about the topic?
- Breakout Session II – What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?
- Breakout Session III – How can these public concerns be effectively addressed?

The initial breakout session identified questions the public might want to know about each of the four subject areas. Although these questions reflected the specific spill scenario off Tampa Bay, many are consistent with questions the public would ask of responders in most spill locations. Questions were expressed as they would be expected to be stated by the public.

The subsequent two sessions began to answer these questions by first understanding the knowns and unknowns about these issues (Session II) and the final session addressed how to best present the information about these questions to the public (Session III).

In the following sections of the report, the results of each breakout group is summarized by presenting Session I-III sequentially by the topic identified in each breakout group for continuity. An effort was made by CRRC to diversify the participant expertise in each breakout group. Each group had a group lead to help facilitate discussion and a note taker equipped with a laptop computer and projector to
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capture the discussion. The breakout group notes, which consisted of a completed matrix previously
developed to record the discussion, can be found in Appendix D.

Response Technologies Breakout Group
The Response Technologies Group addressed issues and questions related to dispersants, ISB,
mechanical recovery, and other issues such as the UC, and situational awareness.

Dispersants
What will the public want to know or ask about with respect to dispersants?

- What is the State’s position on the use of dispersants in state waters?
- How long will dispersants stay in the water column?
- Should dispersant use be based on the potential to impact benthic or reef resources?
- Why are the use of dispersants banned from Europe?
- How do we know if dispersants are actually working?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future
with regard to these public concerns?

Knowledge about the use and effects of dispersants in the environment has increased substantially
following the DWH spill where dispersants were used extensively for the first time. Inherent in the
questions is a general uncertainty about the use of dispersants in FL waters because of the concern
about toxicity and dosage. The federal and state regulators should agree about the use of dispersant,
location and monitoring programs as part of the response.

Dispersants are not 100% effective in dispersing spilled oil. The effectiveness is dependent on
environmental conditions including wind, waves, and temperature. More study is needed to better
understand the conditions that provide for the greatest dispersion of oil. Dispersants dilute rapidly in
the environment, and the rates of dispersion differ based on environmental conditions. The potential
impacts of dispersants on benthic and coral habitats is being studied extensively as part of the Gulf of
Mexico Research Initiative’s (GoMRI) DWH spill research program. Some of these studies indicate that
dispersant and dispersed oil (DDO) is being observed in some locations in the GOM deepwater benthic
environments.

The UC and the state and federal agencies should take into account fate and effectiveness when
determining dispersant use. The dispersant Corexit 9500 is banned in Europe based on one failed
toxicity test. Use of Corexit 9500 in the U.S., and in the scenario, requires approval by federal and state
agencies prior to application for any response. It is important to undertake more research and
monitoring to better understand the effectiveness of dispersants in the environment and their potential
short and long term environmental impacts. A monitoring program will be developed prior to any
application to the spill.

How can these public concerns be effectively addressed?
State and federal agencies should meet and determine their positions regarding the use of dispersants, including the conditions under which they may be used. It is important to make available as much information as possible to the public on dispersant use, their toxicity and the known environmental impacts. Organizations (e.g., GoMRI) should produce one-pagers on how dispersants work, and the results of other monitoring studies would provide useful information to the public. In addition, it is important to share information on the short and long term monitoring results following the application of dispersants.

**ISB**

**What will the public want to know or ask about with respect to ISB as a response technology, its potential impacts and its effectiveness?**

1)  Is the smoke harmful?
2)  Does the oil burn completely?
3)  What are the odors and residue from a burn?
4)  Can ISB be used in Tampa Bay?

**What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?**

The use of ISB, like other response options, requires a tradeoff between the potential impacts of ISB and the spilled oil. Some of the known impacts are smoke, odors and burn residue. Smoke and odors can be mitigated by observing potential air transport patterns prior to a burn. Changing conditions such as winds or storms can add a level of unknowns to such a planning process. It is known that not all oil will be burned as part of a response. This is similar to other response technologies where not all oil is removed. It is known that some of the burn residue will ultimately sink to the bottom. The amount of this deposition, the concentration, and the location will depend on tides and currents. The overall effectiveness of ISB in the scenario can be assessed by designing an effective monitoring program.

**How can these public concerns be effectively addressed?**

ISB can be a useful tool for oil spill response. When using ISB as a response method, the UC will consider the potential impacts to humans and the environment (i.e., air quality, residuals). It is important that information is provided to the public on ISB benefits and impacts. In addition, air and monitoring data should be posted as part of any ISB application. To further inform the public, the UC should also develop and issue one pagers on ISB as a response method including: potential airborne hazards, air modeling, ordinances on burning, and collecting and disposing of oil and residues.

ISB is unlikely to be used within Tampa Bay as part of any response. A permit would be required in order to use ISB.

**Unified Command (UC)**

**What will the public want to know or ask about with respect to the UC within an Incident Command System (ICS) structure, its operations and decision-making?**

1)  How does the public better understand the response terminology?
2) Does the cleanup plan work?
3) Who makes decisions about the response?
4) Why is the public not part of the UC?
5) Why is the Responsible Party (RP) responsible for the cleanup?
6) How long will the process take?
7) Will the leaking ship be brought into port?

**What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?**

The questions regarding the ICS structure and the UC require an explanation of the structure and how it works. The ICS structure provides for unity of command, a structure for planning, decision making, operations, and a developed common terminology. Local representation within the UC is contingent upon local authorities or local government having jurisdiction, authority and resources to add to the response, and is a decision made by the Federal On Scene Coordinator (FOSC) and other members of the UC. If the local government is not part of the UC, there may be a liaison assigned to communicate and coordinate with the local government. Decisions are made in the UC by assessing the best information available gathered from multiple agency inputs. It is important to make the public familiar with how these decisions are made.

Since the UC structure requires numerous organizations to share information and develop joint decisions, it is critical that the ICS system is understood by all levels of government, NGOs and industry that could be involved in a spill or pollution response. The UC structure provides for orderly review of data so that decisions can be made based on the best information available in a timely fashion. It also provides one point of contact for the public where they can obtain the most accurate and up-to-date information.

Questions were asked about whom the RP is, and why the RP has such a significant role in the cleanup. The UC needs to make information on OPA 90 and the Stafford Act available through workshops, webinars, and other materials which describe how the UC process works, the role of the RP and the involvement of local citizens in the response.

**How can these public concerns be effectively addressed?**

The ICS was devised by the USFS to help fight complex forest fires. It has been adopted by the spill response community to allow scientists, experts and federal and state responders to work jointly to make informed decisions for an incident and take necessary actions during. This model follows the National Incident Management System (NIMS) which provides a structure to implement a response plan. It is important for the UC to frequently explain the response plan and update the public on the execution of the plan. Typically, liaisons are appointed for government entities who are not part of the UC and possibly not part of the ICS structure underneath the UC. The public is usually kept aware of ongoing response operations, threats to the community or other important information through a Public Affairs POC or Public Affairs Team made up of representatives from the members of the UC. Often this is in the form of a Joint Information Center (JIC), which is invaluable in keeping the public up to date.
Addressing Public Concerns During Spill Response

regarding the spill and response efforts. The public can also participate prior to a spill during the planning process by attending an Area Committee Meeting.

Under OPA 90, the RP is fiscally responsible for the cleanup of a spill. If the spiller is not fulfilling its obligations, the USCG will take over that role. In the case of this spill scenario, the offshore response is expected to take three to four days. Ongoing monitoring will determine if additional cleanup is required.

The Captain of the Port (COTP) and owner of the vessel will determine the best course of action for the vessel. The vessel will not be moved until the leak is contained and the ship is determined to be seaworthy. During the response, the COTP of Tampa will determine whether the port is open or closed. The COTP will monitor the conditions and the potential transport of oil in managing port access.

Situational Awareness/Other Related Issues

What will the public want to know or ask about with respect to situational awareness and other general issues in the scenario?

- Who is the RP and how is that established?
- Where is the ship located? What direction is the oil moving?
- Who are the cleanup workers and what are the safety protocols?
- Is bioremediation a response option for this cleanup?
- How do we get research samples to study?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

Questions were asked with respect to the viability of using bioremediation as a tool to address the spill. Bioremediation is different than biodegradation which is the natural breakdown of oil by bacteria present in the environment. Bioremediation is not part of the response plan and would not be used in this open water scenario to respond to this spill. It is not a quick way to respond to spills and has not been found to be easily applied in the open ocean.

The safety of workers during a response is extremely important. For that reason, all workers are trained and issued safety equipment before going into the field. Workers are monitored for compliance to protocols during the cleanup by response professionals.

Questions were also asked about the location of the leaking vessel and which direction the oil is moving. The UC tracks the oil daily and is also using models to predict which way the oil will be transported based on environmental conditions. This information is valuable for placing response equipment in locations where it can effectively collect or disperse oil. In addition, it provides the public, through the UC outreach program, data on where the oil is moving relative to natural resources and human assets.

How can these public concerns be effectively addressed?

Bioremediation is not part of the offshore/open water response plan and would not be used for this spill. There will be natural biodegradation of the oil over time as a result of natural biological processes. This process is particularly important in areas such as mangroves and marshes where cleanup impacts
can often be as harmful as the spilled oil. It is important for the UC to explain to the public the response plan technologies, their strengths and weaknesses, as well as the difference between bioremediation and natural biodegradation.

Cleanup is always conducted by workers that have received safety training. In addition, these cleanup workers are outfitted with safety equipment such as protective clothing, boots and masks. The cleanup is always conducted under Occupational Safety and Health Administration (OSHA) guidelines and monitored by response professionals.

**Mechanical Recovery**

What will the public want to know or ask about with respect to mechanical recovery, including oil skimming and booms, its impacts to the environment and its effectiveness?

- Why is there not enough equipment and why does the skimming process take so long?
- Why does it appear that responders are not skimming?
- Why are volunteer vessels not used to skim?
- Are booms trapping sea turtles?
- Are booms impacting sea grass and other habitats?
- Why is the UC not using three-knot booms?
- Why can the responders not pick up all the oil before it reaches the coast and important habitats?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

Questions were asked as to whether there is enough equipment to effectively skim a significant volume of oil as part of the response. Skimming will not collect all the oil due to the volume spilled and the expected environmental conditions. There is sufficient boom in the area to deploy for this spill. There is no plan to use volunteer vessels to conduct skimming because of the lack of training, liability and equipment requirements. A suggestion has been made about using three-knot boom. To date, three-knot boom has not been shown to be effective in oil cleanups such as this one.

The use of boom has not been shown to cause significant impacts to natural resources. If turtles or other protected species are observed near skimming operations or are somehow trapped, all skimming in that area would be stopped. Impacts to critical habitats such as sea grasses, marshes and mangroves are not anticipated as skimming would be conducted offshore.
How can these public concerns be effectively addressed?

There are always questions as to the availability of skimming equipment and its placement. Skimming is only part of the response and can only remove a portion of the oil. The UC will direct the use of skimming assets to the areas where they can be most effective based on the concentration of oil and the sea conditions. It is important that the public is made aware of where skimming is occurring, how effective it is and where future deployments might occur. This information will help the public, commercial fisherman, and other marine businesses avoid areas where skimming might be occurring.

Shoreline Cleanup and Restoration Breakout Group

The Shoreline Cleanup and Restoration Group addressed issues and questions related to impacts to the shorelines, operations, priorities for cleanup, boom placement, and new, innovative technologies.

Impacts to the shorelines

What will the public want to know or ask about with respect to oil impacting the shoreline, including reimbursement for damages?

- Can I ever use the beach again with my family?
- How can I get research samples?
- If oil comes ashore, should I burn it?
- Are cleanup workers safe?
- How much money am I going to get?
- Will I be put in a hotel or receive other compensation?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

The public is concerned about whether the beaches they visit will ever be useable again. The UC uses the Shoreline Cleanup and Assessment Technique (SCAT) to assess an affected shoreline after an oil spill. SCAT surveys begin early in the response to assess initial shoreline conditions, and ideally, continue during operational cleanup. SCAT helps to set priorities for cleanup and monitors the response to ensure the habitat is restored to the proposed endpoints. What is unknown is the time frame for completion of the cleanup. Sometimes pockets of oil are hidden or missed and are not discovered until later, thus extending the process; but with the SCAT monitoring process, ultimately the beach will be cleaned to established levels.

The length of time to complete the cleanup will be “as long as it takes” to meet the UC objectives for cleanup. Based on prior experience, the UC will be able to provide estimates for the various parts of the response. The UC will continue to make the results of the SCAT process available to the public.

The question of response workers safety was raised with regard to offshore and shoreline cleanup. There will be a safety plan develop by the UC that ensures worker safety. That safety plan will be monitored as part of operations. The only uncertainty is if the workers ignore their training and fail to follow the plan as designed.
Questions were raised about the potential compensation to the public, including payment and potential relocation. The UC or the RP will set up a process for filling claims and addressing concerns. False claims will be prosecuted. The time frame for receiving reimbursements is unknown. Payment for any evacuation (i.e. hotels) will be based on evacuation orders issued by the local Emergency Management Agency.

Answers to questions regarding beach and fishing/other recreation closure will be available from the UC. The UC will also inform the public on alternative locations (e.g., for beaching, fishing). Because the amount of time to complete the cleanup is initially unknown, the exact timing when a resource will be re-opened will be based on the SCAT process and environmental testing results.

How can these public concerns be effectively addressed?

In order to inform the public about general issues regarding shoreline cleanup, the UC should develop materials that document the use of SCAT and the development of cleanup endpoints.

Site safety plans ensure the safety of all workers involved in the cleanup. The UC should develop documents that explain the requirements and explain the training and monitoring of all workers on the website.

The UC and or the RP will develop a claims process for the public to refer to and use where appropriate. This information should provide the process for submitting and evaluating claims, the amount of documentation required, and the potential time frame for review.

**Operations**

What will the public want to know or ask about with respect to operations?

- Is my beach open and can I go there?
- Can I fish? Will the area be closed to fishing?
- How long with the response take and how long will I be impacted? Why is the cleanup crew not working around the clock?
- How will the oil be cleaned up?

How can these public concerns be effectively addressed?

Local authorities manage closures and will make available information on the status of beaches as they occur. Florida already maintains a beach information site which the public is familiar with and it could be used for the spill scenario. As described above, the UC will make available information on the SCAT process and estimate the length of the cleanup based on past spills. The UC will provide updates on the ongoing evaluation, the cleanup process, or the potential need to adjust the current techniques to reach endpoints. The UC will also notify the public on fisheries openings and closures and alternative fishing sites.
Priorities for Cleanup

What will the public want to know or ask about with respect to how priorities were set for cleanup and how those priorities would impact individuals?

- How will the natural investments (i.e. preserves, beaches, recreational facilities) be protected?
- With respect to wildlife and bird sanctuaries, what will be done to protect nesting birds?
- How are you going to prioritize the protection and cleanup of sites?
- Is my beach going to be oiled?
- How can we protect or keep oil from my beach, home, etc.?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

The UC will develop priorities for cleanup by using multiple available resources including: the ACP, GRPs, ESI maps, local expertise and other sources as available. After identifying the priority resources, UC operations will determine the booming requirements for important human use areas (e.g., beaches), environmental areas (e.g., wildlife, sanctuaries, marshes), and other areas.

How can these public concerns be effectively addressed?

As part of the outreach effort, the UC will provide information on who is involved in the GRP development and the purpose of that plan. The GRPs are guidelines and actual operations may need to adjust booming strategies, based on the on-the-ground conditions, to protect natural and economic resources.

To assist public in understanding the potential impact of the spill on local beaches, the UC will provide access to the oil trajectory forecasts with documentation on how to interpret the information. This will be supplemented with local closure information.

Boom Placement

What will the public want to know or ask about with respect to boom placement?

- Where are you placing boom and what resources are you protecting?
- Do we have enough boom available for me and others?
- Why can you not boom the entire bay?
- Why do you not use the three-knot boom?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

The placement of boom would be established by the UC as described in the GRP. The boom will be placed to protect natural resources, economic resources and property as identified by planning documents and all available information as discussed above. Individual personal property will be protected in accordance with the priority of resources and the trajectory of the oil transport. It is not prudent or possible to boom the entire bay given the size of the area and the availability of boom. As
addressed in the Response Technology Group the use of three-knot boom has not determined to be effective and would not be used in this response.

**How can these public concerns be effectively addressed?**

Protective booming will be made based on resource information and planning information. This will be supported by an explanation of the prioritization process related to human life and the environment. The USCG will establish a notification process for boaters on the location of boom and access points for navigating the protected areas.

**New Innovative Technologies**

**What will the public want to know or ask new innovative technologies?**

- Why can you not use my new “super-duper alternative” oil clean-up equipment?
- Where do I send my hair or noodles?

**What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?**

A question was asked if or how new suggested technologies would be considered for use in the response. During the DWH, the Alternative Response Technology Program was established to evaluate and test various technologies. Any new technologies need to be tested and proven to be effective before being implemented. Due to the size of the spill and the shorter time estimated for this cleanup, such a process may not be appropriate.

**How can these public concerns be effectively addressed?**

To determine the value of new technologies the UC could develop and implement an Alternative Response Technology Evaluation System. The details of this system will be made available publicly. The value of using this system will depend on the length of the cleanup or the need for specialized cleanup technologies.

**Natural Resources Breakout Group**

The Natural Resources Breakout Group developed questions based on the need for baseline data, a number of important biological groups, habitat types, sampling strategies and recreation. The biological groups include: birds, fish, plants and invertebrates, mammals and sea turtles.

**Baseline Data and Cultural Resources**

**What will the public want to know or ask about with respect to baseline data?**

- What baseline information exists?
- Do we need more research to inform the baseline?
- What are the cultural resources in the area?

**What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?**
Whenever a potential spill or disaster occurs, there is always a question of whether a sufficient amount of baseline data exists upon which scientist and agency personnel can determine the amount of impact. Important tools that can be used to evaluate a baseline include:

- ESI maps
- GRPs
- Mussel Watch
- Southwest Florida Water Management District
- Tampa Bay Estuary Program
- National Marine Fisheries Service (NMFS) critical habitat surveys for fisheries
- FL DEP
- Universities
- FWC Marine Resources GIS Database

Although there are substantial data available, it may not provide the spatial, seasonal or quantitative information that is needed to conduct a statistically sound assessment. There is a need for more information with better replication due to the inherent variability in the natural environment. Specifically for Tampa Bay, there is a need for toxicological data, habitat mapping and abundance mapping of flora and fauna. With baseline and subsequent impact assessment data, there is always a concern for the origin of the data, chain of custody and the validity of the information for legal challenges. This emphasizes the need for data documentation throughout the process.

Cultural and historic resource data is available from a variety of sources including: the State Historic Preservation Office (SHPO), ESI maps, GRPs and the ACP. What is known about this information is usually the specific locations, preservation or mitigation techniques. There are often unknowns about the value of these assets for prioritization during a response event. It is important to engage the cultural and historic representatives to assist the UC with this prioritization.

**How can these public concerns be effectively addressed?**

It is important for the UC to communicate with the public about the value of baseline data and that the Tampa Bay area has been highly studied. As discussed above, more quantitative data dealing with toxicology and natural contaminant levels will always be helpful. Site specific and detailed seasonal information provide clarity in establishing response priorities and assessing short and long term impacts.

**Birds**

**What will the public want to know or ask about with respect to birds?**

- What is the plan for protecting birds?
- What is the threat of oil and dispersants to birds?

**What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?**

There is information on birds for this area in ESI maps, GRPs, and the ACP and in the breeding bird atlas. What is lacking is more detailed information on population dynamics, nesting and bird movements.
within and through the area. Further, there is limited information on body burden of contaminants, including dispersants. More data are needed on the long term fate of birds exposed to oil and dispersants. Long term monitoring is required as part of this spill response to better understand short and long term impacts to birds.

**How can these public concerns be effectively addressed?**

The UC should inform the public, as part of the outreach program, about the plan to protect and rescue birds affected by the spill. The UC will have a Wildlife Management Plan in place for birds and will be coordinating with local wildlife rescue organizations (e.g., SAB). Information will be provided on how to volunteer to help support these rescue efforts.

**Fish**

**What will the public want to know or ask about with respect to fish and fisheries?**

- What is the plan for protecting *Endangered Species Act of 1973* (ESA) listed fish species?
- What is the plan for protecting recreationally important fish species?
- Will there be fisheries closures?
- What is the impact to commercial fisheries from oil and dispersants?
- What is the threat of oil and dispersants to fish?

**What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?**

The questions regarding fish are focused on ESA, recreational and commercial species present in the Tampa Bay region. The ESA species habitats are known to exist in the region. What is not as well-known is presence of each species and their abundance. There are also areas of disagreement as to whether these species and their habitats are adequately protected.

There are data available on recreational species, their size classes and abundance. From creel surveys and license data, there is information on who is fishing in the Bay. What are not well-understood are the population movements of these species. There are economic estimates of the value of recreational fishing but these values are an area where there is disagreement. A better understanding of the economic value of fishing will be possible as more data are collected.

It is expected there will be impacts to both recreational and commercial fishing from the spill. From a commercial standpoint, the location and duration of the impacts are unknown. In addition, the species and habitats impacted may change due to the uncertainty regarding the movement of the spill. Based on monitoring studies, the contamination levels, the impact to various species and the related economic impacts will be better understood for both commercial and recreational species.

The potential for fishery closures exists due to the spill. The location of the closures and the species affected depends on the trajectory of the spill and the effectiveness of the cleanup. The monitoring of species contamination, fish kills and habitat impacts will be better understood. This information will help inform decisions regarding fishery closures.
How can these public concerns be effectively addressed?

There is a plan for conservation measures to avoid impacts to both recreational and commercial species which is available from the UC outreach program or from NMFS. The UC recognizes the importance of fisheries to FL and works diligently (e.g., by testing) to protect those fisheries and open closed areas as quickly as fish are determined safe for consumption. As part of the information available to the public, the UC will identify and publish alternative safe locations for fishing.

**Mammals and Sea Turtles**

*What will the public want to know or ask about with respect to marine mammals and sea turtles?*

- What is the plan for protecting ESA and *Marine Mammal Protection Act of 1972* (MMPA) listed mammals?
- What is the plan for protecting sea turtles?

*What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?*

The existing data for marine mammals and sea turtles are contained in ESI maps, GRPs and the ACP. In addition, there are monitoring programs as well as data from the standing networks. There is limited data on the cumulative effects of oil and dispersants on these groups. Data from the DWH spill, however, has improved knowledge of the acute and chronic effects. There are areas of disagreement as to the effectiveness of protection and of rehabilitation for sea turtle and marine mammal species. Post spill monitoring data will improve this information.

*How can these public concerns be effectively addressed?*

The plans for conservation measures for these species will be available from the UC via the outreach program. The 1993 spill showed that the recovery of the species will vary by species and habitat depending on the location and level of impact.

**Plants and Invertebrates**

*What will the public want to know or ask about with respect to plants and invertebrates?*

- What are the impacts of oil on plankton?
- What are the impacts of oil on plants?
- Is the oil adding nutrients to the Bay’s nutrient problem?

*What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?*

There are water quality, nutrient, phytoplankton and zooplankton data available for the Bay. DWH studies indicate that phytoplankton may have been stimulated by the oil spill, although the presence of low-salinity water in the region makes it difficult to discount the importance of riverine-borne nutrients as a factor (Ozhan *et al.*, 2014). A few other studies suggest that the oil spill was toxic to some phytoplankton species, whereas others indicate that the degree of tolerance to the oil or to dispersants
differs among species. Thus it is still unclear and may be species specific. Results of monitoring from this spill may help to clarify the impacts further.

Impacts to zooplankton may depend on the life stages when the organisms were exposed to oil and possibly dispersed oil. Since many zooplankters become the adults of commercial or other important habitat-formers, the impacts may not be observed until the adult populations. Results of a water quality monitoring study and plankton studies will advance the understanding of these impacts.

**How can these public concerns be effectively addressed?**

Throughout the response and after, the FL DEP is required to monitor water quality to determine what impacts have occurred and when those impacts are determined to be over. These water quality data will be available from the DEP website on a weekly basis.

**Habitats**

**What will the public want to know or ask about with respect to marine habitats?**

- What is the impact of the spill on seagrasses, mangroves, and marshes?
- What are the impacts of the spill on important habitats to fish, mammals, reptiles, invertebrates and plants?
- Will response actions impact the resources and in what ways?
- How long will it take for habitats and species to recover?

**What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?**

If the oil reaches these habitats, it is expected that there will be both acute and chronic impacts to the resources and the habitat will be disrupted as a spawning, nursery or feeding area, for some period of time. It is unknown how effective response and restoration activities will be and there is debate over the use of restoration techniques versus natural recovery. The actual timing of recovery is dependent on the amount of oil and dispersed oil reaching the site as well as the effectiveness of any response and restoration activity.

**How can these public concerns be effectively addressed?**

There have been significant improvements in the health of seagrasses in Tampa Bay in the last 30 years. Likewise, there has been a similar focus on other sensitive habitats. Knowledge about the location and the potential impacts of the spill to these resources will guide the response. Past spills have provided a body of knowledge as to the most effective way to protect these resources from the spill while minimizing damage from response and restoration techniques. This may include using natural degradation in areas such as mangroves, where more rigorous cleanup techniques may cause greater harm. Information on response technologies as they relate to sensitive habitats will be provided by the UC as part of the outreach program.
**Recreational Opportunities**

What will the public want to know or ask about with respect to recreation in general?

- What are the effects of the spill on recreational opportunities?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

Recreational opportunities (e.g., fishing, boating, visiting the beach, birdwatching) may be impacted by the spill and the response actions depending on the trajectory of the spill. Alternate locations for recreation will be suggested by agency and UC public outreach programs. Limiting activities in areas of impact or response activity areas (i.e., closures) will provide a safe environment for the public. Any closures will be removed as soon as it is deemed safe for all citizens.

How can these public concerns be effectively addressed?

Information on recreational closures (e.g., beaches, fishing, boating) will be available from the UC. Up to date information on cleanup, the reopening of recreational sites, and alternative recreation locations will be provided.

**General**

What will the public want to know or ask about with respect to sampling and research?

- How can researchers get samples for ecological and biological research?
- How do you report the presence of oil or oiled wildlife (e.g. citizen science, crowdsourcing)?
- Do we have enough facilities to process all the samples?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

The public can play a role in supporting the cleanup by reporting the presence of oil and oiled wildlife. Wildlife hotlines will be established online for reporting observations. Online reporting will also be available through the UC to identify oil and impacted wildlife. One problem that exists with citizen science is the veracity and quality of the information received.

During a spill of this magnitude there is a need for volunteers to assist with wildlife and bird restoration. The capacity of this response (e.g., time, financial contributions) for organizations (e.g., SAB) remain unknown until the cleanup is ongoing. Experience with previous spills has demonstrated how important it is to make sure the public is aware, through briefings, of their important role in the cleanup.

How can these public concerns be effectively addressed?

In order to make sure the public has an opportunity to effectively contribute to the cleanup, the UC and volunteer organizations need to make information available on how to report oil and oiled wildlife, and how to volunteer. It is important for agencies and the UC to identify volunteer organizations immediately and coordinate activities between the responders and the volunteers. Clear communication is important so that response activities are understood and roles are clearly defined.
Human Dimensions Breakout Group
The Human Dimensions Breakout Group developed questions focused on human health, recreation, tourism, volunteerism and other information.

In Breakout Session I, 30 questions were developed in five categories. The largest number of questions was generated in the categories of Human Health and in the broad area of Other, encompassing areas related to questions as to how the spill will directly impact them.

**Human Health**

*What will the public want to know or ask about with respect to human health?*

- Is the beach safe?
- Are tarballs dangerous or hazardous?
- Are dispersants dangerous?
- Is it safe to swim in the water?
- What are the human health effects of oil, dispersed oil, dispersants, ISB smoke?
- Is there a greater health risk for subsistence fishers?
- What is the impact on community mental health?
- How can I report my health issues?
- When dispersants are used, is it safe to eat seafood?
- Who is a trusted source we can talk to about seafood safety

*What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?*

Human health issues are some of the most important to the public. The questions regarding human health focus on potential contact with the spilled oil, DDO and seafood safety. If there is oil in the water or on the beach, or if tarballs are present in large numbers, the area will likely be closed to swimming or other recreational activities. If the public adheres to the closure warning there will be limited/no risk. If people do not adhere to the closure signs and warnings, there is a potential for risk from inhalation, ingestion, aspiration or dermal contact. The closed area may change due to the projected trajectory of the oil or change in environmental conditions. Initially, the established closures may be conservative until the responders determine the trajectory of the spill. Tarballs do appear on FL beaches in small numbers and are not necessarily a risk from a recent spill. However, there is a risk from tarballs due to ingestion and possibly contact.

There is a disagreement as the type of exposure and the threshold levels in water that constitute a hazard to humans. With ongoing research and results from monitoring studies conducted during and after this spill, it should be possible to improve the data on toxicity and exposure thresholds in water.

There are legitimate human health concerns related to the effects of oil, DDO and the smoke from ISB. Those effects could be acute, chronic, cancerous or non-cancerous. There are a large number of oil components for which adequate toxicology does not exist. In addition to these unknowns, there is disagreement on the threshold of effects and controversy as to which chemicals to include in risk
analysis. Better toxicology data and identification of the most vulnerable populations can improve regional risk models.

Oil spills and the related economic impacts can also have negative effects on the mental health of individuals and the overall resilience of communities. Citizens will want to know where they can get assistance to deal with these mental health issues. Impacts to humans have been shown to be greatest when income is affected. It is unknown how long these impacts last, but the duration is likely related to the impact of the spill, the response, and the restoration time.

The public will want to know how to report any health issues, either physical or mental. As part of the outreach program, contact numbers will be established where the public can obtain help, on an emergency or more routine basis. This effort is not normally part of the UC responsibility; they are responsible for the safety of responders. Local and state public health agencies should establish these links.

The primary risk from dispersants to workers is from inhalation. In the Response Technology and Shoreline Breakout groups, worker safety was discussed. Workers are relatively safe if they follow their training and use protective equipment. Dispersants are generally used offshore. They degrade rapidly and are present in low concentrations if they reach the shoreline. There is confusion about the potential risk of dispersants through the ingestion of seafood. Material Safety Data Sheets (MSDS) include risk as “only a large volume risk”. The toxicity of dispersants is better known now and current dispersants are less toxic than older formulations.

Subsistence fishing communities consume significantly more seafood than the general population, thus increasing their potential exposure. However, there is little data on the amount of seafood consumed by these populations. There are many unknowns and areas of disagreement about threshold concentrations, exposure and individual susceptibility to increased hydrocarbon concentrations. Long term health monitoring may provide better data on these populations.

Seafood safety is always a high priority, especially for segments of the population for which seafood is a significant part of their diet. Likewise, commercial fishermen also have a major concern about the safety of seafood as it is significant to their economic well-being. There is always a question about the safety of seafood when dispersants are used as part of the response. Fishery closures associated with a spill are opened by health authorities when the seafood is safe from all contaminants, including dispersants. The timing for such openings is dependent on monitoring and may be different depending on geographical locations or species. More data is needed to better understand the relationship of the toxicity of DDO to seafood safety.

There is always a concern from the public regarding who can be trusted to provide accurate information about seafood safety. Points of contact for public health agencies need to be disseminated early in the response process. Key also is the identification of respected external experts who can validate agency actions.
How can these public concerns be effectively addressed?

The primary concern of the response team is to keep the public safe and well informed about the progress of the cleanup. Daily maps of beach openings and closures, including the siting of oil, should be posted to websites and distributed to local media. Daily updates on environmental and public health issues should also be issued to the media. Guidance documents on oil, oil impacted beaches, DDO and cleanup activities should be developed and be available for public dissemination as soon as the UC is established.

Information on oil, tarballs, and dispersant toxicity should also be developed and issued to the public. This information should discuss known toxicity, and sub-lethal effects as they relate to human health. Information should also discuss the potential chances to encounter contaminants through contact, water or air. Literature should discuss the importance of adhering to closure warnings.

The stress of this type of disaster can cause mental health issues, often related to personal or economic loss. Keeping the public informed on the progress of the cleanup and the reopening of "clean" areas will help to relieve some stress. Information on mental health resources should be made available.

Daily closure maps with information on alternative safe beaches are very important to the public and the tourist industry. The State of Florida has already in place a system of communication on beach status. Media and news outlets could be incorporated to announce the status of beaches.

Environmental and public health officials and the USCG can provide daily updates on the status of the spill and public health concerns.

The public should not be exposed to dispersants because they are only applied offshore if used; they degrade and are diluted rapidly, thus eliminating exposure potential to humans. Some components of oil can be hazardous at high concentrations. The public should be informed, via the UC and other public health sources, that if you are exposed you should remove yourself from the situation, get to well-ventilated area, and see a local physician. In general, the public will not be exposed to harmful concentrations of oil, DDO, ISB smoke or dispersants as part of cleanup operations.

Special communication may be required to engage subsistence fishers. Subsistence fishers and others who rely on seafood as a major staple are not at higher risk if they observe the fishery closures and they do not eat the seafood from the oil-impacted areas. It will be important to develop a guidance document (e.g., on oil hazards) for fishing, oil-impacted beaches including stranded oil, tarballs, DDO, or cleanup activity that are carefully written for these populations.

Seafood safety is an important issue for all residents as well as the tourist industry. Fisheries resources are extensively tested before they are reopened to fishing and seafood consumption. The UC and agencies’ responsibilities are to keep the public safe and informed about the status of fishery closures. The status of clean seafood should be communicated widely to avoid economic impacts especially due to the importance of the tourist industry to the region.
Recreation

What will the public want to know or ask about with respect to recreation?

- Will charter boats operate and will I be able to fish?
- How do I clean my boat?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

Recreational fishing will continue in areas not closed as part of the response. Charter fishing boats will use alternate locations suggested by agencies that avoid contamination and cleanup activities. Fishing will return to closed areas when contamination levels are deemed safe.

Recreational fishermen who have concerns about cleaning their vessels and equipment can refer to public information on how to best complete the process. Any costs associated with the cleaning should be documented and submitted as part of the claims process.

Tourism

What will the public want to know or ask about with respect to tourism?

- What information should be given to local tourists from neighboring counties?
- Will the spill come back in the news years later continuing to impact tourism?
- How do we communicate to tourist with different communication needs?
- Will cruise ships be diverted? Will the port be closed to ships?
- How will this spill affect tourism? How do we keep them coming during the process?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

Tourism is an important part of the economy of FL and the Tampa Bay region. The messaging for tourists who might come to the area will differ depending on the origin of the tourists. Those tourists who might visit from neighboring counties would receive a simpler message because these people would better understand the geography and location. Tourists who come from further away would require more complicated information that familiarizes these people with the location and the potential for clean sites. Foreign tourist information has the complication of different languages and multiple press releases. Messaging should emphasize the availability of other adjacent coastal locations where recreational activities are unaffected.

Cruise ships frequent the Port of Tampa. These ships will continue to use the Port unless the COTP determines the need to divert vessel traffic based on the spill trajectory and the response.

Tourism will be impacted in the short term due to the spill. However the tourism industry and the state will need to develop messaging that can be transmitted widely, including internationally, to bring tourists back. The tourism industry representatives will need to work with hotels, resorts, the recreation industry and others to offer incentives. This process may require a plan that spans several years until the area’s reputation is reestablished.
How can these public concerns be effectively addressed?

The impacts to tourism will be significant initially. The tourist industry will need to employ an active advertising program that emphasizes the positives for the area and offers specials like “free days” if oil impacts visitor days. When the cleanup is completed the tourist industry will need to develop extensive marketing material aimed at target groups including international tourist locations.

Volunteers

What will the public want to know or ask about with respect to volunteers?

- Where do we send people who want to volunteer?
- Where do I go to get training?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

Volunteers are an integral part of the restoration process. It is important to post opportunities for volunteering and volunteer training on the UC and other websites. Training for these volunteer opportunities usually takes three days.

How can these public concerns be effectively addressed?

It is important to identify and to build up the cadre of volunteer groups before spills occur (see also Natural Resources Breakout Group). This knowledge will assist the UC to put volunteer groups “in action” more quickly if a spill occurs.

Other

What other topics related to human dimensions will the public want to know or ask about?

- Is there somebody who can help us?
- Is there anybody we can trust?
- Where can we go for the next information update?
- How do we address conflicting objectives for communications?
- How do we address conflicting images?
- Will the community be resilient?
- How do we get samples for public health research?
- Do I need to change my wedding plans?
- Who is responsible for covering losses, including business?
- How do I get my claims reimbursed?
- Will I need to be evacuated? When and for how long?

What is known or uncertain? What are areas of disagreement? What might be knowable in the future with regard to these public concerns?

There is a theme throughout all of the breakout groups that deals with the public’s need to have accurate, timely and trustworthy information. With respect to the other breakout groups, that
information is focused on the cleanup process, safety and the protection of natural resources. With respect to human dimensions, the concern is for personal property, safety and human health. It will be the responsibility of the UC and agencies to provide the information required by the public in a timely way, using as many different media as possible. Recent disasters have demonstrated that incorrect information appearing on the internet is difficult to correct once it has been released. Thus, there is a need to be prepared to issue information as quickly as possible. It is important for the UC to also be issuing images that will document oil location, cleanup activity, natural resource protection and restoration; especially as anyone can record images and post to the internet.

Community resiliency is important to all citizens because of the economic issues, including jobs and business continuity. The DWH spill provides a guideline as to the time for recovery. The size of the spill and the success of the response will impact the recovery time and the return to normalcy for the community.

The scheduling of personal activities like weddings should not be affected by the spill or cleanup process unless it is scheduled for a closed beach or recreational facility. For any question about these activities the public should contact the public information number to verify availability of a location.

The public concern about the impacts to personal property and business raises the question of who is responsible for recovering losses and how they file a claim. Businesses usually have business interruption insurance to cover losses due to this type of event. The insurance broker should help with the process and they may wish to file a claim against the RP. The claims process will be established as part of the determination of spill liability and will be made public by the outreach program. More detail about claims and evacuations was discussed as part of the Shoreline Cleanup and Restoration Breakout Group response.

**How can these public concerns be effectively addressed?**

There is a long standing distrust by the public, the RP and the response community. Therefore, it is important to provide frequent information on the progress of the cleanup and to provide information regarding the time frames for recovery from other spills such as DWH. One participant suggestion to make the public aware of the progress is to have special events that highlight milestones toward completion (e.g., public release of recovered birds, ceremonial beach openings with press coverage).

Resiliency of the community is dependent on the recovery of recreational and business activity in the region. The cleaning and opening of commercial and recreational fisheries areas will improve two major industries: seafood and tourism. It is important for the UC and agencies to keep the public informed of these developments via the outreach program.
Workshop Conclusions and Recommendations

Each of the four breakout groups developed a significant number of questions with similar themes. A summary of these questions are listed below. These questions provide an indication of the types of questions that responders will experience in future spills no matter where the location of the incident. As a result, these questions provide excellent training material for regional response teams and for pre-prepared public information packets in the GOM and beyond.

- Who is in charge of the cleanup?
- What is the UC and how does it work?
- Where can I get timely, reliable, and trustworthy information about the spill and the cleanup?
- What is OPA 90?
- Is there a directory of oil spill nomenclature?
- What technologies will be used to clean-up the spill? How are they chosen?
- How do these technologies work?
- How is the clean-up strategy developed and the cleanup priorities established?
- How will you protect my personal property?
- How will you protect public property?
- What is the closure process? How will I be informed? When will the area be open again?
- What is the reimbursement process? How will it operate?
- How will you protect natural resources? What natural resources are at risk?
- How will the spill affect commercial fishing?
- How will the spill affect recreational fishing? And other recreation?
- How do you track the movement of oil?
- Is my health, physical and mental at risk?
- How do I know if my seafood is safe? What are fisheries closures? How long do they last?
- Are subsistence fishermen at greater risk?
- How can I volunteer?
- How can we maintain the tourism during and after the spill?

By using these questions and others that might be developed from the DWH spill as a guide, training materials and workshops can be developed to train responders at all levels, from potential UC members to on the ground responders who will encounter citizens as part of the daily clean-up responsibilities.

There consistent themes regarding how to respond to the concerns raised by the public. It is clear that a significant number of the questions are of a general nature regarding how responders will react to a spill and deploy various strategies to limit impacts. Written or electronic material on these subjects could be developed in advance and be available to the UC and outreach coordinators immediately when the response headquarters is established. This would permit the outreach efforts to “get out front” of the inevitable misinformation that will begin to surface on the internet.

As part of any effort it is important to identify all the sources of site specific information that is available for each region. Each of breakout groups identified the many sources of information that would be available for this spill scenario. For example these included:
• ESI database
• SHPO
• GRPs
• ACP
• Breeding bird and wildlife surveys
• Estuary programs
• State DEP fisheries data

• NMFS critical habitat surveys for fisheries
• State and federal threatened and endangered species for the area
• FWC fisheries independent and dependent monitoring data

By expanding the effort to identify sources of information for other regions, and including academic sources where appropriate, the responses team could have an index of sources to guide cleanup efforts, prioritize the use of response tools and protect natural resources in advance of any spill.
Training
CRRC and DRC conducted a one-day training on June 30, 2016, on risk communication and the use of social media during a response which was open to all workshop participants. The agenda for the training can be found in Appendix E.

Presentations
The training included topics on risk communication state-of-science, social media, agency perspectives on risk communication, and risk communication during the Deepwater Horizon Oil Spill (DWH). Below is a list of the presentations titles, speakers and their affiliations. The training presentation slides are located in Appendix F.

- Risk Communication – State-of-Science:
  - Risk Communications State-of-Science, Ann Hayward Walker (SEA Consulting)
  - SeaGrant’s Role in Communication During DWH, Monica Wilson (FL SeaGrant)

- Social Media:
  - Social Media Use During Crisis Events, Elodie Fichet (University of Washington (UW))

- Risk Communication – An Agency Perspective:
  - NOAA Perspectives, Keeley Belva (NOAA)
  - ESF 14 External Affairs and Public Information, Aaron Gallaher (State of FL)
  - Shannon Herbon (FL Department of Environmental Protection (DEP))
  - LT John Fitzgerald (U.S. Coast Guard (USCG))

- Risk Communication During DWH – Reflections of Responders:
  - David Kennedy (NOAA)
  - James McPherson (FEMA)
  - Initial NRDA Communications Approach During DWH, Tom Brosnan (NOAA)
References

Appendices

Appendix A: Workshop and Training Participants
Appendix B: Workshop Agenda
Appendix C: Workshop Presentation Slides
Appendix D: Breakout Group Notes
Appendix E: Training Agenda
Appendix F: Training Presentation Slides
Addressing Public Concerns During Spill Response

APPENDIX

June 28 - 29, 2016
Florida Fish and Wildlife Research Institute
St. Petersburg, FL
Appendices

Appendix A: Workshop and Training Participants
Appendix B: Workshop Agenda
Appendix C: Workshop Presentation Slides
Appendix D: Breakout Group Notes
Appendix E: Training Agenda
Appendix F: Training Presentation Slides
Appendix A: Workshop and Training Participant List
NOAA’s Regional Preparedness Training (NRPT)
Addressing Public Concerns during Spill Response... sorting fact from fiction during response

June 28 - 30, 2016
Florida Fish and Wildlife Research Institute
St. Petersburg, FL

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*Designates Organizing Committee Member
Appendix B: Workshop Agenda
Day 1 – Tuesday, June 28

8:30 am  Welcome and Introductions
- Coastal Response Research Center, Nancy Kinner
- NOAA ORR Gulf of Mexico’s Disaster Response Center – Charlie Henry
- Florida Fish and Wildlife Conservation Commission– Kathleen O’Keife

8:45 am  Background and Workshop Goals
- Presenter: Monica Wilson, Florida Sea Grant Program

9:00 am  Participant Introductions

9:30 am  Overview of Scenario
- Presenter: Brad Benggio, NOAA ORR Emergency Response Division, Scientific Support Coordinator

Plenary Sessions: Overview of Oil Spill Response-related Topics (including Public Concerns)

9:45 am  Plenary Session I: Response Technologies
- Presenter: Charlie Henry, NOAA Gulf of Mexico Disaster Response Center
  Addressing: mechanical recovery, dispersants, and in situ burning

10:15  Break

10:30  Plenary Session II: Shoreline Protection and Cleanup, including Chemical Counter Measures
- Presenter: Jacqui Michel, Research Planning, Inc. (via WebEx)

11:00 am  Plenary Session III: Natural Resources (Fisheries Focus)
- Presenter: Nancy Thompson, Florida Keys Marine Lab
  Addressing: ecosystem, economic and recreational impacts

11:30 am  Plenary Session IV: Public Health
- Presenter: Robert Dickey, University of Texas Marine Science Institute
  Addressing: ingestion/seafood safety, dermal contact, inhalation, mental health/social impacts

12:00 pm  Lunch (on your own)

1:15 pm  Plenary Session V: Other Impacts
- Tourism (Presenter: David Downing, Visit St Petersburg Clearwater)
- Volunteers (Presenter: Lee Fox, Save All Birds)
- Interactions between scientific and response communities (Presenter: Bill Hogarth, Florida Institute of Oceanography)
Charge to Breakout Groups* and Review of Scenario

Breakout Groups (5 groups divided into these focus areas):
- A. Response Technologies (*in situ* burn, dispersants, mechanical recovery)
- B. Shoreline Protection & Cleanup
- C. Natural Resources (fisheries focus)
- D. Human Dimensions: Public Health/Tourism/Volunteers

*All groups will address* 1) public concerns and 2) interactions between scientists and response communities for their specific topic.

2:00 pm Breakout Group Session I: What will the public want to know / ask about the topic?

3:30 pm Group Reports

4:30 pm Adjourn

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**Day 2 - Wednesday, June 29**

8:30 am Recap & Recalibrate

9:15 am Breakout Group Session II: What is known/uncertain/ area of disagreement/knowable with regard to these public concerns?

10:30 am Break

10:45 am Group Reports

11:45-1:00 Lunch (on your own)

1:00 pm Breakout Group Session III: How can these public concerns be addressed?

2:30 pm Break

2:45 pm Group Reports

3:45 pm Wrap-Up and Path Forward

4:30 pm Adjourn
Appendix C: Workshop Presentation Slides
NOAA’s Regional Preparedness Training

Addressing Public Concerns During Spill Response...
Sorting Fact from Fiction

June 28 - 29, 2016
Florida Fish & Wildlife Research Institute
Logistics

- Fire Exits
- Restrooms
- Cell Phones/Email: “Let It Go”
- Breaks (coffee, tea, soda, water, snacks)
- Meals: On your own: List 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 – Mark Miller
Overall CRRC Mission

- Conduct and oversee basic and applied research and outreach on spill response and restoration
- Transform research results into practice
- Serve as hub for oil spill R&D
- Facilitate workshops bringing together ALL STAKEHOLDERS to discuss spill issues and concerns

Meeting Products

- Copies of All Slide Presentations
- Workshop Report
- All Posted on CRRC Website
NRPT Workshop

THANK YOU
Participants, Group Leaders, Recorders, Organizing Committee, FWRI Facilities, and Speakers!

Meeting Objectives

• State-of-science of risk communication during oil spills
• Understand and communicate with public about their concerns (e.g., dispersant use, seafood safety, fisheries impacts, public health, tourism, volunteers)
  • Knowns, uncertainties, disagreements
Workshop Agenda

Day 1 – Tuesday, June 26

8:30 am  Welcome and Introductions
- Coastal Response Research Center, Nancy Kinner
- NOAA ORR Gulf of Mexico’s Disaster Response Center – Charlie Henry
- Florida Fish and Wildlife Conservation Commission - Kathleen O’Keeffe

8:45 am  Background and Workshop Goals
- Presenter: Charlie Henry

9:00 am  Participant Introductions

9:30 am  Overview of Scenario
- Presenter: Brad Bengell, NOAA ORR Emergency Response Division, Scientific Support Coordinator

Plenary Sessions: Overview of Oil Spill Response-related Topics (including Public Concerns)

9:45 am  Plenary Session I: Response Technologies
- Presenter: Charlie Henry, NOAA Gulf of Mexico Disaster Response Center
Addressing: mechanical recovery, dispersants, and in situ burning

10:15

Break

Workshop Agenda

10:30  Plenary Session II: Shoreline Protection and Cleanup, including Chemical Counter Measures
- Presenter: Jacqui Michel, Research Planning, Inc. (via WebEx)

11:00 am Plenary Session III: Natural Resources (Fisheries Focus)
- Presenter: Nancy Thompson, Florida Keys Marine Lab
Addressing: ecosystem, economic and recreational impacts

11:30 am Plenary Session IV: Public Health
- Presenter: Robert Dickey, University of Texas Marine Science Institute
Addressing: ingestion/seafood safety, dermal contact, inhalation, mental health/social impacts

12:00 pm  Lunch (on your own)
Workshop Agenda

1:15 pm  Plenary Session V: Other Impacts
- Tourism (Presenter: David Downing, Visit St Petersburg Clearwater)
- Volunteers (Presenter: Lee Fox, Save All Birds)
- Interactions between scientific and response communities (Presenter: Bill Hogarth, Florida Institute of Oceanoerassic)

1:45 pm  Charge to Breakout Groups* and Review of Scenario

Breakout Groups (4 groups divided into these focus areas):
  A. Response Technologies (in situ burn, dispersants, mechanical recovery)
  B. Shoreline Protection & Cleanup
  C. Natural Resources (fisheries focus)
  D. Human Dimensions: Public Health/Tourism/Volunteers

*All groups will address 1) public concerns and 2) interactions between scientists and response communities for their specific topic.

2:00 pm  Breakout Group Session I: What will the public want to know/ask about the topic?
3:30 pm  Group Reports
4:30 pm  Adjourn

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Workshop Agenda

Day 2 - Wednesday, June 29

8:30 am  Recap & Relibrate

9:15 am  Breakout Group Session II: What is known/uncertain/final area of disagreement/knowable with regard to these public concerns?

10:30 am  Break

10:45 am  Group Reports

11:45-1:00  Lunch (on your own)

1:00 pm  Breakout Group Session III: How can these public concerns be addressed?

2:30 pm  Break

2:45 pm  Group Reports

3:45 pm  Wrap-Up and Path Forward

4:30 pm  Adjourn
# Training Agenda

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<tr>
<th>Time</th>
<th>Session</th>
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<tr>
<td>9:00 am</td>
<td>Welcome and Introductions</td>
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<td>CRRC - Nancy Kinner&lt;br&gt;NOAA DRC - Charlie Henry&lt;br&gt;FWRI - Kathleen O’Keife</td>
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<tr>
<td>9:15 am</td>
<td>Background and Training Goals</td>
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<td>Nancy Kinner</td>
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<td>9:30 am</td>
<td>Risk Communication – State-of-Science</td>
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<td>Ann Hayward Walker, SEA Consulting (via WebEx)&lt;br&gt;Monica Wilson, SeaGrant</td>
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<tr>
<td>10:45 am</td>
<td><strong>Break</strong></td>
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<tr>
<td>11:00 am</td>
<td>Social Media – Elodie Fichet, University of Washington, Dept. of Communication (via WebEx)</td>
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<tr>
<td>12:00 pm</td>
<td><strong>Lunch (on your own)</strong></td>
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## Training Agenda

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<th>Time</th>
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<tr>
<td>1:30 pm</td>
<td>Risk Communication – An Agency Perspective</td>
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<td>NOAA PIO – Keeley Belva&lt;br&gt;State of Florida EMA Communications – Aaron Gallaher&lt;br&gt;Florida Department of Environmental Protection – Shannon N. Herbon&lt;br&gt;U.S. Coast Guard - LT John Fitzgerald</td>
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<td>2:30 pm</td>
<td><strong>Break</strong></td>
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<td>2:45 pm</td>
<td>Risk Communication During DWH: Reflections of Responders</td>
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<td>David M. Kennedy, NOAA (via WebEx)&lt;br&gt;James McPherson, FEMA, (USCG, retired) (via WebEx)&lt;br&gt;Tom Brosnan, NOAA ORR ARD, Communications Branch (via WebEx)</td>
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<tr>
<td>3:15 pm</td>
<td>Overall Discussion</td>
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<tr>
<td>4:00 pm</td>
<td><strong>Adjourn</strong></td>
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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
Workshop Agenda

Day 1 — Tuesday, June 28

8:30 am  Welcome and Introductions
  - Coastal Response Research Center, Nancy Kinney
  - NOAA ORR Gulf of Mexico’s Disaster Response Center — Charlie Henry
  - Florida Fish and Wildlife Conservation Commission — Kathleen O’Keefe

8:45 am  Background and Workshop Goals
  - Presenter: Charlie Henry

9:00 am  Participant Introductions

9:30 am  Overview of Scenario
  - Presenter: Brad Benitez, NOAA ORR Emergency Response Division, Scientific Support Coordinator

Plenary Sessions: Overview of Oil Spill Response-related Topics (including Public Concerns)

9:45 am  Plenary Session I: Response Technologies
  - Presenter: Charlie Henry, NOAA Gulf of Mexico Disaster Response Center
  - Addressing: mechanical recovery, dispersants, and in situ burning

10:15  Break

Charlie Henry

NOAA GOM Disaster Response Center
Kathleen O’Keife

Florida Fish and Wildlife Conservation Commission

Participant Introductions

Name
Affiliation
Job
Reason for Participating in Workshop
Brad Benggio

NOAA Office of Response and Restoration
COMPARING NRPT SCENARIO To THE TAMPA BAY SPILL OF 1993

- OIL TYPE: CRUDE OIL vs HEAVY FUEL OIL #6
- VOLUME: 50,000 Bbls vs 8000 Bbls
- LOCATION: 36 MILES OFFSHORE vs INSIDE TAMPA BAY
- RESOURCES AT RISK: Similar
- COUNTERMEASURE CONSIDERATION DIFFERENCES:
  - Dispersants, ISB, SKIMMING, SHORELINE CLEANUP
Historical Wind Directions

01–15 December
QuikSCAT .5x.5° (1999–2008)
Annual data indicates: \((5.8 + 6.8 + 7.9) = 20.5\%\) winds are onshore (WSW-W-WNW)
Gnome Model Results

Oil Status (July 19 @ 0600)
Spill Response (July 19 @ 0600)

Habitat Affected
- Seagrasses (~1,060 acres)
- Mangroves (~120 acres)
- Turtle nesting beaches (~11.25 linear miles)

Animals Affected (not a complete list)
- Diving birds
  - Brown pelican (SSC)
- Shore birds
- Waterfowl
- Wading Birds
  - Snowy egret
  - Roseate spoonbill
- Gulls and Terns
  - Least tern (T)
- Reptiles
  - Green sea turtle (E)
  - Loggerhead Sea Turtle (T)
- Mammals
  - West Indian manatee (E)
Oil Status (July 23 @ 0600)

Spill Response (July 23 @ 0600)
Spill Impact (July 23 @ 0600)

Habitat Affected
- Seagrasses (~10,880 acres)
- Mangroves (~4,600 acres)
- Turtle nesting beaches (~30.64 linear miles)

Animals Affected (not a complete list)
- Diving birds
  - Brown pelican (SSC)
- Shore birds
- Waterfowl
- Wading Birds
- Snowy egret
- Roseate spoonbill
- Gulls and Terns
- Least tern (T)
- Reptiles
  - Green sea turtle (E)
  - Loggerhead Sea Turtle (T)
- Mammals
  - West Indian manatee (E)

ADIOS (10 MPH Winds)
ADIOS (15 MPH Winds)
Oil Spill Response:

Off-shore Spill Response Options

NRPT - St. Petersburg, FL

28 June 2016

Charlie Henry
Director, NOAA’s GOM Disaster Response Center

Disclaimer:
The information presented reflects only the views of the presenter, and does not necessarily reflect the official positions or policies of NOAA or the Department of Commerce.
The Scientific Support Coordinator’s view of an oil spill can seem an endless series of questions:

- What was spilled? (Oil Chemistry - Changes)
- Where is it going? (Oil Forecasts)
- What’s at risk? (RAR/ESI)
- How will it hurt? (Potential Impacts)
- What can be done to **mitigate** the hurt?

**DO NO MORE HARM THAN GOOD**

---

**Fundamental Oil Spill Response Strategy**

- Prevention
- Protection of Life
- Source control
- Contain the oil at or near the source
- Protect sensitive habitats/environments
- Recover spilled oil
- Mitigation - Minimize environmental impact from the spill and enhance natural recovery
Fundamental Oil Spill Response Strategy

- Prevention
- Protection of Life
- Source control
- Contain the oil at or near the source
- Protect sensitive habitats/environments
- Recover spilled oil
- Mitigation - Minimize environmental impact from the spill and enhance natural recovery
Oil Recovery: Brush-Type Skimmer

What did each of the last five pictures have in common?
What did each of the last five pictures have in common?

**Very Calm Weather Conditions**

What about fire?  
Let’s think about burning it.
Was there any in-situ burns during the Exxon Valdez Response?
Burning Oil at Sea Research
Review - Basics of Burning Oil at Sea

- Oil must be several mm thick to support sustained combustion on water – thicker better.
- Requires mechanical recovery prior to burning.
- Oil must not be emulsified (water-in-oil) more than 50% (maybe a bit higher water content if you can get a hot enough fire initiated).
- Ignition systems maybe hand deployed or helio-torch (jellied gasoline).
- Not 100% Efficient (is anything 100% efficient?)
Burn Effectiveness In General

• 90-98% Effective at removing surface oil.
• Primary products are CO2 and H2O.
• Some 5% of the oil removed from the surface are incomplete combustion by-products:
  – particulates such as smoke and soot
  – Polynuclear Aromatic Hydrocarbons (pyrogenic)
• Plume monitoring may be required (SMART).
• Surface residues are highly distilled oil residues and may sink especially after the begin to cool.
PROS:

- Removes a large amounts of oil very fast (>2000 bbl/hr) – much faster than a skimming system.
- No storage capacity issues.
- Removes the bulk of the oil from the water surface with no significant increase in dissolved hydrocarbons into the water column.
- May have a relatively broad window of opportunity (often days – often not!).
CONS:

- Limited to same mechanical encounter rate challenges as skimming operations.
- Moves pollution from water to air.
- **Highly visible plume** (public is often alarmed).
- Combustible liquids only (not emulsified oil).
- Requires specialized fire boom systems.
- May require air monitoring (SMART and maybe other requirements).
- Will likely require wildlife monitoring.

CONS:

- May require RRT approval (Preauthorization)
- Residues may sink (often sink) – exclusion zones pre-identified in RRT6 Authorization

(Tar and Live Coral – How could it hurt?).
Fundamental Oil Spill Response Strategy

• Prevention

• **Protection of Life**
  • Source control
  • Contain the oil at or near the source
  • Protect sensitive habitats/environments
  • Recover spilled oil

• **Mitigation** - Minimize environmental impact from the spill and enhance natural recovery

Why consider using dispersants?

Aerial application of dispersants can mitigate large amounts of oil if treated promptly – oil that would not likely be recovered mechanically.

- **Mitigate** -- reduce the overall impact of an oil spill to the environment as a whole.

- **Dispersant use is a trade-off**: increased risked to the water column to reduce injury to surface water and nearshore and shoreline resources.
Encounter Rate

20% Coverage of Oil Greater than Shaded
Estimated Oil Thickness: 0.4 mm
25,000 L @ Approx. 6000 ppm = 1.5 T

0.25 Km² Total Area Displayed

[Image of an airplane over ocean with a trail behind it]

[Image of a map showing areas covered by oil]

[Image of a map with a yellow line indicating 150 meters]
Total Dispersant Summary

Roughly 1.8 M gallons applied.

Total

* Data as of 6/4 22:00 hrs.
A Few Sampling Highlights...

- Water – 28,850 samples (12,038 with lab results)
  - All samples below EPA benchmarks for protection of Human Health
  - All dispersants below EPA benchmarks, detected in 7 samples
  - 83 samples above EPA benchmarks for aquatic life

Did we do no more harm than good?

Charlie’s Final Thoughts:

- Oil and chemical spills are unplanned and uncontrolled events.
- The job of a spill responder is to protect life, establish control of the spill if it can be done safely, and prevent or reduce environmental injury (NEBA).
- There is no such thing as “Net Environmental Benefit.”
- Most of the early information known during an emergency response is wrong, and response decisions must be made anyway.
  “Dealing with uncertainty is just part of the job.”
- Most everything we know about how to best respond to an emergency is based on success and mistakes of the past.
Shoreline Protection and Cleanup
Jacqueline Michel, Ph.D.
Research Planning, Inc.

May Not Be
Version Jacqui used
in workshop

National Oceanic and Atmospheric Administration
Office of Response and Restoration

Questions for Shoreline Protection and Cleanup during a Response

• What are the countermeasure options?
• How do we select the best combinations?
• What tools are available to help select?
• What are realistic effectiveness expectations?
• What tradeoff considerations should be considered for each countermeasure?
• How do we best communicate this to the public
Tools to Assist Decision Making

- Environmental Sensitivity Index (ESI) maps/databases
- Geographic Response Plans
- NOAA ERD guides
- NOAA Chemical Aquatic Fate and Effects (CAFE) database (properties, toxicity, degradation rates)
TIPS RANKING SCALE
- based on degree of difficulty for containment and recovery of spilled oil.

A. Extremely difficult because of large size and extreme physical conditions. Large expense because of magnitude of resources to protect.

B. Difficult because it is subject to strong currents and/or large waves. Significant amount of resources to protect.

C. Less difficult because of smaller tidal prism and relatively weak tidal currents.

D. Inlet channel can be closed with sediment dike under normal adverse conditions.
Shoreline Protection and Public Concerns

- Expectation that the oil can be effectively contained and recovered by “booming” or other on-water tactics
- Want to put booms “everywhere”
- The response wants the public to know that they are doing something, even if it is not effective

Selecting the Right Shoreline Cleanup Methods Involve Tradeoffs
New/Updated NOAA Job-Aids

Oil Spills in Mangroves

Oil Spills in Marshes

Oil and Sea Turtles

Characteristic Coastal Habitats
Choosing Spill Response Alternatives

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Office of Response and Restoration
Emergency Response Division
## Cleanup Matrix for Sand Beaches

<table>
<thead>
<tr>
<th>Response Method</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Recovery</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>Barriers/Barriers</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Manual Oil Removal/Cleaning</td>
<td>D</td>
<td>B</td>
<td>A</td>
<td>A</td>
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<tr>
<td>Mechanical Oil Removal</td>
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<td>B</td>
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</tr>
<tr>
<td>Sorbents</td>
<td>–</td>
<td>B</td>
<td>A</td>
<td>A</td>
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<tr>
<td>Vacuum</td>
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<td>Debris Removal</td>
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<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Sediment Reworking/Tilling</td>
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<td>B</td>
<td>B</td>
<td>B</td>
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<tr>
<td>Vegetation Cutting/Removal</td>
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<td>C</td>
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<tr>
<td>Flooding (deluge)</td>
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<td>Low-pressure, Ambient Water Flushing</td>
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<td>Low-pressure, Hot Water Flushing</td>
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<tr>
<td>High-pressure, Hot Water Flushing</td>
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<tr>
<td>Steam Cleaning</td>
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<tr>
<td>Sand Blasting</td>
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<tr>
<td>Solidifiers</td>
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<tr>
<td>Shoreline Cleaning Agents</td>
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<tr>
<td>Nutrient Enrichment</td>
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<tr>
<td>Natural Microbe Seeding</td>
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<td>I</td>
<td>I</td>
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<tr>
<td>In-situ Burning</td>
<td>–</td>
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<td>C</td>
<td>C</td>
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</table>

## DWH Cleanup Endpoints for Sand Beaches

<table>
<thead>
<tr>
<th>Shoreline Type</th>
<th>Surface Oil</th>
<th>Subsurface Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential and Amenity Sand Beaches</td>
<td>No visible MC-252 oil, or...*</td>
<td>No visible MC-252 oil, or...*</td>
</tr>
<tr>
<td>Non-Residential or Non-Amenity Sand Beaches</td>
<td>&lt;1% visible surface oil and oiled debris, and no SRBs &gt;5 cm, or...*</td>
<td>No subsurface oil exceeding 3 cm in thickness and patchy (&lt;50%) distribution that is greater than Oil Residue, or...*</td>
</tr>
</tbody>
</table>

* or as low as reasonably practicable, considering the allowed treatment methods and net environmental benefit
Manual Cleanup of Sand Beaches

- Crushing from foot/UTV traffic
- Physical removal
- Wrack removal
- Wildlife disturbance

Mechanical Cleanup of Sand Beaches

- Excavation of Clean Sand to Access Buried Oil
- Sifting: Minimizes sand removal but affects biota and habitat quality
Tilling:

Bring subsurface oil to the surface for removal by sifting

Break up larger oil particles to speed degradation

Tradeoffs?
- Macrofaunal impacts from crushing and burrow damage
- Wrack removal affects associated animals

Cleanup Matrix for Mangroves

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### Environmental Tradeoffs in Mangroves

<table>
<thead>
<tr>
<th>Effects of Oil</th>
<th>Effects of Cleanup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat</td>
<td>Trampling of roots</td>
</tr>
<tr>
<td>Biological users of</td>
<td>Cutting vegetation</td>
</tr>
<tr>
<td>habitat</td>
<td>Mixing oil in soils</td>
</tr>
<tr>
<td>Off-site impacts</td>
<td>Removing surface soils</td>
</tr>
<tr>
<td></td>
<td>Smothering</td>
</tr>
</tbody>
</table>

Oil Impacts on Mangroves Affected by:

1. Oil type
2. Extent of contamination of the vegetation
3. Degree of contamination of the soils
4. Exposure to currents and waves which effects the speed of natural recovery
5. Time of year of the spill
6. Species sensitivity
7. Damages associated with cleanup activities
Shoreline Treatment: Mangroves

- Natural recovery
- Sorbents
- Manual Removal/Vacuum accessible oil
- Flushing (very difficult)
- Bioremediation (usually O₂ is limiting)
Shoreline Cleanup and Public Concerns

- Initial public response, when the oil is coming ashore, is that the environment will never be the same again
- Everything looks bleak; they don’t understand the recovery process
- Assumption that any oil is toxic
- Expectation that cleanup operations must remove every molecule of oil
- Expectation that “technology” has a quick fix
Believing in a magic technology that will undo all the bad things that may be caused by an oil spill comforts our nagging realization that there is a true cost to many of our modern conveniences such as our dependence on fossil fuels

(Brad Benggio)

Shoreline Cleanup and Public Concerns

- The response goes through an active, iterative consultation process with resource managers to make sure that the response is conducted to minimize environmental impacts
- Lack of trust in government officials
- Some groups use the spill to promote their agendas and do not always seek the truth
When we suggest cleanup approaches that may be more long term, or may leave some oil in the environment, they tend to be very unpopular.

Shoreline Cleanup and Public Concerns

- Cleanup endpoints drive the shoreline cleanup and need to get public buy-in
- Out of this workshop, need effective communication recommendations to enhance the public's understanding, “involvement”, and acceptance of chosen cleanup countermeasures and endpoints
Go to Reference with Economic Statistics for US by Region and State

NOAA summary of fisheries of the US by state
Additional information

• Myfwc.com for finer scale information on landings and to determine what living marine resources are where when an event occurs
• Gsmfc.org for interstate fisheries information, e.g. blue crab, menhaden, red drum
• GoMRI: gulfresearchinitiative.org
• Sea grant publication 6/16/16 Oil Spill Impacts on Fisheries......including dispersants and oil dispersants

State waters
Importance of seafood and commercial industry

• Americans consume almost 5 billion pounds of seafood annually (2014/15 NOAA) second only to China
• GoM provides 1.1 billion pounds annually and ranks no. 2 in US with a dockside value of $1.03 B
• Florida’s west coast contribution includes shrimp, blue crab, groupers, snappers

Shrimp fishery is the most valuable commercial fishery in the US

• Annual value > $700M in 2014/15
• Wild shrimp from the Gulf of Mexico
• Florida shrimp fishing from the panhandle to Key West
• Created a niche fishery and market demand for wild pink shrimp
Bluefin tuna

- Spawning Gulf of Mexico
- Value: in 2013 one fish sold for $1.8M at market in Tokyo
- Spawning season peaks in April and May
- DWH disaster: began in April 2010

How important is Florida’s commercial fishery?

- 93,000 jobs
- Florida’s west coast: Ranks #2 in the US in total total value of $28B
- Florida’s west coast: In 2014 93 M lbs. landed with dockside value of $205M
How important is recreational fishing to Florida?

- Florida’s west coast alone ranks #1 in recreational fishing trips per year: 15 M
- Florida’s west coast ranks #1 in total value $15.5B in 2014/14
- Florida’s west coast ranks #1 in jobs: 71,000
- Top species include: drum, sea trout, clams, crabs, grouper/snapper, shrimp, tunas and mackerels

Gross State Product Location Quotient

- Value of all goods and services
- For all of US: 1
- For Florida: GSPLQ=1.04
- Fisheries both commercial and recreational are a greater contribution to Florida’s economy as compared to the US as a whole
Fisheries Management

- Federal waters Magnon Stevens Fishery Management and Conservation Act which created regional councils, e.g., Gulf of Mexico Fishery Management Council
- Mandates recovery for overfished stocks; those stocks that are below biomass needed to sustain stock
- Mandates science based management using best available information
- Science advice provided through assessments of status (relative to overfished) and condition (health of stock)
- Many strategies used to manage fisheries and are described in plans developed by the council with NOAA and available on their websites
- State waters of Florida via Florida Fish and Wildlife Commission based on best available information
- Open processes that allow for public input and comment because these are resources that are "owned" by everyone in the state and in the US

Protected Species

- Managed under the Endangered Species Act: sea turtles, manatees, corals
- Managed and protected under the Marine Mammal Protection Act: manatees, bottlenose dolphins
- ESA mandates recovery and establishes recovery criteria
- MMPA provides protection for all marine mammals; e.g., Take, harassment
Value of Protected Species

- Intrinsic value as members of ecosystem that are critical in sustaining function and structure
- Turtle walks estimated to generate $49M in ecotourism, study focused on Bald Head Is. SC
- Florida’s coastline much larger and many sites host turtle walks in the summer
- Manatee ecotourism brings $8-$9 M to Citrus county alone

Impacts of oil spill

- Oil itself is a hydrocarbon, natural seeps
- Dispersants are not organic
- Combination of oil and dispersants of concern
- At the surface? DWH was in deep water and distributed vertically and horizontally
- Public concerns articulated by stakeholders (anglers, coastal communities and their economic drivers)
- Immediate concerns and long term concerns
Life history and timing of event

- Many species are seasonal migrants to inshore/offshore (blue crabs), estuary to coastal ocean (shrimp), hard bottom and structure (groupers/snappers), beach to open ocean to coastal waters (sea turtles), freshwater springs to coastal marine waters (Manatees)
- Many species have specific habitats where they spawn (BFT in NE GoM), beaches (sea turtles), deep reefs (groupers/snappers)
- Need to consider the timing of event relative to where a species is likely to be and what it may be engaged in that can effect productivity (e.g., Spawning, nesting, mating)

Life history of shrimp

[Diagram of shrimp life cycle]

Bailey-Eck & Moss, 1992
Questions from DWH

- Can I fish? When will I be able to fish? Is this going to impact my ability to fish/distribute seafood/on the menu/in the store short term or long term? Will there be some way to alternatively earn of living during this event? NOAA, FWC
- Is the seafood safe? Is safety a short term or long term issue? States, NOAA, FDA
- What long term impact will this have on recovery of protected species? On fishing stocks? NOAA, FWC
- Will management of these species be impacted long term? NOAA, FWC
- What is the impact on tourism? Coastal community integrity and economy? States
- What type of plans have been developed to describe what the response will be by the community, state, federal government
- What can I do to help?
- What is being done to make sure this doesn’t happen again?

Information needed to address questions

- Considerable research and resulting publications on impacts on fish, mechanical impacts (gills), external condition, physiological effects including on growth and reproduction
- Publications on invertebrates: shrimp, crabs, oysters
- Publications on protected species: manatees, sea turtles, dolphins
Public Health Concerns about Marine Oil Spills
Sorting Fact from Fiction

Robert W. Dickey, Ph.D.
University of Texas Marine Science Institute
Port Aransas, Texas

NOAA Regional Preparedness Training
June 28-30, 2016
Florida Wildlife Research Institute
St. Petersburg, Florida

Public health concerns raised by marine oil spills:
Defining the hazards

How oil & dispersants present human health hazards:

• Consumption of seafood contaminated with harmful organic and inorganic petrochemicals.
• Consumption of seafood tainted with flavors and odors.
• Contact (dermal, ocular) with oil and dispersed oil at sea and stranded on beaches and shorelines.
• Inhalation of volatile components of oil and dispersed oil at sea and stranded on beaches and shorelines.
Implement protective measures

- Close oil-spill impacted waters and shorelines.
- Prepare to close areas expected to be impacted.
- Sample and test open waters and shorelines to verify baselines and that closures were protective.
- Inform and inspect primary seafood vendors & public service/commerce in impacted region.
- Develop of protocol and criteria for re-opening fisheries and shorelines.
- Develop comprehensive risk communication plan.
- Delegate/assign well defined roles and stay in lane.

Identify the Chemicals of Concern and Methods of Analysis

Example: MC252 Source Oil Aromatics Analysis
Identify the Elements of Concern and Methods of Analysis

Example: MC252 Source Oil Metals Analysis

Develop Levels of concern for target petrochemicals

For PAH with cancer and points estimates of contamination levels and consumption rates that, if sustained for period of 5 years, may result in excess consumer lifetime cancer risk of $1 \times 10^{-5}$

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Levels of Concern (ppm)</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13 g/day (Shrimp &amp; Crab)</td>
<td>12 g/day (Oysters)</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>123</td>
<td>133</td>
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<tr>
<td>Fluorene</td>
<td>246</td>
<td>267</td>
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<tr>
<td>Anthracene-Phenanthrene</td>
<td>1846</td>
<td>2000</td>
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<td>Pyrene</td>
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<td>Fluoranthenene</td>
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<td>Chrysene</td>
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<tr>
<td>Benzo(k)fluoranthene</td>
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<td>Benzo(b)fluoranthene</td>
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<tr>
<td>Benz(a)anthracene</td>
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<td>Indeno(1,2,3-cd)pyrene</td>
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<td>Dibenzo(a,h)anthracene</td>
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<td>0.143</td>
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<tr>
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<td>0.132</td>
<td>0.143</td>
</tr>
</tbody>
</table>

1 Includes alkylated homologues C1,C2,C3,C4 naphthalenes, C1,C2,C3 fluorenes, and combined C1,C2,C3,C4 Anthracene/Phenanthrenes. Sum of ratios, measured to LOC may not exceed 1.
In developing levels of concern be as inclusive as possible with local advisories

E.g. For PAH with cancer end points estimates of contamination levels and consumption rates that, if sustained for period of 5 years, may result in excess consumer lifetime cancer risk of $1 \times 10^{-5}$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Average Adult Body Weight</th>
<th>Average Life Span</th>
<th>Consumption Rate (annualized)</th>
<th>Population Percentile</th>
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<tbody>
<tr>
<td>Exposure Dose (LOCs)</td>
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<td></td>
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<tr>
<td>Exposure Duration</td>
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<tr>
<td>Acute Noncancer Risk Level (RfD)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic Cancer Risk Level (CSF)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

However, consider context......

### Average, Annual Releases of Petroleum (1990-1999) by Source

<table>
<thead>
<tr>
<th>Source</th>
<th>Gulf of Mexico</th>
<th>North America</th>
<th>Worldwide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Seeps</td>
<td>43.1 (82%)</td>
<td>49.6 (63%)</td>
<td>184.7 (83%)</td>
</tr>
<tr>
<td>Extraction of Petroleum</td>
<td>0.8 (2%)</td>
<td>0.9 (1%)</td>
<td>11.7 (5%)</td>
</tr>
<tr>
<td>(platforms, atmospheric deposition, produced waters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation of Petroleum</td>
<td>1.3 (2%)</td>
<td>2.8 (4%)</td>
<td>6.3 (3%)</td>
</tr>
<tr>
<td>(pipeline spills, tanker spills, operational washings, coastal facility spills, atmospheric deposition)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption of Petroleum</td>
<td>7.1 (14%)</td>
<td>25.9 (33%)</td>
<td>20.2 (9%)</td>
</tr>
<tr>
<td>(land-based, recreational, operational discharges, atmospheric deposition, jettisoned aircraft fuel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>52.3</td>
<td>79.2</td>
<td>222.9</td>
</tr>
</tbody>
</table>
Distribution of natural seeps within the Gulf of Mexico
(Soley 2010, MacDonald 1998, Garcia 2009)

Deep water hydrocarbon seep (Chemosynthetic) communities
(Cordes et al. 2007, 2010, Fisher et al. 2007)

At a Glance
- 300 monitoring sites
- Stations 10 to 100 km apart
- 140+ contaminants monitored
- 51 PCB congeners
- 65 PAHs
- 17 Metals and Metalloids

Determine Baseline, Background, Benchmark

Coastal Zone Surveillance - NOAA Mussel Watch Program

At a Glance
- 70 sites in GOM

Figure 1. Distribution of species (C. granulata regional, mussels (Mytilus
annexed, and still in the US) (Drosophyllum annexed) collected and
monitored as part of the Mussel Watch Program.
Comparative Regional Background

10-Year Average PAH Levels in Shellfish from U.S. East Coast, Gulf of Mexico, and West Coast 2000 - 2009

- East Coast
- Gulf Coast
- West Coast

Data from NOAA National Status & Trends Mussel Watch Program

Background Aromatics in Specific Areas of Concern

- Benzo(a)pyrene
- Anthracene/Phenanthrene + Alkylated Homologues
- Benzo(k)fluoranthene

North Central Gulf of Mexico Shellfish PAH Levels

- Average
- Maximum

NOAA National Status & Trends Mussel Watch Program
### Background Metals in Specific Areas of Concern

![Graph showing arsenic, cadmium, mercury, and lead concentrations](image)

**Gulf of Mexico Shellfish Metals 1990 – 2011**

- **Arsenic**: Average = 0.00, Maximum = 0.10
- **Cadmium**: Average = 0.00, Maximum = 0.01
- **Mercury**: Average = 0.01, Maximum = 0.10
- **Lead**: Average = 0.00, Maximum = 0.01

### Factual Perspective

<table>
<thead>
<tr>
<th>PAH</th>
<th>Meat &amp; meat products</th>
<th>Fish &amp; seafood</th>
<th>Vegetables</th>
<th>Fruits &amp; confections</th>
<th>Cereals &amp; cereal products</th>
<th>Beverages</th>
<th>Oils &amp; fats</th>
<th>Dairy products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphthalene</td>
<td>0.9 – 55</td>
<td>ND – 156</td>
<td>0.06 – 0.5</td>
<td>0.18 – 4.3</td>
<td>2.6</td>
<td>ND – 57</td>
<td>ND – 87</td>
<td>ND – 0.1</td>
</tr>
<tr>
<td>Benzo[a]pyrene</td>
<td>ND – 212</td>
<td>ND – 173</td>
<td>ND – 25</td>
<td>ND – 1.5</td>
<td>ND – 5.4</td>
<td>ND – 0.6</td>
<td>ND – 164</td>
<td>ND – 1.3</td>
</tr>
<tr>
<td>Benzo[b]fluoranthene</td>
<td>ND – 197</td>
<td>ND – 134</td>
<td>ND – 28.7</td>
<td>ND – 3.5</td>
<td>0.03 – 1.3</td>
<td>ND – 0.65</td>
<td>ND – 91</td>
<td>ND – 0.7</td>
</tr>
<tr>
<td>Benzo[k]fluoranthene</td>
<td>ND – 172</td>
<td>ND – 55</td>
<td>ND – 17</td>
<td>ND – 0.2</td>
<td>0.02 – 1.4</td>
<td>ND – 0.24</td>
<td>ND – 99</td>
<td>ND – 0.1</td>
</tr>
</tbody>
</table>

Range of concentrations (ppb) of select PAHs in major food groups

Naturally Occurring Mutagens & Carcinogens found in Foods & Beverages, examples

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Foods/Beverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaldehyde</td>
<td>Apples, Bread, Coffee, Tomatoes</td>
</tr>
<tr>
<td>Acrylamide</td>
<td>Bread, Rolls</td>
</tr>
<tr>
<td>Aflatoxin</td>
<td>Nuts, Grains</td>
</tr>
<tr>
<td>Isothiocyanates</td>
<td>Arugula, Broccoli, Mustard</td>
</tr>
<tr>
<td>Aniline</td>
<td>Carrots</td>
</tr>
<tr>
<td>Benzaldehyde</td>
<td>Apples, Coffee, Tomatoes</td>
</tr>
<tr>
<td>Benzene</td>
<td>Butter, Coffee, Roast Beef</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>Bread, Coffee, Pumpkin Pie, Rolls, Tea, Kale</td>
</tr>
<tr>
<td>Benzoilfurane</td>
<td>Coffee</td>
</tr>
</tbody>
</table>

Corexit® Ingredients

<table>
<thead>
<tr>
<th>Ingredient Name</th>
<th>CASRN</th>
<th>Common Uses</th>
<th>BCF/BAF</th>
<th>Rodent p.o. LD50</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Butoxyethanol</td>
<td>111-76-2</td>
<td>Soaps, cosmetics and personal care products &lt; 10% Also, lacquers and paints, agricultural chemicals Indirect &amp; Direct Food Additive: 21 CFR 175.105(FAP 180233); 178.1010(FAP 4A1375); ++</td>
<td>2 - 3</td>
<td>0.2-12 g/kg</td>
</tr>
<tr>
<td>Propylene Glycol</td>
<td>57-55-6</td>
<td>Drugs, cosmetics and personal care products Food products (GRAS): 21 CFR 175.105(FAP 180233, 280650); 178.3300; 175.320; 177.2420; +++</td>
<td>&lt; 10</td>
<td>18-46 g/kg</td>
</tr>
<tr>
<td>Dipropylene glycol monobutyl ether</td>
<td>29911-28-2</td>
<td>Cleaners, degreasers, paints, plasticizers</td>
<td>&lt; 10</td>
<td>3-5 g/kg</td>
</tr>
<tr>
<td>Dioctyl sodium sulfo succinate</td>
<td>577-11-7</td>
<td>OTC Lalatives, cosmetics Indirect &amp; Direct Food Additive: 21 CFR 73.1; 131.130; 131.124; +++</td>
<td>&lt; 10</td>
<td>2.6-5.2 g/kg</td>
</tr>
<tr>
<td>Petroleum distillates</td>
<td>64742-47-8</td>
<td>Paints, varnish, lubricants (e.g. HW-40); hand-cleaners (e.g. Mojo &amp; Goop), C-8 to C-20 Aliphatic HC; Norpar-13 (CASNR 94094-93-6) is Food-Grade</td>
<td>60 - 80</td>
<td>&gt; 5g/kg</td>
</tr>
<tr>
<td>Span 80</td>
<td>1338-43-8</td>
<td>Cosmetics &amp; personal care products Drugs and parenteral products Food Products: 21 CFR 73.1; 107.105; 172.515; 172.623; +++</td>
<td>36 - &gt;300</td>
<td>NOAEL &gt;5 g/kg d</td>
</tr>
<tr>
<td>Tween 80</td>
<td>9005-65-6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tween 85</td>
<td>9005-70-3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FDA approval means that the compound is safe for its approved uses and the human exposures associated with those uses
Integrating Status and Trends in Human and Environmental Health

- Environmental contaminant baseline monitoring data.
- Human health and nutrition baseline data.
- Human population demographic data.
- Integrate research approaches to connect and understand potential impacts to human health, economy, infrastructure and natural resources.
- Comprehensive Risk Communication is very important to prevent -

Incomplete information leading to suspicion, fear & dissemination of misinformation

Complete information lead to suspicion, fear & dissemination of misinformation

Thank you
Save All Birds

Lee Fox, Founder and President

2709 CR 579

Wimauma, FL 33598

Silverfoxsos1@gmail.com
INTRODUCTION

The purpose of Save All Birds (SAB) Oiled Wildlife Response Program is to have a pre-trained, organized force of volunteers, along with a core group of employees, ready and willing to respond and care for oiled wildlife in the event of a spill anywhere else needed.

This handbook has been developed to assist our organization and yours to organize volunteers in an efficient manner and assemble all the necessary documentation, information and materials for a successful cleaning operation in one location.

Through pre-training and hands-on experience, SAB has developed a volunteer network of 17 committees, each with very specific responsibilities. This organization effectively distributes the workload, simplifies the tasks that any one individual or committee is responsible for, and ensures that all tasks are covered. It focuses on an overall smooth operation of the compound, thereby facilitating the rescue, cleaning, treatment and release of as many injured birds or other wildlife as possible.

This protocol and volunteer network was put to the test when thousands of gallons of oil was spilled, injuring 371 birds. They were rescued and treated, and 85% were released back to the wild. This was an unprecedented recovery rate, and our success was due in large part to this program, its preplanning efforts, its effective organization and dedication of the volunteers.

FOUR STAGES TO A SUCCESSFUL OILED WILDLIFE RESPONSE PROGRAM

FIRST STAGE - PREPARATION:

1. Enlist volunteers for each of the 17 committees outlined in this handbook.

2. Identify a Chair and Co-Chair to be responsible for each committee. This ensures that at least one will be available in an emergency. Begin implementation of the steps outlined in each committee section under "Responsibilities to prepare the committees."

3. Prepare the volunteers by providing the necessary training. Booklets developed by SAB available can be revised for use in other regions following SAB approved training. Other materials also can be available to familiarize new volunteers of all aspects of the oiled wildlife program.

4. Start accumulating equipment, supplies and other materials outlined throughout this handbook to be prepared when an emergency strikes.

SECOND STAGE - MOBILIZATION:

1. Mobilize the trained core of volunteers immediately to be on site and prepared to start operations within 12 hours.

2. Physically establish the staging area and be ready to start rescue and rehabilitation activities within one to two days:
3. Set up office trailer, supply tent, admitting and triage, critical care, holding, washing, drying, and outside pens in that order.

4. Prepare a shelter for personnel to rest, eat and conduct certain tasks; provide refrigerator/freezers; cage washing, drying, and newspaper storage areas; provide food preparation station for animals; and prepare the volunteer indoctrination area.
5. Establish satellite triage(s) as necessary.

THIRD STAGE - RESCUE & RELEASE:
1. Rescue, give immediate care, medical exam, wash, rehabilitation and supportive care as long as necessary until release is possible.

2. It is the responsibility of the state wildlife and Federal FWS that will determine if the environment is clean enough to release. Environmental agency can determine perfect locations for specific species release.

FOURTH STAGE - DEMOBILIZATION
1. Demobilize, pack and store all remaining supplies and permanent equipment for future use.

2. Prepare documentation of activities and submit rescue and rehabilitation data to appropriate agencies and a copy for your future reference.

USING THIS MANUAL
Pre-preparation is key to any successful oiled wildlife program. This cannot be stressed enough. This handbook is designed to provide a step-by-step approach to organizing each of the 17 volunteer committees. Each committee section in Tab 1 lists the responsibilities or tasks that need to be completed to prepare the committee, as well as the tasks that each individual committee is responsible for during a spill event. Some of the tasks will be obvious, while others may be details (large and small) not previously considered. Supplemental information is provided in tables, diagrams and flow charts located within the committee section or in the resources section.

The manual is designed in a binder format so that it is easy to include any additional information, particularly information pertinent to specific locales or wildlife (i.e., handling or specific medical protocols for different species). Additional research to "fill in the blanks" in some sections may be necessary; therefore it is important to familiarize yourself with all the committees and aspects of an oiled wildlife program. Consider this the starting point for your own program.
RESPONSIBILITIES OF THE PROGRAM DIRECTOR

The Program Director, the person in charge of the oiled wildlife response program, is ultimately responsible for ensuring that the above-mentioned permits and training requirements are met by the organization and its staff and volunteers. This individual will also be the point contact person for federal and state agencies, as well as the spiller. The Program Director is also responsible for the first committee, Operations Control. The Incident Report or Oil Spill Alert Form outlines the critical information needed to initiate an oiled wildlife spill response.

The most important responsibility of the Director is to fully "staff" each of the 17 committees outlined in this handbook and identify responsible individuals as committee co-chairs. The best time to organize and train thousands of well-intentioned people is before a spill occurs -- not afterward when mass confusion is typical. With key people trained to respond to specific aspects of the spill on each of these committees, the energy of helpful new volunteers can be effectively channeled.

Following are some ideas to reach out, enlist and organize volunteers of a successful oiled wildlife response program!
ORGANIZING VOLUNTEERS

Start with your organization's key volunteers and identify those who are interested in initiating an oiled wildlife response program in your area. Enlist these key people to help you get the word out and build a volunteer base. Choose a day, time and location to hold a program orientation. An ideal location may be a well known civic or community center, library, Coast Guard station or hotel meeting room, if you do not have your own space. Set aside a minimum of 5 hours; you may need even more time depending on the turnout.

Develop a media release announcing your Oiled Wildlife Response Team and Preparedness Program. Distribute widely to your local media: television stations, cable, county/city access channels, radio and print media. Also develop a flyer to be posted on community bulletin boards and the Internet. Contact local conservation organizations to ensure that it is included in their newsletters.

Identify at least two contact people and list their names and phone numbers on the announcement to accept telephone calls from potential volunteers.
Send invitations to wildlife rehabilitators, environmental organizations, wildlife rehabilitators veterinarians and veterinarian technicians within a two-hour driving distance.

Large businesses or corporations like power co. will support your efforts as it will help them if an incident should occur. Service organizations are a great resource for volunteers.

Once you have publicized your event, be prepared to answer phone calls and respond to questions. Tell interested callers that the intent of the meetings is to be prepared if an oil spill should occur. Describe the various tasks and responsibilities involved in treating and rehabilitating oiled wildlife, giving examples of some of the different committees. Encourage callers to attend the meeting and document names, addresses and phone numbers. If the event was publicized well in advance, you may want to send out a reminder postcard to people who responded early. This will underscore the importance of each individual's participation.

Use this handbook as the guide for these initial orientation meetings. You will need to describe each committee to recruit volunteers for them. Remember, no task or committee is more important than another -- each one has responsibilities which must be covered and each committee must work well for the overall operation to be successful.

VOLUNTEER COMMITTEES & MAJOR RESPONSIBILITIES
The following 17 volunteer committees have been established by SAVE All Birds Inc. with very specific duties and responsibilities so that the workload is shared, and no one person or committee is overburdened. Each committee and its responsibilities are detailed in the sections that follow. Relevant tables, reporting sheets and other pertinent information are provided at the end of each committee’s section.
1. Operations Control
   a. Coordinate entire operation.
   b. Approve supply orders and communications installations.
   c. Coordinate with spiller via contract.
   d. Coordinate with state and federal agencies.
   e. Keep accurate records.

2. Volunteer Coordination
   a. Develop an efficient volunteer telephone network.
   b. Follow the phone interview flow chart to evaluate volunteers' skills and experience, and to schedule orientations.
   c. Schedule volunteers into appropriate positions: office/reception, medical/rehabilitation, general duties.
   d. Ensure volunteer release paper work signed.

3. Medical
   a. Prior to spill, identify local avian specialists who will volunteer in an emergency.
   b. Have remote triage teams and supplies ready and available, separate from main staging equipment if main staging area is 15 miles from where birds start coming in oiled. This will stabilize the bird for their trip to main staging area.
   c. Examine incoming birds and other wildlife; conduct initial cleansing (eyes, nares, mouth) and health assessment (stabilize and determine treatment necessary).
   d. Dispose of bio-hazardous waste (medical waste) properly.
   e. Dispose of oiled waste (considered toxic) properly.
   f. Preserve dead animals for U.S. Fish & Wildlife Service damage assessment.
   g. Segregate oiled birds from non-oiled birds.

4. Bird Washing
   a. Develop wash teams and divide responsibilities based on experience.
   b. Clean bird of all oil to begin process of restoring bird's natural waterproofing (bird-handling experience necessary).
   c. Maintain water at proper temperature (104EF) for washing and dispose of used water appropriately.
   d. Keep accurate records (water temperature, concentration of Dawn liquid detergent, rinse information).

5. Media
   a. Designate primary and secondary media contacts; ensure that one contact person is on site as often as possible.
   b. Identify volunteers to escort media through the compound at given times (identify more than one person).
   c. Schedule press visits during specific times for photo opportunities.
   d. Allow no unauthorized interviews.
   e. Coordinate with Operations Control and Medical Committees before making any public statements.
   f. Allow only designated individuals to make official comments on behalf of your organization.
6. Communications
a. Secure beepers, regular phones, mobile/cellular phones, and faxes.
b. Establish contact with ham radio operators. They are a potential source of information/communications assistance.
c. Develop and maintain a list of important phone numbers.
d. Develop strategy for establishing necessary number of lines at a spill site.

7. Cleaning
a. Keep cages, compound and volunteer common areas clean (ensures less confusing work atmosphere, as well as maintains sanitary conditions).
b. Responsible for separating recyclable materials.
c. Responsible for handling laundry.

8. Food Sources
a. Identify possible suppliers for bird food prior to spill (check with Rehabilitation Committee for special requirements).
b. Identify possible donors for volunteer and staff food prior to spill. Have varied types of food and drink, including water, available.

9. Construction
a. Handle all carpentry needs: build tables, cages and pools.
b. Work with other committees to determine size/dimension requirements for local species prior to spill.

10. Plumbing
a. Ensure that water requirements for washing area (hot/cold water; softened water) are met.
b. Provide water for rehab pens/pools, and human/animal consumption.

11. Electrical
a. Work with Plumbing and Carpentry Committees to determine and handle all electrical needs (medical, office, triage, etc.) following all applicable safety regulations.

12. Rescue (Land & Sea)
a. Experience in rescuing birds a must (injuries to both birds and volunteers can be caused by inappropriate techniques).
b. Prepare rescue kits for rescue teams.
c. Coordinate and manage all land and sea rescues.

13. Inventory Control/Informational Signs
a. Make signs (directional, site location, etc.) prior to spill.
b. During spill, assist Supply Requisitioning committee.
c. Coordinate current inventories with Supply Requisitioning.
d. Routinely check with other committees for supply needs.
e. Maintain inventory sign-out sheet(s); all supplies must be signed for.
f. Maintain records of donations for thank you letters.
14. Supply Requisitioning
a. Generate list of contacts/vendors/donors to meet all supply needs.
b. Secure all equipment for Medical, Washing, Construction and Cleaning (general cleaning supplies) committees and maintain necessary office supplies.
c. Keep inventory count and report to Inventory Control.
d. Have all purchases approved by Operations Control.

15. Rehabilitation
a. Maintain birds as per instructions from Medical Committee, including critical care (caged birds), feeding, and cleaning pens/pools.
b. Keep accurate medical records, including fluid therapy (oral and IV), medications and feeding.
c. Mist birds in pens to promote preening for waterproofing restoration after washing.

16. Environmental & Hazmat Volunteer Training
a. Develop and provide environmental training relative to local environmental habitats/conditions.
b. Complete and provide full (40 hours) and short-course OSHA hazmat training for appropriate individuals.
c. Develop and provide training for bird handlers.
d. Develop volunteer orientation and conduct training programs as needed during spill response efforts.

17. Predator/Security Patrol
a. Protect birds. If pens are outside, area must be predator proof -- with special attention to raccoons, rats, snakes and dogs.
b. Have sufficient volunteers available to patrol from dusk to dawn.
c. Protect people. This includes security for parking and getting people into facility
Appendix D: Breakout Group Notes
<table>
<thead>
<tr>
<th>CONCERN</th>
<th>Category</th>
<th>LONG/SHORT TERM</th>
<th>STAKEHOLDERS**</th>
<th>WHAT IS KNOWN ABOUT THE CONCERN?</th>
<th>WHAT IS UNCERTAIN?</th>
<th>WHAT ARE AREAS OF DISAGREEMENT?</th>
<th>WHAT THINGS COULD BE KNOWNABLE IN THE FUTURE?</th>
<th>HOW CAN CONCERNS BE ADDRESSED?</th>
</tr>
</thead>
<tbody>
<tr>
<td>state's position on dispersants - for or against</td>
<td>dispersants</td>
<td>short and long</td>
<td>state and federal authorities/representatives; industry</td>
<td>significant distrust of the science (state/public position)</td>
<td>dose response, general toxicity, efficacy</td>
<td>fed may not go forward unilaterally; state may not approve inshore utilization</td>
<td>yes or no</td>
<td>state and fed need to reaffirm their positions and they have one unified position, they are working together.</td>
</tr>
<tr>
<td>Should dispersants be used at all due to impacts to benthic and reef habitat?</td>
<td>dispersants</td>
<td>long</td>
<td>resource managers; state regulators; tourism; public</td>
<td>components in dispersants are not persistent; rapidly diluted but still in the environment</td>
<td>rates under different environmental conditions</td>
<td>public perception; persistence vs. half life</td>
<td>could monitor and track the persistence of these chemicals</td>
<td>explain that dispersants should only be used when the negative potential impacts are less than the environmental impacts of non-dispersed oil.</td>
</tr>
<tr>
<td>How long do dispersants stay in the water/environment?</td>
<td>dispersants</td>
<td>short and long</td>
<td>tourism; citizens; fishermen</td>
<td>components in dispersants are not persistent; rapidly diluted but still in the environment</td>
<td>rates under different environmental conditions</td>
<td>public perception; persistence vs. half life</td>
<td>could monitor and track the persistence of these chemicals</td>
<td>sharing monitoring results; talk about the science we know; put in contrast.</td>
</tr>
<tr>
<td>How do we know dispersants are working?</td>
<td>dispersants</td>
<td>short</td>
<td>federal/state regulators; natural resource managers; media</td>
<td>it is not 100% effective</td>
<td>oil composition with changes due to emulsification</td>
<td>rate of change of both the oil and dispersant at sea</td>
<td>monitoring that is required</td>
<td>define how dispersants work don't minimize benefits, share monitoring results, report out on a regular basis.</td>
</tr>
<tr>
<td>Why are you using dispersants which are banned in Europe?</td>
<td>dispersants</td>
<td></td>
<td></td>
<td>in UK Corexit 9500 is not approved for nearshore environments because it failed one toxicity screening test for a nearshore organism</td>
<td>is Corexit 9500 any worse or better than any other products in nearshore and offshore environments</td>
<td>none</td>
<td>yes, can measure concentrations of Corexit in nearshore environments</td>
<td>provide facts from study.</td>
</tr>
<tr>
<td>Can dispersants be used in state waters?</td>
<td>dispersants</td>
<td></td>
<td></td>
<td>yes, situational for each incident</td>
<td>results of consultation between fed and state</td>
<td>none</td>
<td>possible depending on consultation and RRT process</td>
<td>yes they can be, talk about the process on how this decision was made.</td>
</tr>
<tr>
<td>Is the black smoke from in situ burning harmful?</td>
<td>in situ burn</td>
<td>short and long</td>
<td>citizens; public</td>
<td>yes it is harmful, removing the oil from the surface is a positive trade off</td>
<td>weather and change of smoke</td>
<td>trading one pollutant for another</td>
<td>yes however ISB is not used as a response tool when there is expected exposure to the public. Provide weather forecast to ensure people understand that it will not spread towards them.</td>
<td></td>
</tr>
<tr>
<td>Does the oil burn completely?</td>
<td>in situ burn</td>
<td>short and long</td>
<td>resource managers; public; tourism</td>
<td>not at this volume because we cannot collect it all</td>
<td>weather and change of smoke</td>
<td>trading one pollutant for another</td>
<td>yes however ISB is not used as a response tool when there is expected exposure to the public. Provide weather forecast to ensure people understand that it will not spread towards them.</td>
<td></td>
</tr>
<tr>
<td>Can you do ISB in Tampa Bay?</td>
<td>in situ burn</td>
<td></td>
<td></td>
<td>unlikely for this scenario</td>
<td></td>
<td></td>
<td></td>
<td>no because it would require a permit and the negatives would not outweigh the positives. This would cause closure to the port for extended periods of time which is not a feasible option.</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
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<tr>
<td>What are the odors and residue with in-situ burn?</td>
<td>90-98% of the oil is converted to carbon and water, other residue is tar and smoke; reiterate that the location of the burn is taken into consideration and will not be done if there is potential to harm the public.</td>
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<tr>
<td>Vocabulary - not understanding all the jargon that is used</td>
<td>come up with a reference guide with easy explanations to science jargon</td>
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<tr>
<td>Why doesn’t the plan work?</td>
<td>Explain plan and that it is being executed to the best of our ability in this particular scenario</td>
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<tr>
<td>Who’s making the decisions?</td>
<td>They are invited. There is typically a liaison that represents the local authorities. To be involved participate in the preplanning process by attending your area committee meetings</td>
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<tr>
<td>Why aren’t locals authorities being invited into Unified Command?</td>
<td>Explain Oil Pollution Act 1990 - spiller is fiscally responsible for the cleanup. If spiller is not doing their part, USCG will take over</td>
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<tr>
<td>Why is the oil spiller in charge of cleanup?</td>
<td>response technologies offshore will likely be done within 3-4 days. Response techniques may continue depending on tightening of vessel. Continued monitoring will occur to ensure no other cleanup techniques are needed</td>
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<tr>
<td>How long is this response going to take?</td>
<td>The course of action will depend on the extent of damage to the boat.</td>
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<tr>
<td>Don’t bring that leaking ship here (maritime debris)! Port of refuge</td>
<td>We do not currently consider that as part of the response plan for offshore open water. Note differences between bioremediation agents vs natural biodegradation and NRT Guidance.</td>
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<tr>
<td>Are there any bioremediation solutions?</td>
<td>Every clean up worker is provided with safety equipment to ensure their health. They are operating under OSHA guidelines.</td>
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<tr>
<td>How can we get samples for our research?</td>
<td>Every clean up worker is provided with safety equipment to ensure their health. They are operating under OSHA guidelines.</td>
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<tr>
<td>Are the cleanup workers safe?</td>
<td></td>
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<tr>
<td>Who is the responsible party? Who is really responsible?</td>
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Group A; Page 2
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where is the oil, the ship, how much oil, where is it going? Is the oil coming toward me?</td>
<td>situational awareness</td>
</tr>
<tr>
<td>Who is at fault? Financial responsibility?</td>
<td>situational awareness</td>
</tr>
<tr>
<td>Why is there not enough equipment and why is it taking so long to respond?</td>
<td>skimming short media; elected officials there is no boom to contain the vessel; there is boom in the area that needs to be deployed knowledge of area plan; equipment availability</td>
</tr>
<tr>
<td>Why aren't you skimming?</td>
<td>skimming short citizens; state authorities/representatives we are not but it may take time to get there; skimming is not going to solve this oil spill availability of equipment; sea state</td>
</tr>
<tr>
<td>Why aren't there volunteer skimming vessels???</td>
<td>skimming short fishers not effective; no preplans currently exist for volunteer vessels to participate</td>
</tr>
<tr>
<td>Are booms trapping turtles getting damaged by skimmers or causing them to be burned?</td>
<td>skimming short and long resource managers; public</td>
</tr>
<tr>
<td>Can skimming cause impact to critical habitats (seagrasses)?</td>
<td>skimming short and long resource managers; public not relevant offshore</td>
</tr>
<tr>
<td>Why don't you use that 3-knot boom?</td>
<td>skimming short manufacturers; industry ineffective</td>
</tr>
<tr>
<td>Why can't you pick all of the oil up before it gets to the coast?</td>
<td>skimming short public, politicians, property owners amount of oil makes this impossible</td>
</tr>
<tr>
<td>Why don't you use that 3-knot boom?</td>
<td>skimming skimming short</td>
</tr>
</tbody>
</table>
### NOAA's Regional Preparedness Training (NRPT) Group A Response Technologies

**Addressing Public Concerns During Spill Response... Sorting Fact from Fiction During Response**

**Date:** June 28 – 29, 2016  
**Location:** FWRI, St. Petersburg, FL

#### GROUP B

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>I can never use the beach again to swim with my family.</td>
<td>other</td>
<td>property owner &amp; NGOs</td>
<td>You all never cleanup enough - what if I see more oil later? What will you all do about it then?</td>
<td>From past experience, the UC/SCAT. -- Some shorelines have baseline data.</td>
<td>The time frame for cleanup and recovery. -- Hidden/missed pockets of oil contamination.</td>
<td>Completeness of the cleanup endpoints.</td>
<td>Estimated time of recovery (post damage assessment).</td>
<td>By developing/publish a document of past case studies. -- Explain endpoints of cleanup. -- Basic document about product spilled. -- Actual progress and tests on cleanups. -- Status of beach cleanups (ERMA).</td>
</tr>
<tr>
<td>How can we get samples for our research?</td>
<td>other</td>
<td>academics, scientists</td>
<td>FIO agreement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>One pages: airborne hazards, modeling, local guidance for burning, collection and disposal.</td>
</tr>
<tr>
<td>If the oil comes onshore, should I burn it?</td>
<td>other</td>
<td></td>
<td>No!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Site safety plan from UC ensures the safety of our workers. -- Can develop public document to explain training/safety requirements for the workers. -- Safety Officer has the responsibility of workers' safety.</td>
</tr>
<tr>
<td>Are the cleanup workers safe?</td>
<td>other</td>
<td></td>
<td>There’s a site safety plan from the UC that ensures workers’ safety. -- We have a way to monitor those involved in cleanup.</td>
<td></td>
<td></td>
<td></td>
<td>Claims process developed and explain the process. -- Provide relevant contact information for this process. -- Documentation of valid claims.</td>
<td></td>
</tr>
<tr>
<td>How much am I going to get ($)?</td>
<td>other/economic</td>
<td>$/L</td>
<td>politicians, property owners</td>
<td>UC and/or RP has set up a claims process to assess these concerns (private claim).</td>
<td>Area claims. -- Exact claim process. -- What’s needed to file a claim. -- Time frame of assessment/reimbursement.</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Will I be put in a hotel while this is going on? [other compensation?</td>
<td>other/economic</td>
<td>$/L</td>
<td>politicians, property owners</td>
<td>Authority and determination for evacuation will come from local EMA.</td>
<td></td>
<td></td>
<td></td>
<td>Local authority manage beach closures. -- Online information on open/closed beaches. -- Development of documentation for beach closure POCs (where to find that info). --</td>
</tr>
<tr>
<td>Is my beach open? Can I go there?</td>
<td>other/impacts</td>
<td>$/L</td>
<td>public</td>
<td>Someone in the UC will know if the beach is closed due to clean or health concerns.</td>
<td>How long will they be closed? -- How will they be notified? -- How will they evaluate when it’s safe to go back?</td>
<td></td>
<td></td>
<td>The other group is answering.</td>
</tr>
<tr>
<td>Can I fish? Are you closing the area to fishing?</td>
<td>other/impacts</td>
<td>$/L</td>
<td>public, recreational</td>
<td>Someone in the UC will know if the fisheries are closed.</td>
<td>How long will they be closed? -- How will they be notified? -- How will they evaluate when it’s safe to go back?</td>
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<tr>
<td>Question</td>
<td>Responsible Party</td>
<td>Date/Format</td>
<td>Notes</td>
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<td>-------------------------------------------------------------------------</td>
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<tr>
<td>How long will this process last...how long will I be impacted?</td>
<td>politicians, property owners</td>
<td>D/M/Y</td>
<td>As long as necessary to meet the objectives and determined by the UC. -- Estimates of time durations based on past experience(s). -- Display SCAT status and make publicly available.</td>
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<td>How long that will really be. -- Wx (even heat of the day) events could impact duration significantly.</td>
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<td></td>
<td>Actual time frame.</td>
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<tr>
<td>How is it going to be cleaned up?</td>
<td>other/operations</td>
<td>S/L</td>
<td>U/C/SCAT operations.</td>
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<tr>
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<td></td>
<td>What kind of cleaning will be done/best option?</td>
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<td></td>
<td>The method(s) of cleanup (most effective).</td>
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<tr>
<td>How long is this response going to take? Why aren't the crew working around the clock?</td>
<td>other/operations</td>
<td></td>
<td>When UC signs off on SCAT.</td>
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<td>When will this be done?</td>
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<tr>
<td>How to protect investments (preserves, beaches, etc.)? (from public official view)</td>
<td>prioritization of protection</td>
<td>ST</td>
<td>politicians, NGOs, &amp; public (depending on who owns area)</td>
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<td>That weren't originally captured in the GRP process.</td>
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<td>See #21.</td>
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<tr>
<td>Wildlife and Bird sancts: What are you going to do to protect the nesting birds?</td>
<td>prioritization of protection</td>
<td>ST</td>
<td>NGOs</td>
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<tr>
<td></td>
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<td></td>
<td>See #21.</td>
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<tr>
<td>How are you going to prioritize protection/cleanup sites? (Mine is more important)</td>
<td>prioritization of protection</td>
<td>ST</td>
<td>property owners</td>
<td>ACP, GRPs, ESIs, FL Marine Spill Analysis System, local expertise (stakeholders/trustees/tribal), ERMA (preliminary work that’s been done).</td>
<td>Document(s) are (if they cover it) – Does everyone agree with the priorities that have been established in the GRPs? – Is there shoreline impacted that’s not covered by the GRP? – Booming strategies are unrealistic. – We impacts to support operations. –</td>
<td>Documentation on who is involved in the GRP development &amp; purpose of the plan. Point the public to the ACP. – Explain how the ICS process works/flows and how priorities and decisions are made.</td>
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<tr>
<td>Is my beach going to be oiled?</td>
<td>prioritization of protection</td>
<td></td>
<td>UIC has access to forecasts and predications of oil movement.</td>
<td>UIC doesn’t recommend the homeowner take actions. – Potentially establish an alternative way for the homeowner to be involved such as beach sentinel program.</td>
<td>Provide access to trajectory forecast and have documentation describing how to interpret.</td>
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<tr>
<td>How can we protect or keep oil from my beach/home/etc.</td>
<td>prioritization of protection</td>
<td>ST</td>
<td>property owner, politicians, &amp; NGOs</td>
<td>UIC recommendations would establish boom requirements. – Also determined by the RP’s vessel response plan.</td>
<td>Resource management decisions based on available information. – Educate public on how we prioritize the resources we have. – Reiterate priorities of human life and environment.</td>
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<tr>
<td>Where are you placing boom &amp; what resources are you protecting?</td>
<td>protective booming</td>
<td>ST</td>
<td>property owner, politicians, &amp; NGOs</td>
<td>UIC waterway closure. – Safety messages.</td>
<td>CG generated notification on safe zone(s). – Provide access to boom placement.</td>
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<tr>
<td>Why can’t I move my boat...boom issues...recreational use.</td>
<td>protective booming</td>
<td>ST</td>
<td>public</td>
<td>UIC operations would establish boom requirements. – Also determined by the RP’s vessel response plan.</td>
<td>Resource management decisions based on available information. – Educate public on how we prioritize the resources we have. – Reiterate priorities of human life and environment.</td>
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</tr>
<tr>
<td>Do we have enough boom...for me?</td>
<td>protective booming</td>
<td>ST</td>
<td>politicians, property owners</td>
<td>UIC operations would establish boom requirements. – Also determined by the RP’s vessel response plan.</td>
<td>Resource management decisions based on available information. – Educate public on how we prioritize the resources we have. – Reiterate priorities of human life and environment.</td>
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</tr>
<tr>
<td>Why can’t you boom the entire boom/bay entrance?</td>
<td>protective booming</td>
<td>ST</td>
<td>politicians, property owners, public</td>
<td>UIC operations would establish boom requirements. – Also determined by the RP’s vessel response plan.</td>
<td>Resource management decisions based on available information. – Educate public on how we prioritize the resources we have. – Reiterate priorities of human life and environment.</td>
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<tr>
<td>Why don’t you use that 3-knot boom?</td>
<td>protective booming</td>
<td>skimming</td>
<td>short</td>
<td>manufacturers; industry</td>
<td></td>
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<tr>
<td>Where do I send my hair or noodles? Why not use sheep?</td>
<td>shoreline cleanup strategies</td>
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<tr>
<td>Where's it going?</td>
<td>waste disposal</td>
<td>D/M/Y</td>
<td>politicians, property owners</td>
<td>Where will it be staged (in my neighborhood)?</td>
<td></td>
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<tr>
<td>Archaeological/historical burial ground be impacted/oiled?</td>
<td>waste disposal</td>
<td>S/L</td>
<td>public</td>
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### NOAA’s Regional Preparedness Training (NRPT) Group A Response Technologies

#### Addressing Public Concerns During Spill Response... Sorting Fact from Fiction During Response

Date: June 28 - 29, 2005  
Location: FWRI, St. Petersburg, FL

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<tbody>
<tr>
<td>What baseline information exists?</td>
<td>baseline</td>
<td>short term</td>
<td>ES, GRP, Mussel watch, Bay watch,</td>
<td>Age of the data, special</td>
<td>Sample for</td>
<td>Access to sample sites, Origin</td>
<td>Focused research on effects oil</td>
<td>There is a lot of information. This area is a high studied. For more information ...</td>
</tr>
<tr>
<td></td>
<td>information</td>
<td></td>
<td>Hillborough EPC, Fisheries Ind.</td>
<td>resolution, seasonality of the</td>
<td>toxigogy, abundance</td>
<td>data, competing interests, chain</td>
<td>spills,</td>
<td>More information will help to minimize the impacts of the spill. Research capability used to collect initial information to inform NRDA, response and long term research</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Monitoring FWC, Southwest Florida</td>
<td>data, migratory populations</td>
<td>mapping, abundance</td>
<td>evidence, jurisdictional</td>
<td></td>
<td>We have a wildlife management plan in place and we are coordinating with wildlife rescue organizations. If you are interested in volunteering or supporting the effort...</td>
</tr>
<tr>
<td>Do we need more research to inform baseline?</td>
<td>baseline</td>
<td>short term</td>
<td>We need more!</td>
<td>population dynamics, uncertainty of bird movement,</td>
<td>Shifting baselines,</td>
<td>Site specific environmental</td>
<td></td>
<td>They are one of the highest priorities for protection.</td>
</tr>
<tr>
<td></td>
<td>information</td>
<td></td>
<td></td>
<td>nesting, long term fate,</td>
<td>research needs, fundig, SOPs,</td>
<td>effects.</td>
<td></td>
<td>There is a plan available with conservation measures in place to avoid impacts to these species. (For example...). However, this is a plan that is available for your review at... You can also contact NMFS @ 800-</td>
</tr>
<tr>
<td>What is the plan for protecting birds?</td>
<td>birds</td>
<td>both</td>
<td>Audubon, Save All Birds</td>
<td>ES, GRP, ACP, Breeding bird</td>
<td>Population dynamics,</td>
<td>Monitoring of long term and short term impacts</td>
<td></td>
<td>There is a plan available with conservation measures in place to avoid impacts to these species. (For example...). However, this is a plan that is available for your review at... You can also contact NMFS @ 800-</td>
</tr>
<tr>
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<td></td>
<td>atlas, wildlife recovery grp.,</td>
<td>uncertainty of bird movement,</td>
<td></td>
<td></td>
<td>We recognize this is an important area for recreational fishing and we are working hard to remove the oil so we can oil get back to fishing. Fishing opportunities are still available...</td>
</tr>
<tr>
<td>What are impacts to historical/cultural resources?</td>
<td>cultural/historical</td>
<td>short term</td>
<td>preservation societies</td>
<td>ES, GRP, ACP, SHPO, THPO,</td>
<td>Specific locations,</td>
<td>monitoring contamination levels,</td>
<td></td>
<td>There are likely to be a few areas of closure based on fishing that ensures the health of the seafood. These areas will be open as it is safe.</td>
</tr>
<tr>
<td></td>
<td>resources</td>
<td></td>
<td></td>
<td></td>
<td>preservation techniques, cleanup techniques, prioritization of value, jurisdictions, access,</td>
<td>reopening of the fishery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is plan for ESA listed species of fish?</td>
<td>fish</td>
<td>both</td>
<td>critical habitat, endangered</td>
<td>is it present, abundance</td>
<td>Were protection efforts sufficient</td>
<td>monitoring contamination levels, economic impacts</td>
<td></td>
<td>They are one of the highest priorities for protection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>species</td>
<td></td>
<td>Abundance and distribution</td>
<td>reopening of the fishery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the plan for protecting recreational important fish?</td>
<td>fish</td>
<td>both</td>
<td>CCA, BTT</td>
<td>size classes and abundance in Tampa Bay, who’s fishing,</td>
<td>Population movement</td>
<td>Economic arguments, Economic impacts of the spill</td>
<td></td>
<td>There are likely to be a few areas of closure based on fishing that ensures the health of the seafood. These areas will be open as it is safe.</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>We recognize this is an important area for recreational fishing and we are working hard to remove the oil so we can oil get back to fishing. Fishing opportunities are still available...</td>
</tr>
<tr>
<td>Will there be a fisheries closure?</td>
<td>fish</td>
<td>short term</td>
<td>CCA, BTT, Commercial fishing industry, recreational industry</td>
<td>Yes, possible</td>
<td>Where and duration, species</td>
<td>Where, duration and species Monitoring contamination levels, reopening of the fishery</td>
<td></td>
<td>There are likely to be a few areas of closure based on fishing that ensures the health of the seafood. These areas will be open as it is safe.</td>
</tr>
<tr>
<td>What is the impact to the commercial fishery?</td>
<td>fish</td>
<td>short term</td>
<td>commercial industry</td>
<td>Yes, possible</td>
<td>Where and duration, species</td>
<td>Where, duration and species Monitoring contamination levels, economic impacts</td>
<td></td>
<td>There are likely to be a few areas of closure based on fishing that ensures the health of the seafood. These areas will be open as it is safe.</td>
</tr>
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<td></td>
<td></td>
<td>We recognize this is an important area for recreational fishing and we are working hard to remove the oil so we can oil get back to fishing. Fishing opportunities are still available...</td>
</tr>
<tr>
<td>What is the threat of oil and dispersant tainted fish to birds?</td>
<td>fish, birds</td>
<td>short</td>
<td>public, natural resource trustees; Bird lovers</td>
<td>ES, GRP, ACP, Breeding bird</td>
<td>Population dynamics, uncertainty of bird movement, nesting, long term fate,</td>
<td>Level of impacts, Type of recovery and restoration techniques</td>
<td>The Florida Shorebird Alliance will monitoring birds for years to come.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>atlas, wildlife recovery grp.,</td>
<td></td>
<td></td>
<td></td>
<td>We have made great strides over the last thirty years with sea grass in Tampa Bay and it is a high priority for protection. We have a similar focus on all sensitive habitats in the Bay. There is significant knowledge on how oil impacts these resources and it is being used to guide the response.</td>
</tr>
<tr>
<td>What is the impact to sea grasses? (mangroves, beaches, marshes)</td>
<td>habitats</td>
<td>both</td>
<td>impacts acute and chronic</td>
<td>Effectiveness of restoration and recovery time,</td>
<td>Cleanup and restoration techniques</td>
<td>Level of impacts, Type of recovery and restoration techniques</td>
<td></td>
<td>Past experience has taught us how to implement response actions in a manner that causes minimal impacts to resources.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Will response actions impact the resources and in what ways?</td>
<td>habitats, fish, mammals, reptiles, invertebrates, plants</td>
<td>both</td>
<td>We know it will, will disturb wildlife, habitat destruction, levels of impact,</td>
<td></td>
<td></td>
<td>Level of impacts, Effectiveness of type of recovery and restoration techniques</td>
<td></td>
<td>In the 1993 spill we found that... We know from past experience that recovery will vary by species and habitat depending on the level of impact.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How long will it take to recover?</td>
<td>habitats, fish, mammals, reptiles, invertebrates, plants</td>
<td>both</td>
<td>Recovery rates and species resilience, what is clean enough? Models,</td>
<td>Models, weathering rates, resilience of the habitat, response time, resources, storm events,</td>
<td>Recovery rates and species resilience, what is clean enough? Models,</td>
<td>Recovery rates and species resilience, what is clean enough? Models,</td>
<td></td>
<td>In the 1993 spill we found that... We know from past experience that recovery will vary by species and habitat depending on the level of impact.</td>
</tr>
<tr>
<td>What is the plan for protecting ESA/MMPA listed mammals?</td>
<td>ESA, GRR, ACP, critical habitat, monitoring programs, stranding network</td>
<td>Limited knowledge on long term effects, cumulative effects, movements</td>
<td>acute and chronic effects, stranding rates, NGO differences, was protection sufficient, effectiveness of rehab,</td>
<td>acute and chronic effects, stranding rates, was protection sufficient, effectiveness of rehab,</td>
<td>There is a plan available with conservation measures in place to avoid impacts to these species. (For example...). However, this is a plan that is available for your review at... You can also contact NMFS @ 800- or through the Dolphin and Whale 911 APP.</td>
<td></td>
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<td>----------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How can we get samples for our research?</td>
<td>MAC. Save the Manatee</td>
<td>Wildlife hotlines, online reporting, FWC APP, Unified command</td>
<td>Coordination, follow-up, capacity of response, methods for volunteer or donating,</td>
<td>Coordination between sources, veracity of information, assuptions learned, after action briefings, public perspective</td>
<td>The US will coordinate access.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How do we report the presence of oil and oiled wildlife? (e.g. Citizen science, crowdsourcing)</td>
<td>public; natural resource trustees; bird lovers</td>
<td>Wildlife hotlines, online reporting, FWC APP, Unified command</td>
<td>Coordination, follow-up, capacity of response, methods for volunteer or donating,</td>
<td>Coordination between sources, veracity of information, assuptions learned, after action briefings, public perspective</td>
<td>DEP has been doing water quality monitoring for... They will continue to monitoring throughout the spill and beyond.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What about the plankton? Is this oil adding to the bay's nutrient problem?</td>
<td>plants/invertebrates</td>
<td>Wildlife hotlines, online reporting, FWC APP, Unified command</td>
<td>Coordination, follow-up, capacity of response, methods for volunteer or donating,</td>
<td>Coordination between sources, veracity of information, assuptions learned, after action briefings, public perspective</td>
<td>DEP has been doing water quality monitoring for... They will continue to monitoring throughout the spill and beyond.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What about recreational opportunities?</td>
<td>industry groups, tourism councils, travel industry</td>
<td>Wildlife hotlines, online reporting, FWC APP, Unified command</td>
<td>Coordination, follow-up, capacity of response, methods for volunteer or donating,</td>
<td>Coordination between sources, veracity of information, assuptions learned, after action briefings, public perspective</td>
<td>We will provide them with information on where to recreate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the plan for protecting sea turtles?</td>
<td>ESL, GRR, ACP, critical habitat, monitoring programs, stranding network</td>
<td>Limited knowledge on long term effects, cumulative effects, movements</td>
<td>acute and chronic effects, stranding rates, NGO differences, was protection sufficient, effectiveness of rehab,</td>
<td>acute and chronic effects, stranding rates, was protection sufficient, effectiveness of rehab,</td>
<td>There is a plan available with conservation measures in place to avoid impacts to these species. (For example...). However, this is a plan that is available for your review at... You can also contact NMFS @ 800-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do we have the facilities to process the samples?</td>
<td>other</td>
<td>ESL, GRR, ACP, critical habitat, monitoring programs, stranding network</td>
<td>Limited knowledge on long term effects, cumulative effects, movements</td>
<td>acute and chronic effects, stranding rates, NGO differences, was protection sufficient, effectiveness of rehab,</td>
<td>There is a plan available with conservation measures in place to avoid impacts to these species. (For example...). However, this is a plan that is available for your review at... You can also contact NMFS @ 800-</td>
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</table>

<p>| Group C: Page 2 |
|----------------------------------------------|-----------------|-------------------------------------|---------------------------------|-------------------|---------------------------------|-----------------------------------------------|----------------------------------|
| Is it safe to be on the beach?              | human health    | both                                | Is it safe?                     | Dependent on active cleanup or response operations; Respect beach closure signs. Limited risk. Yes safe unless there are sightings. Sightings of fresh oil. | Which beaches are impacted? | Some studies suggest there is higher risk. Ingestion is risk. | Add preambles to maps of open/closure of beaches (including last sightings of oil); daily SCAT data; note the alternative beaches to go to. Outreach and guidance documents daily. Local media. State of Fl has already in place a communication on beach status. Media/news stations could be incorporated (just like school closures) to announce status of beaches. Environmental and public health authorities and USCG (boots on the ground) daily updates and push out to media; both physical status of spill as well as public health concerns. Guidance document (oil hazards) for oil-impacted beaches: stranded oil, tarballs, DDO oil, or cleanup activity. |
| Are tarballs dangerous/hazardous?           |                 |                                     |                                 |                   |                                 |                                               |                                  |
| Are dispersants dangerous?                  |                 |                                     |                                 |                   |                                 |                                               |                                  |
| Is it safe to be in the water/swim/recreate? | human health    |                                     |                                 |                   |                                 |                                               |                                  |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the human health effects of oil, dispersed oil, dispersant, in situ burn/smoke?</td>
<td>Legitimate concerns if you are in the area of any of these operations. Acute, chronic, cancer, non-cancer effects. There is large amount of oil components that we do not have adequate toxicology data or mixtures. Thresholds of effects. Which oil chemicals to include in risk analysis. Disagreement on toxicology. Vulnerable populations can be identified. There are vulnerable populations. Risk assessments can be improved. Regional risk assessments can be performed. Primary concern and response to the spill is to keep the public informed and safe. The public should not be exposed (see Q2 response). However, some high concentrations of some components of oil can be hazardous. If you are affected remove yourself from the situation, get to well ventilated area, and see local physician should potential health effects. At this time, current monitoring indicates that the public will not be exposed to harmful concentrations of oil, smoke, or dispersants.</td>
</tr>
<tr>
<td>Is there a greater health risk for subsistence fishers?</td>
<td>Subsistence fishing communities consume significantly more seafood than general population which increases exposure. Subsistence fishing communities consume significantly more seafood than general population which increases exposure.</td>
</tr>
<tr>
<td>What is the impact on our community’s mental health?</td>
<td>The species most impacted by DWH was human (depression, abuse, drug and alcohol abuse, recidivism) caused by income lost. Oil spills and economic impact have negative effects on mental health and community resilience. How much of an impact and how long it will persist? Where do I go and who can help me? How long will it take for fisheries to reopen? Monitoring results may take time. Mental and health trends are knowable (i.e., baseline) (NIH study) Primary concern and response to the spill is to keep the public informed and safe. Worry about ecological and economic impacts can be very stressful and impact mental health please refer to appropriate resources/phone number.</td>
</tr>
<tr>
<td>How can I report my health issues?</td>
<td>Contact points for reporting for concerns and issues could be established (i.e., emergency room, hospital, poison control). Workers have another reporting structure. This is not normally rolled into response structures. Not responsibility of UC except for workers Who is responsible for this data? Who is to contact? See above Q8.</td>
</tr>
<tr>
<td>When dispersants are used is seafood (fish and shellfish) safe to eat?</td>
<td>Yes. After the area is opened by health authorities. Some species may take longer to be safe for consumption. Yes. After the area is opened by health authorities. Some species may take longer to be safe for consumption. How long will it take for fishery to reopen? Monitoring results may take time. Some may link sublethal effects in fish to unsafe seafood for humans Toxicity of DDO and where dispersants were applied to unsafe seafood for humans Primary concern and response to the spill is to keep the public informed and safe. Fisheries are extensively tested before they are reopened for fishing, so seafood is safe for consumption. If no closure...Do not catch or eat fish from a visibly oil-impacted area.</td>
</tr>
<tr>
<td>Is there somebody who can help us?</td>
<td>Yes. Point of contacts (for seafood safety and public health) will be identified. Key is external validation of regulatory source. Yes. Point of contacts (for seafood safety and public health) will be identified. Key is external validation of regulatory source. The level of trust the public. Who is trustworthy and why? Who is trustworthy and why? Most effective information came from ordinary/fisherman, etc. State that the collaborating response agencies have implemented a response plan to protect the public. Primary concern and response of all of the agencies into keep the public informed and safe. The responders and workers (and their families) are also impacted. We will continue to provide you with up-to-date, reliable, accurate information on the state of the spill as well as public health impacts.</td>
</tr>
<tr>
<td>Is there anybody we can trust?</td>
<td>Yes. Point of contacts (for seafood safety and public health) will be identified. Key is external validation of regulatory source. Yes. Point of contacts (for seafood safety and public health) will be identified. Key is external validation of regulatory source. The level of trust the public. Who is trustworthy and why? Who is trustworthy and why? Most effective information came from ordinary/fisherman, etc. State that the collaborating response agencies have implemented a response plan to protect the public. Primary concern and response of all of the agencies into keep the public informed and safe. The responders and workers (and their families) are also impacted. We will continue to provide you with up-to-date, reliable, accurate information on the state of the spill as well as public health impacts.</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Where can we go for the next up to date information?</td>
<td>other</td>
</tr>
<tr>
<td>How do we address conflicting objectives for communications?</td>
<td>other</td>
</tr>
<tr>
<td>How do we address conflicting images?</td>
<td>Nomenclatures; “state of disaster”; i.e., Louisiana may be more familiar with oil, hence more resilient.</td>
</tr>
<tr>
<td>Will the affected community be resilient? We are not LA, where their</td>
<td>other</td>
</tr>
<tr>
<td>“Once it is over, it’s not really over” The spill keeps coming back in</td>
<td>“ex: competing future interests/information; cleaned, recovered birds have ceremony releases”</td>
</tr>
<tr>
<td>the news years later so the impact on tourism continues.</td>
<td></td>
</tr>
<tr>
<td>How can we get samples for our public health research?</td>
<td>academics, scientists</td>
</tr>
<tr>
<td>Do I have to change my wedding plans?</td>
<td>other</td>
</tr>
<tr>
<td>Who is responsible for covering losses (industry loss, employment loss)</td>
<td>other/economic</td>
</tr>
<tr>
<td>How do I make claims/get reimbursed for expenses?</td>
<td>other/economic</td>
</tr>
<tr>
<td>Will I have to be evacuated? What can I take with me? How long will I</td>
<td>other/operations</td>
</tr>
<tr>
<td>be gone? Do I have to evacuate? What should I take with me?</td>
<td>No. It is very rare that evacuation would be done in response to oil spills (air monitoring). Evacuations are not ordered unless there is a life-threatening situation.</td>
</tr>
<tr>
<td>Should voluntary evacuations take place? Whether mandatory or voluntary evacuations should be considered.</td>
<td>Should voluntary evacuations take place? Whether mandatory or voluntary evacuations should be considered.</td>
</tr>
<tr>
<td>Where the oil and odor may be present. Areas of impact.</td>
<td>Where the oil and odor may be present. Areas of impact.</td>
</tr>
<tr>
<td>It is extremely unlikely that you will be asked to evacuate from an oil spill. Should a public health emergency arise requiring evacuation, local county EMA authorities will announce an evacuation notice. Including houseboats in marinas? Is it a local authority for houseboats?</td>
<td>It is extremely unlikely that you will be asked to evacuate from an oil spill. Should a public health emergency arise requiring evacuation, local county EMA authorities will announce an evacuation notice. Including houseboats in marinas? Is it a local authority for houseboats?</td>
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<tr>
<td>Question</td>
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</tr>
<tr>
<td>Will Charter boats be able to operate? Will I be able to do recreational fishing, local and visitors), heritage (families returning to same spot to fish for generations) fishing/oystering?</td>
<td>recreation</td>
</tr>
<tr>
<td>How do I clean my boat? What should I do? How do I clean it?</td>
<td>recreation</td>
</tr>
<tr>
<td>What information should be given to local tourists from neighboring counties?</td>
<td>tourism</td>
</tr>
<tr>
<td>Will cruise ships be diverted/will ports be closed to traffic?</td>
<td>tourism</td>
</tr>
<tr>
<td>How do we communicate to different tourist types who have different communication needs?</td>
<td>tourism</td>
</tr>
<tr>
<td>What is this going to do to tourism? How do we keep them coming while this process is going on?</td>
<td>tourism</td>
</tr>
<tr>
<td>Where do we send people who want to volunteer? (e.g., for training, for supervision, for coordination)</td>
<td>volunteer</td>
</tr>
<tr>
<td>Where do I go to get training? (for shoreline cleanup, cleaning birds, etc.)</td>
<td>Volunteer</td>
</tr>
<tr>
<td>How can I help/volunteer?</td>
<td>volunteer</td>
</tr>
</tbody>
</table>

May need a different message because they understand the geography/location. This is cheaper messaging. Different counties in same state should not compete against each other.

Foreign vs Floridians, language barriers; are there different press releases?

3 days to train volunteers; how to build a network; where do I go to get training? Include an email to ask additional questions.

Unified command needs to stay ahead of the information. Get ahead of the volunteers; must have a place to direct them as soon as possible.

Volunteers (planned and spontaneous)
Appendix E: Training Agenda
NOAA’s Regional Preparedness Training (NRPT)
Addressing Public Concerns during Spill Response... sorting fact from fiction during response

June 30, 2016
Florida Fish and Wildlife Research Institute
St. Petersburg, FL

TRAINING AGENDA

8:45 am   Registration

9:00 am   Welcome and Introductions

   CRRC - Nancy Kinner  
   NOAA DRC - Charlie Henry  
   FWRI - Kathleen O’Keife

9:15 am   Background and Training Goals

   Nancy Kinner

9:30 am   Risk Communication – State-of-Science

   Ann Hayward Walker, SEA Consulting (via WebEx)  
   Monica Wilson, SeaGrant

10:45 am   Break

11:00 am   Social Media – Elodie Fichet, University of Washington, Dept. of Communication (via WebEx)

12:00 pm   Lunch (on your own)

1:30 pm   Risk Communication – An Agency Perspective

   NOAA PIO – Keeley Belva  
   State of Florida EMA Communications – Aaron Gallaher  
   Florida Department of Environmental Protection – Shannon N. Herbon  
   U.S. Coast Guard - LT John Fitzgerald

2:30 pm   Break

2:45 pm   Risk Communication During DWH: Reflections of Responders

   David M. Kennedy, NOAA (via WebEx)  
   James McPherson, FEMA, (USCG, retired) (via WebEx)  
   Tom Brosnan, NOAA ORR ARD, Communications Branch (via WebEx)

3:15 pm   Overall Discussion

4:00 pm   Adjourn
Appendix F: Training Presentation Slides
WELCOME

NOAA’s Regional Preparedness Training:

Risk Communication During Oil Spills

June 30, 2016
Florida Fish & Wildlife Research Institute

NOAA’s Regional Preparedness Training:

Risk Communication During Oil Spills

Nancy E. Kinner
Coastal Response Research Center

June 30, 2016
Florida Fish & Wildlife Research Institute
Logistics

- Fire Exits
- Restrooms
- Cell Phones/Email: “Let It Go”
- Breaks (coffee, tea, soda, water, snacks)
- Lunch: On your own, in packet
- 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 – Mark Miller
Overall CRRC Mission

- Conduct and oversee basic and applied research and outreach on spill response and restoration
- Transform research results into practice
- Serve as hub for oil spill R&D
- Facilitate workshops bringing together ALL STAKEHOLDERS to discuss spill issues and concerns

NRPT Workshop

THANK YOU
Participants and Speakers!
Part 1: Tuesday and Wednesday Workshop: 
Addressing Public Concerns During Spill Response... Sorting Fact from Fiction

Part 2: Thursday Training: 
Risk Communication During Oil Spills

Meeting Objectives

• Understand and communicate with public about their concerns (e.g., dispersant use, seafood safety, fisheries impacts, public health, tourism, volunteers)
  • Knowns, uncertainties, disagreements
• State-of-science and practice for risk communication during oil spills
Meeting Objectives

• Understand and communicate with public about their concerns (e.g., dispersant use, seafood safety, fisheries impacts, public health, tourism, volunteers)
  • Knowns, uncertainties, disagreements
  • **State-of-science and practice for risk communication during oil spills**

Meeting Products

• Copies of All Slide Presentations
• Workshop Report
• All Posted on CRRC Website
## Training Agenda

### 9:00 am
Welcome and Introductions
- CRCC - Nancy Kinner
- NOAA DRC - Charlie Henry
- FWRI - Kathleen O’Keefe

### 9:15 am
Background and Training Goals
- Nancy Kinner

### 9:30 am
Risk Communication – State-of-Science
- Ann Hayward Walker, SEA Consulting (via WebEx)
- Monica Wilson, SeaGrant

### 10:45 am
**Break**

### 11:00 am
Social Media – Elodie Fichet, University of Washington, Dept. of Communication (via WebEx)

### 12:00 pm
*Lunch (on your own)*

## Training Agenda

### 1:30 pm
Risk Communication – An Agency Perspective
- NOAA PIO – Keeley Belva
- State of Florida EMA Communications – Aaron Gallagher
- Florida Department of Environmental Protection – Shannon N. Herbon
- U.S. Coast Guard - LT John Fitzgerald

### 2:30 pm
**Break**

### 2:45 pm
Risk Communication During DWH: Reflections of Responders
- David M. Kennedy, NOAA (via WebEx)
- James McPherson, FEMA, (USCG, retired) (via WebEx)
- Tom Brosnan, NOAA ORR ARD, Communications Branch (via WebEx)

### 3:15 pm
Overall Discussion

### 4:00 pm
*Adjourn*
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
Charlie Henry
NOAA GOM Disaster Response Center

Kathleen O’Keife
Florida Fish and Wildlife Conservation Commission
Participant Introductions

Name
Affiliation
Job
Reason for Participating in Workshop

Training Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</table>
Risk Communications
State of Science

NOAA’s Regional Preparedness Training
Addressing Public Concerns during Spill Response... sorting fact from fiction
June 30, 2016

Ann Hayward Walker
ahwalker@seaconsulting.com
SEA Consulting Group • Cape Charles, VA
Aims of oil spill risk communications?

• Mitigate risks, and perceptions about risk, from oil spills and response actions?
• Improve public understanding?
• Increase stakeholder acceptance of the success of response actions?
• Help speed recovery from the spill -
  • Ecological dimensions?
  • Human dimensions?
Risk Communications

Integral component of risk analysis, assessment and management

Much more than “outreach” (get the message out)

(Graphic source – Risk Management: Guideline for Decision Makers, Canadian Standards Association, 1997)
This Presentation

- Risk perceptions
- Risk communications
- Stakeholders
- Related issues
- Oil spill risk communications
- Incident-specific risk communications
- Starting assumption: *We can do better, so we should*
Risk Perceptions

• Subjective judgments of probable harm or loss
• How something is regarded, understood, or interpreted
• Derived from what people hear, know, or experience
• Behavior depends on risk perceptions.
• Expertise and information can have large effects on risk perceptions
Experience: risk perceptions about exposure pathways

The tidal range in SE Louisiana is about 6 inches - essentially no difference between low and high tide.

Storm surges of any magnitude are a cause of concern in Louisiana.

Following Hurricane Katrina, hazardous substances came into some yards with the storm surge.
State of Scientific Research related to Risk Communications

• Sciences that study people
  • Since the 1950s
  • Cognitive psychology, environmental sociology, behavioral science, decision science and disaster science

• CDC and FDA have considerable experience with risk communications during a crisis, e.g., food contamination, Ebola and Zika risks

• A noteworthy finding:
  • Lay person contemplation of risk is much richer than that of experts and reflects legitimate concerns that are typically omitted
Risk Perceptions are “drivers”

- Influence judgments, opinions, fears, beliefs, and decisions
- They drive stakeholder questions, concerns, and gaps
- Stakeholders listen to those they trust and consider credible
  - Often those with whom they have an existing relationship
### Oil Spill Stakeholders

**Think about their role in preparedness and response**

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decision makers</strong></td>
<td>Formal governmental authorities (international, national, regional, state, local, parish) – <strong>Unified Command</strong>&lt;br&gt;Spiller (private or public)&lt;br&gt;Compensation providers</td>
</tr>
<tr>
<td><strong>Knowledge sources and advisors</strong></td>
<td>Oil spill practitioners and technical specialists (government and industry)&lt;br&gt;Resource managers&lt;br&gt;Energy and marine operators&lt;br&gt;Academic researchers&lt;br&gt;Public health agencies&lt;br&gt;Others with traditional knowledge (i.e., fishers and marine pilots)</td>
</tr>
<tr>
<td><strong>Stakeholders affected by decisions</strong></td>
<td>Local communities&lt;br&gt;Fishers and seafood industry&lt;br&gt;Tourist industry&lt;br&gt;Other businesses in the spill area&lt;br&gt;Oiled property owners&lt;br&gt;Designated resource managers&lt;br&gt;Energy/oil, marine, and shipping industries</td>
</tr>
<tr>
<td><strong>Communicators, influencers, and opinion leaders</strong></td>
<td>Media (print, broadcast, and electronic)&lt;br&gt;Elected officials and community leaders&lt;br&gt;Academia&lt;br&gt;Non-governmental Organizations (NGOs)&lt;br&gt;Community health workers&lt;br&gt;Social media bloggers/communicators</td>
</tr>
</tbody>
</table>
Risk and Affected Stakeholders

• Lack of clarity around controversial issues can lead to higher perceptions of risk and feelings of outrage by stakeholders
Risk Communications

• Interactions that **respect** the perceptions of the information recipients, intended to help people make more informed decisions about threats to their health and safety (National Research Council).

• Interactive process among stakeholders concerning a risk or potential risk to human health or the environment (Ropeik).

• Supply lay people with the information they need to make informed, independent judgments about risks to health, safety and the environment (Morgan et al).

*Multiple Approaches to Risk Communication - Various perspectives about messages, conflict management, decision making*
Different Communications

Risk Communications

- Exchange of information about the nature of risk and risk management options
- Essential to manage potential risks
- Effective communication products
  - Take into account recipients’ existing beliefs, including perceptions about risks
  - Address recipient decisions/judgments (opinions)

Crisis Communications

- More message driven
- Use media to influence public beliefs, opinions, and judgments
  - Regain control of the situation and conversation
  - Minimize impact on operations and target audiences
  - Minimize time spent on crisis
- Rapid response communications from external/public affairs
1990s Oil Spill and Dispersant Risk Communication Research

- Ecological Issues in Dispersant Use: Decision Makers’ Perceptions and Information Needs
  - Mental models approach of risk communication
- Prior scientific information had not been communicated to meet decision makers’ needs, e.g., information gaps
  - Different mental models about oil spills in general before adding dispersants
Mental Models
An expert-informed risk communication approach
(Granger, Fischhoff, Bostrom, & Atman 2002)

• A mental model is someone's understanding of how something works in the real world

• Includes ideas people have about identifying a risk, exposure to risk, effects of exposure, how to mitigate the risk, and how risk unfolds over time

• Key to this approach: transdisciplinary science-informed decision model developed by experts
  • Decision makers are not necessarily experts
  • Multiple decision makers – multiple ways to understand

• Lay people may have an incomplete / inaccurate understanding
  • Address identified information gaps in risk communication materials
Findings from 1990s Project

- Seven topics identified to improve decision maker understanding
- Addressed in 3 booklets prepared using risk communicating principles

1. Fate and transport of oil in marine waters,
2. Dispersibility of oil in marine waters,
3. Links between fate and transport and exposure and effects processes,
4. Acute and chronic effects of exposure in the upper water column with and without use of dispersants,
5. Biodegradation, Evaporation, Photo-oxidation of oil,
6. Logistics, and
7. Monitoring
Recent Oil Spill Risk Communication Research (2013-14)

• Response Risk Communication Tools for Dispersants and Oil Spills; a Dispersants Initiative grant from UNH Coastal Response Research Center with funding from NOAA.

• Project tasks:
  • National Public Survey
  • Social Media/Twitter Analysis
  • White Papers and Peer Review Workshop

• Outputs: [http://crrc.unh.edu/center-funded-projects](http://crrc.unh.edu/center-funded-projects)
  • Report, Guidance Tools (training module), and 5 published papers
Related Issues

- **Disasters** - A situation resulting from an environmental or technological phenomenon that produces physical damage, stress, personal injury, and economic disruption of great magnitude; on a scale that the stricken community needs extraordinary efforts to cope with it.

- **Human dimensions impacts** are all impacts that are not ecological; include health, social, economic, health, institutional, and cultural impacts following a disaster
  - Occur on a wide range of entities at multiple scales, including individuals, families, businesses, communities, institutions, and government.

Ref: Webler et al, 2010 [http://seri-us.org/content/human-dimensions-guidance-for-planners](http://seri-us.org/content/human-dimensions-guidance-for-planners)
Community Resilience

- Capacity of a group of people to cope with a serious event that impacts them but they did not cause, and is managed by outside entities like government, insurance, and experts.

- Key component - community adaptive capacity, e.g., transfer of resources and knowledge from the response organization to the community.

- Encourages collaboration with oil spill experts as a necessary component of adaptive resilience.
  
  - That is, develop oil spill literacy

Mistakes with stakeholders

• Inadequate accessibility
• Lack of understandability
• Problems with timing – too little, too late
• Impersonal, detached interactions
• Perceptions of arrogance, e.g.,
  • Disbelief that lay people can grasp and understand complex technical information
  • Tendency to lecture; ask questions instead to help them discover answers
Adapt/update planning for real-time implementation

Incident-specific Risk Communications
Politics – can we “get ahead?”

• Large or politicized oil spills involving dispersant use, benefit from collaborative decision making that moves beyond message mapping (Tierney, 2009)

• Collaborative decision-making involves both horizontal and vertical integration

• Critical strategic decisions can fall to elected or appointed leaders who are outside the ICS.

• ICS has its limitations when events become politicized (Buck et al., 2006).
Incident Information Cycle

1. **Incident Management Objectives**
   - Identify stakeholder questions and concerns

2. **Incident Management Objectives**
   - Expert/scientific input

3. **Coordinate with Trusted Sources**
   - Develop deliverables for stakeholders

4. **Develop deliverables for stakeholders**
   - Deliver information to stakeholders

5. **Deliver information to stakeholders**
   - Evaluated and update information

6. **Evaluated and update information**
   - Situation Update

7. **Situation Update**
   - Training – Risk Communications During Oil Spills
For risk communication to be effective ...

• Collaborate through trusted networks, e.g., Sea Grant, community health workers
• Engage in active listening and dialogue, e.g., social media
• Assess risk perceptions, risk situation
• Develop information to address unfamiliar issues, identified concerns, and stakeholder questions
  • Apply risk communication principles
• Review information and media messages pre- and post-release to confirm intended understanding
  • Risk communications and social media supplement, not replace, traditional media
ICS Risk Communications*

USCG 2014 Incident Management Handbook (IMH) now includes risk communications responsibilities
https://homeport.uscg.mil/mycg/portal/ep/browse.do?channelId=17668&channelPage=%2Fep%2Fchannel%2Fdefault.jsp&pageTypeId=11328

* Walker-proposed example: Incident management structure varies with the incident. TASC assesses situation to integrate knowledge for incident-specific risk communications, coordinating with functions highlighted in blue.
This is a page from FEMA’s 2009 IMH. FEMA published an Incident Action Planning Guide in 2012, which would be used during declared disasters. https://www.fema.gov/media-library/assets/documents/25028
FEMA Guide: Core Capabilities by Mission Area

When a disaster is declared by the President or a Governor, agencies and private sector responders will provide a capability according to assignments in an incident action plan.
Open Houses = “World Café”

*Used during DHW in LA*

- Large group method to educate on issues
- Encourages conversations
- Increase participant knowledge and understanding
- Focus on common ground, rather than differences,
- Promotes flat hierarchy
- Allows for conflict to be managed
- Limited scale

Ref: Fullerton and Palermo, 2008
Organizing Social Media and Community Engagement – An Example

Related Guidance

• Pre-spill information papers (not “fact sheets”!) using risk communication principles
• Inspire trust – proactively express empathy, show competence, encourage feedback, commit to engagement
• Explain organizational procedures – mission, tools, expected outcomes
• Pay attention to the organizational process – involve the affected community in determining recommendations
• Promise only what can be delivered, and follow through
• Good one-on-one interactions build relationships and trust, both pre-spill and during the incident
Top area needing improvement

(In my opinion)

- Inter-related ecological and human dimension problems:
  - Emergency fishery management + seafood safety
  - Impacts on renewable resource communities
- Shortfalls: Absence of stakeholder involvement in the process → poor risk communications
- Well documented in environmental sociology, public health, and behavioral health literature
  - Tendency to dismiss, leave resolution of human dimensions problems to claims or lawsuits, and to omit incident management team in the process
We can do better, but we’ll need to think differently.
Sea Grant’s role in communication during Deepwater Horizon

Monica Wilson, Florida Sea Grant

NOAA Regional Preparedness Training Workshop
June 28 – 30, 2016

What is Sea Grant?

• Primary support is from NOAA
• University-based program
• Network with presence in every coastal state
• Four focus areas

gulfseagrant.org/oilspilloutreach
Sea Grant Programs in our Gulf

Science-based
Non-advocacy
Embedded in and serve coastal communities
Regional team focused on oil spill science

gulfseagrant.org/oilspilloutreach

Short Term Commitment
summer/fall of 2010

gulfseagrant.org/oilspilloutreach
Sample of Sea Grant Oil Spill Related Activities

- Three areas of emphasis
  - Research
  - Services
  - Funding
  - Education
  - Extension
- Four Gulf of Mexico Sea Grant Programs
- More than 40 year history serving the region
- Service-oriented

Oil Spill-Related Extension Work

- Alaska Sea Grant
- Seafood working groups
- Host public forums
Oil Spill-Related Extension Work

- Peer listening trainings
- Engage with fishing communities
- Hazmat training workshop
- Meetings, workshops, trainings
  - More than 83 events
  - At least 6,400 participants
- Incident Command

Regional Website (gulfseagrant.org)
DWH Research and Monitoring Clearinghouse

- Activities listed regardless of funding source
- Self reported activities
- NOAA NCDDC and Sea Grant led
- 203 activities
  - 94 monitoring activities
  - 181 research activities
  - 40 restoration activities

More than 5,700 unique visitors; 70 countries
Long Term Commitment

Gulf of Mexico Research Initiative

$500 million, 10-year investment

Goal - Improve society’s ability to understand, respond to, and mitigate the effects of petroleum pollution and related stressors

Focus areas:
1. How do oil and dispersants move around the environment?
2. How do oil and dispersants break down over time?
3. How do oil and dispersants impact the environment?
4. How can technology be improved?
5. How do oil spills impact people?

Learn more at gulfresearchinitiative.org
GoMRI Scientific Production

As of June 2016:

• 729 scientific peer-reviewed publications
• 2,869 scientific presentations and posters
• 3,341 people: 1,466 Scientists, 286 Post Docs, >1,000 graduate students

Photo credits from GoMRI website: Markus Huettel, Kim Nightingale

gulfseagrant.org/oilspilloutreach

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
Oil Spill Science – Outreach Team

Our Target Audiences

- Elected officials
- Emergency responders/managers
- Environmental non-profit staff
- Fishing industry, commercial
- Fishing industry, for-hire
- Fishing industry, recreational
- Natural resource managers
- Port and harbor employees
- Public health officials
- Tourism industry
- GoMRI outreach specialists
- University/college researchers

gulfseagrant.org/oilspilloutreach
Summary Report

Oil Spill Science – Outreach products

Sharing peer-reviewed, published science

- Science outreach publications
  - Focused on science topics identified by our audiences

- Fisheries management
- Seafood testing
- Series about dispersants
- Frequently asked questions
- Oil on our beaches
- Fish health
- Impacts on fisheries
Oil Spill Science – Outreach products

Sharing peer-reviewed, published science

- Science seminars & input sessions
  - Presentations by experts
  - Continue to identify needs of coastal audiences

As of today...

- Delivered 75 presentations
- Produced 10 outreach publications
- Organized 11 science seminars
Thank you

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gulfseagrant.org/oilspilloutreach
Social Media Use During Crisis Events

Relationship status: “It’s complicated”

Elodie Fichet, Ph.C.
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Agenda + Takeaways

- The omnipresence of social media and how it affects crisis communications

- **Study 1:**
  “Social Media is Free Like a Free Puppy”

- **Study 2:**
  Public Participation During the 2010 Deepwater Horizon Oil Spill

- **Study 3:**
  “Keeping Up with the Tweet-Dashians: The impact of ‘Official’ Sources on Online Rumoring During Crisis Events”
Social Media
Affordances & Challenges

- 71% of online adults use Facebook, 23% use Twitter (Pew)
- American adults see the Internet as go-to source for reliable news
- The Public has more control than ever before
- Multi-dimensional communications at light-speed
- Fast and effective but creates issues with accuracy
- Not only nationally but worldwide

... So social media can be, an “instigator,” an “accelerant” and an “extinguisher”
(Crystal DeGoede of BurrellesLuce, 2013)
“Social Media is Free Like a Free Puppy”

Broad Findings

Main Hurdles to Social Media Implementation

Organizational Hurdles

- Delay in management buy-in

  - Lack of understanding
  - Lack of financial resources
  - Lack of time and commitment
  - Need for trust

Technology-Related Hurdles

- Technology and its use

  - Lack of social media skills/knowledge
  - Mismatch between the tools and governmental use
    (Social media policies)
“We all have to understand that there will never again be a major event in this country that won’t involve public participation. And the public participation will happen whether it’s managed or not.”

- Admiral Thad Allen
Public Participation during the 2010 Deepwater Horizon Oil Spill
@Surfrider: This is what an oil-soaked ocean wave looks like
@LocalTweeter: @BP_America I wanna kno what #BP is gonna do for my Daughter age 4 if shes sick b/c of your use of #Corexit in #oilspill #Toxic #blacktide
@NWF: video scenes of #oilspill floating into wetlands, aerial spraying of dispersant chemicals
http://bit.ly/b1rBE0
@OceanDog (July 1, 2010): Oiled brown pelican-La. #oilspill http://twitpic.com/21hs3i

@WhoDat35 (June 13, 2010): Huge globs of oil mixed in w/dispersant (red) on Ala. Beaches #oilspill #oceans http://twitpic.com/lwmht4

@CarmenSisson (July 13, 2010): Spent the evening exploring Biloxi to Waveland. Lots of BP workers on the beach at 9 p.m. using work lamps in Long Beach. #oilspill #response
@blackgoldnews (June 15, 2010): #oilspill #bp MSDS information for Dispersants Corexit 9500 and 9527
http://url4.eu/4X18B
Network of #OilSpill retweets: A multi-faceted conversation

Green = locals, NGOs, media, “Core” conversation
Blue = media, celebrities, Unified Command, BP
Purple = media, activists
Red = political blogosphere
Oil Spill 2010
@Oil_Spill_2010

 Joined May 2010

Tweet to Oil Spill 2010

TWEETS  FOLLOWING  FOLLOWERS
3            2            130

Oil Spill 2010 @Oil_Spill_2010 · 8 Oct 2010
If cars ran on stupid ideas, this wouldn't happen.

Will there be an @Oil_Spill_2011 next year?" Yes. (http://bit.ly/dsRxWA)
KEEPING UP WITH THE TWEET-DASHIANS: The Impact of ‘Official’ Accounts on Online Rumoring

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Kate Starbird
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@katestarbird
Social Media used for receiving and sharing news

Looking at rumor during crisis event

Twitter increasingly adopted for official use
“Official Accounts”

1. Government Officials
2. Mainstream Media
3. Companies/Organizations
4. Breaking News

1. AFP National Media
   - AFP Media
   - Latest news updates from the Australian Federal Police. This is an official AFP account. DO NOT REPORT CRIME HERE.
   - Australia
   -AFP.gov.au

2. Sky News Australia
   - @SkyNewsAust
   - Sky News is Australia's 24/7 news channel, bringing you the latest news as it happens. Facebook goo.gl/b9InU | Ch 601 on Foxtel
   - Sydney, Australia
   - skynews.com.au

3. WestJet
   - @WestJet
   - Welcome to the official WestJet Twitter account! We’re online from 9 a.m. to 5 p.m. MT on business days and from 10 a.m. to 4 p.m. MT on weekends.
   - Calgary, Alberta
   - westjet.com

4. PzFeed Top News
   - @pzfeednews
   - A global news channel bringing you the latest news as it happens and the most talked about stories, pictures and videos from around the world.
   - PzFeedTopNews@gmail.com
   - pzfeed.com
How do these “official” channels impact the propagation and correction of crisis-related rumors on Twitter?
Informal Communication During Crisis Events

- Speed
- Multidimensional Communication
- ‘Being First’
- Little Fact-Checking
Background

Rumoring as Collective Sensemaking

Natural Reaction

True or False or in Between

‘Fog of War’

Fill the Void
BACKGROUND

The Role of Official Sources

Authenticate, propagate & correct

Intensified pressure on Official Sources to keep up
METHODS

Event Identification
Event Collection
Rumor identification
Manual coding of rumors
<table>
<thead>
<tr>
<th>CODE</th>
<th>EXAMPLE TWEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affirm</td>
<td>Breaking: West Jet Flight WA2154 sends “hijack signal” in-flight over Mexico; flight departed Vancouver for Puerto Vallarta</td>
</tr>
<tr>
<td>Deny</td>
<td>lol exasperation after news of a hijacked plane … that turned out to be wrong</td>
</tr>
<tr>
<td>Neutral</td>
<td>@Aviator pls advise. Which means hijack? 00000 or 7500?</td>
</tr>
<tr>
<td>Uncodable</td>
<td>Compagnia West Jet volo #WS2154 nega che abbia mandato segnale di dirottamento</td>
</tr>
<tr>
<td>Unrelated</td>
<td>Wow @WestJet I almost thought you would not get a flight delayed</td>
</tr>
</tbody>
</table>
CASE STUDIES

Rumored Raids of the Lakemba Neighborhood during the Sydney Siege

Rumored Hijacking of WestJet Flight #2154
Rumored Hijacking of WestJet Flight #2154

Event Background

- Saturday, January 10, 2015
- Flight-tracking website reported WestJet flight 2154 hijacked
- "Squawking" via transponders the standardized code for hijacking, 7500
[4:13pm MT] BREAKING: West Jet #WA2154 is squawking #7500 -- the code for hijacking
Affirm

Denied

Tweets Per Minute

Jan. 10 4:45 PM
Jan. 10 5:15 PM
Jan. 10 5:45 PM

Time (MT)

~425 TPM
Tweets Per Minute

Jan. 10 4:45 PM Jan. 10 5:15 PM Jan. 10 5:45 PM

Time (MT)
@WestJet: Contrary to internet rumour, air traffic control has confirmed #WS2154 is “squawking” standard transponder code, not 7500.
@WestJet: Contrary to internet rumour, air traffic control has confirmed #WS2154 is “squawking” standard transponder code, not 7500.
Actions and Reflections from WestJet
“This event was not part of our crisis plan. We had policy procedure and language written for hijacking but we had NOTHING about rumors.”
“The biggest question for us was “do we respond now with almost confirmed information or wait five minutes to get confirmed info?” We chose, let’s get it out now and then 5 minutes later confirmed.”
Actions and Reflections from WestJet

- Not specifically prepared for a crisis of this kind
- Learning opportunity
- 100 management-approved pre-crafted 'stock-tweets'
- Detailed protocol

“If a Twitter account tweeting about WestJet with more than 100k followers tweets this, then we can say this. If we are the number one trending topic on Twitter in Canada, then we can say that.”
DISCUSSION

Official Sources can...

- Influence rumor as it is occurring (Westjet hijacking)

- Revive conversation and correct misinformation - even after rumor has slowed (Lakemba raids)
Encourage some Twitter users who were involved in rumorizing to correct themselves.

BUT in the absence of ‘official’ sources, the Twittersphere looks elsewhere for information - mainstream media and “breaking news” sources.
DISCUSSION

Breaking News Accounts

- Have a significant impact on the information space
- Mimic legitimacy and appeal to the fast-moving landscape of Twitter
- Attract large audiences
- Tone of factuality and immediacy – even if information is unconfirmed
Emerging Best Practices

“We all have to understand that there will never again be a major event in this country that won’t involve public participation. And the public participation will happen whether it’s managed or not.”

- Admiral Thad Allen
Emerging Best Practices

- Speed, active presence & constant monitoring
- Trust is extremely important
- Position the public as participatory
- Empowerment of multiple employees
- Pre-planned and detailed response protocol
- Can’t control the conversation but you might be able to shape it
The spread of official communication can have a positive effect on the spread of rumors on Twitter.

Further rationale for organizations and emergency management to leverage Twitter.
ACKNOWLEDGMENTS

Students: John Robinson, Ahmer Arif, Jim Maddock, Stephanie Stanek, and others

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WestJet representatives

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Leysia Palen, Ken Anderson and colleagues

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NOAA Perspectives
Presenter: Keeley Belva, NOAA Office of Communications @ NOS
July 2015
Frequent Questions

- NOAA Science
  - Trajectories
  - Marine Mammals/Protected Species
- Fisheries concerns
  - Fishing, Seafood
- Shipping channels

- Volunteers/NGOs
- Dispersants
- Reimbursements
- Beach closures

NOAA’s Communications Role

- NOAA’s Role During a Spill
  - Responding to NOAA topics
  - Identifying Subject Matter Experts
  - How NOAA works within a JIC

- NOAA’s Role Before a Spill
  - Training
  - Working with USCG and other partners
    - Public affairs guides
    - JIC trainings
Proactive vs. Reactive

- **Proactive**
  - Puts us in the driver’s seat
  - Enables us to “frame” the issue, highlight what we think is important
  - Requires us to think ahead, plan, train

- **Reactive**
  - Puts us on the defensive
  - Consumes valuable time, energy
  - Allows others to drive conversation

Questions?
**ESF 14 External Affairs**

- Disseminate information regarding emergencies to the public through the news media.
- Coordinate with local governments to disseminate all disaster-related information to the public through the media and the Florida Emergency Information Line (FEIL).
- Provide clear and consistent direction to citizens before, during and following a disaster.

*Prepared citizens are better equipped to provide for the safety of their families, reduce damage to their homes and recover more quickly from a disaster.*
**THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT**

## ESF 14

**LEAD AGENCY**

<table>
<thead>
<tr>
<th>ESF #</th>
<th>Emergency Support Function</th>
<th>PRIMARY STATE AGENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transportation</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>2</td>
<td>Communications</td>
<td>Department of Management Services, Division of Telecommunications</td>
</tr>
<tr>
<td>3</td>
<td>Public Works &amp; Engineering</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>4</td>
<td>Firefighting</td>
<td>Department of Financial Services, Division of State Fire Marshal</td>
</tr>
<tr>
<td>5</td>
<td>Information &amp; Planning</td>
<td>Division of Emergency Management</td>
</tr>
<tr>
<td>6</td>
<td>Mass Care</td>
<td>Department of Business and Professional Regulations and Department of Children and Families</td>
</tr>
<tr>
<td>7</td>
<td>Resource Management</td>
<td>Department of Management Services, Division of Purchasing</td>
</tr>
<tr>
<td>8</td>
<td>Health and Medical</td>
<td>Department of Health</td>
</tr>
<tr>
<td>9</td>
<td>Search &amp; Rescue</td>
<td>Department of Financial Services, Division of State Fire Marshal</td>
</tr>
<tr>
<td>10</td>
<td>Environmental Protection</td>
<td>Department of Environmental Protection</td>
</tr>
<tr>
<td>11</td>
<td>Food &amp; Water</td>
<td>Department of Agriculture &amp; Consumer Services</td>
</tr>
<tr>
<td>12</td>
<td>Energy</td>
<td>Public Service Commission and Division of Emergency Management</td>
</tr>
<tr>
<td>13</td>
<td>Military Support</td>
<td>Department of Military Affairs, Florida National Guard</td>
</tr>
<tr>
<td>14</td>
<td>External Affairs - Public Information</td>
<td>Executive Office of the Governor, Office of Communications</td>
</tr>
<tr>
<td>15</td>
<td>Volunteers &amp; Donations</td>
<td>Governor's Commission on Volunteerism and Community Service (Volunteer Florida)</td>
</tr>
<tr>
<td>16</td>
<td>Law Enforcement &amp; Security</td>
<td>Department of Law Enforcement</td>
</tr>
<tr>
<td>17</td>
<td>Animal and Agricultural Issues</td>
<td>Department of Agriculture &amp; Consumer Services</td>
</tr>
<tr>
<td>18</td>
<td>Business, Industry, and Economic Stabilization</td>
<td>Department of Economic Opportunity</td>
</tr>
</tbody>
</table>

**THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT**
Governor is **Statutorily** Responsible
- Statute 252

Ensures Continuity of Message
- Governor is setting the tone

Perspective of the Administration
- Everyday role is Governor’s messaging

Cuts Through the Clutter
- *Can you hear me now?*
THERE’S A PROCESS IN PLACE

THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT

CEMP

THE STATE OF FLORIDA
2014
COMPREHENSIVE EMERGENCY MANAGEMENT PLAN

THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT
THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT

THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT

CEMP

THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT

THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT

BATTLE RHYTHM

0830 SEOC Morning Briefing
0930 Morning Media Update
1115 NHC / County Conference Call
1200 Press Conference (if needed)
1230 FEMA VTC with Affected States
1330 Mid-Day “Sit Rep” Media Update
1430 IAP Briefing
1715 NHC / County Conference Call
1800 Press Conference
1800 SEOC Evening Briefing (Adjusted if press conference)
1845 Evening Media Update
**Traditional Media**

- Meltwater News
- Google Alerts
- Press Conferences

**Social Media**

- Virtual Operations Support Team

**Intergovernmental Affairs**

- Transition from Response to Recovery

**Rumor Control**

- Actionable Operational Intelligence
ESF 14 Responsibilities

Maintain the Public Trust

ESF 14 Responsibilities

Balanced Messaging
- Operational Concerns
  - Life-Safety Messages
- Public Concerns
  - Setting Expectations
  - Rumor Control
- Political Concerns
- Manage Pressure Away From Ops
Maintaining Public Trust

Ensure a cohesive and unified message exists between local, state and federal partners
NEWS TRAVELS FAST... REALLY FAST

THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT

VIRTUAL OPERATIONS SUPPORT TEAM

V.O.S.T.

- Florida State University
- Center for Disaster Risk Policy
- Trained Volunteers
- Monitor for Social Media Trends
- Provide Reports
- Alert Life-Safety Issues
- Amplify Messaging

THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT
The Center is the research arm of the FSU Emergency Management and Homeland Security Program. As such, CDRP conducts both applied and academic research activities in partnership with local, state, and Federal organizations.

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What constitutes a PR crisis?

- Something has gone wrong, either internally or externally. Accidents or disasters have occurred – Hurricanes, Oil Spills, Chemical Spills, Sinkholes, Sanitary Sewer Overflows, etc.

- Extensive negative or controversial media coverage (financial woes; café closure)

- The General Public is discussing your organization online or in public, and the information they are passing on is not accurate nor what you want them to believe.

Any one of these would prompt you to launch your crisis communications plan. Often, you will have all three at once.
Crisis Planning Starts Early

• A crisis is a crisis is a crisis.

• Be aware of actions and events that can create the need for crisis communications
  • A health threat, potential toxin exposure, an accident, etc.

• Assess potential risks
  • Gather communications staffers to ask “would the public or media be interested in this?” or “will this prompt concern/interest in policy makers or public?”

• Prep and Practice, Practice, Practice
  • There is no such things as being too prepared!

Have a portfolio of sources

• Have consistent messaging prepared for a variety of sources:
  • Scientists/Researchers
  • Experts
  • Personnel
  • External Affairs representatives
  • Impacted public who can add weight to the efforts made by your organization
  • Partnering organizations
Recent Example

What did we do?

• Be aware of actions and events that can create the need for crisis communications
  • We knew the rainy season was coming and that we would probably have more issues with sewer overflows

• Assess potential risks
  • Based on the media’s extreme interest in these overflows last year, we suspected their interest would continue.

• Prep and Practice, Practice, Practice
  • We prepared a statement, and practiced it (repeatedly)!
The Results

St. Pete comes up with plan to fix aging sewer system

Recent Example

Water quality concerns echoed from SW Fla. fishermen, residents
What did we do?

• Be aware of actions and events that can create the need for crisis communications
  • The EPA released new scientific data on surface water quality in 2015. This was a red flag for us that we needed to prepare.

• Assess potential risks
  • We began doing research on our water quality and where it ranked.

• **Prep and Practice, Practice, Practice**
  • Because it was more extensive, we prepared a fact sheet, and reviewed it (repeatedly)!

---

**FREQUENTLY ASKED QUESTIONS**

**HUMAN HEALTH CRITERIA**

Q: What are Human Health Criteria?
A: Human Health Criteria are health-based surface water quality standards DEP sets to ensure Floridians can continue to safely use Florida’s seafood and drink potable water from state surface waters.

Q: Why is DEP updating these standards?
A: Florida’s current human health-based water quality criteria were last updated in 1993. To meet U.S. Environmental Protection Agency (EPA) obligations, the Florida Department of Environmental Protection (DEP) is working to update these criteria to incorporate new scientific information, including national guidance published by the EPA last summer.

Q: Are these new proposed standards less protective than previous standards?
A: Absolutely not. In fact, we are increasing protection by proposing to nearly double the number of chemicals and bacteria that have been given an acceptability rating. In addition:...
The Results

Evaluation and Assessment

After any substantial event, it’s crucial to take the time afterward to evaluate the successes and challenges that resulted from your actions. Even successful results can be improved.

What worked?
What didn’t work?
How could our message have been communicated easier?

Adapt your plans from there.
Any Questions?

Thank you!
Lt. John FitzGerald

USCG,
PAO, District 8

NOAA’s Regional Preparedness Training:
Risk Communication During DWH:
Reflections of Responders

James McPherson, FEMA (USCG RET.)
David M. Kennedy, NOAA
Tom Brosnan, NOAA ORR

June 30, 2016
Florida Fish & Wildlife Research Institute
James McPherson
FEMA, Region 1
USCG, Retired

James McPherson, FEMA (USCG Ret.)

- Branding in a crisis—changing the tone from largest oil spill to world’s largest oil spill response
- Developing coalitions– working with feds, states and local partners
  - Reaching out to “non-friendly forces”—taking James Carville out to dinner
    - Influencing the influencers
- Strategy for success– oil was on beaches
  - Take media offshore to where 65 vessels where working within 5 miles to stop oil from getting to beaches.
James McPherson, FEMA (USCG Ret.)

- Messaging - Transparency - daily technical media calls “Top hat”
- Communicating - words have meaning
  - “BP is our partner” not the right message
- If you have seen one spill – you have seen just one oil spill.....All are different
  - James Cameron’s ROVs, Kevin Costner’s mystery oil separator

David M. Kennedy

NOAA, Senior Advisor, Arctic
Ever-evolving, voracious need of information to media.
- 24/7 need from media during a time when responders were responding and not always readily available
- Inappropriate information leaked to press caused extra time and effort to correct or address leaked information
- Contingency planning: educational sessions for federal agencies and local communities to learn/understand oil spill response
- Academic interaction

Tom Brosnan
NOAA Office of Response and Restoration
Assessment and Restoration Division
Initial NRDA Communications Approach
During the DWH Oil Spill

Tom Brosnan
NOAA’s Regional Preparedness Training (NRPT)
St. Petersburg, FL
June 30, 2016

NRDA Communications

Initial challenges: unprecedented and relentless public/press/political interest; multiple uncertainties; rapidly changing conditions; small communications staff; coordination with response and co-trustees; legal concerns

Goal: dispel misconceptions and manage expectations about what NRDA is and isn’t, re: process; timeframe; relation to response; roles of co-trustees, BP, academics, the public, etc.
Overarching Guidelines

- Transparency: early commitment by co-trustees
- Tell our story vs responding to others: lack of information from experts creates a vacuum that’s filled by misinformation from amateurs
- Timely responses, especially to press and NGOs
- Acknowledge what we don’t know and can’t answer, i.e., stay within your expertise and publicly available, don’t speculate

Approaches

- NRDA 101 training –internal and external
- Factsheets, infographics, powerpoints, videos, webinars, blogs –repeat messages
- Many interviews and field trips: press, ngo’s, politicians, CEQ, etc. Prep Q&A’s first!
- Attend public meetings –encourage dialogue
- Publish NRDA injury assessment plans and data

Lessons Learned

- Pre-spill:
  - Prepare basic explanatory materials: fact sheets, infographics, case examples
  - Get Risk Communications training and include communications in drills
  - Identify 1st tier points of contact to direct questions to
  - Develop relationships w/media and trusted outsiders who can communicate
  - Prepare and internally share Q&A’s before speaking to press, public, etc.
  - Be as transparent as you can and tell your story
  - Be timely with responses
  - Acknowledge uncertainty and what you can’t discuss
  - Don’t speculate: stay within your expertise and what is publicly known
Appendix A: Participant List
### NOAA’s Regional Preparedness Training (NRPT)
Environmental Tradeoff Analysis (ETA) for an Oil Spill Response
Impacting the Flower Garden Banks National Marine Sanctuary

## PARTICIPANTS

<table>
<thead>
<tr>
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<th>Affiliation</th>
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*Denotes workshop organizing committee member
Appendix B: Training Agenda
State-of-Science of Dispersants and Dispersed Oil

NRPT Training

May 24, 2016
Flower Garden Banks, National Marine Sanctuary,
Galveston Texas

TRAINING AGENDA

9:00 am Welcome and Logistics
- Nancy E. Kinner, Coastal Response Research Center, University of New Hampshire
- Charlie Henry, NOAA ORR, Gulf of Mexico Disaster Response Center
- G.P. Schmahl, Flower Garden Banks, National Marine Sanctuary

9:15 am Goals of Training

9:30 am Efficacy and Effectiveness
- Tim Nedwed, ExxonMobil Upstream Research Company

10:30 am Break

10:45 am Physical Transport and Chemical Behavior
- Chris Barker, NOAA ORR ERD (remote)

11:45 – 12:45 Lunch (1-hour break – on your own)

12:45 pm Degradation and Fate
- Nancy Kinner

1:45 pm Break

2:00 pm Eco-toxicity and Sublethal Effects
- Lisa DiPinto, NOAA ORR ARD

3:00 pm Public Health and Food Safety
- Doug Helton, NOAA ORR ERD (remote)

4:00 pm Adjourn
Appendix C: Training Presentations
Dispersant Efficacy & Effectiveness

Efficacy – do dispersants work in a controlled setting?
Effectiveness – do they have a benefit in the real world?

Spill Response Options: *The Toolbox*

- Mechanical Recovery: Booms & Skimmers
- In-Situ Burning
- Aerial Dispersants
- Boat-based Dispersants
- Subsea Dispersants
Rapid Response is Key

- A slick continuously expands and oil thins
  - The size of the problem will increase with time
- Response options get less efficient with time
  - The goal is to respond as quickly and as close to the source as possible

Challenges to Oil Spill Response

- Weather
  - Recovery very challenged in rough seas (>2 M) or high winds (>25 kts)
  - Safety concerns in high seas and inclement weather
- Thousands of different oils with a wide range of properties
  - Weathering effects
- Remote locations may not have immediate logistical support
- Wide range of impacted habitats
  - Rocky beaches to sensitive marshes
- Very little to no daylight during winter at higher latitudes
- Limited access to impacted areas
Dispersants

Introduction

Topics of Discussion
- Oil spill response options
- Background on dispersants
- Subsea dispersants
  - Observations on their use
- Summary
Dispersants – What are they?

- Solutions of surfactants dissolved in a solvent
- Surfactants reduce oil-water interfacial tension – allows slick to disperse into very small droplets with minimal wave energy
- Dispersed oil rapidly dilutes to concentrations <10 ppm within minutes, <1 ppm within hours, ppb range within a day
- Each dispersed oil droplet is a concentrated food source that is rapidly colonized and degraded by marine bacteria
- Dilution allows biodegradation to occur within nutrient and oxygen limits
Encounter Rate

Spill Conditions Limit Response Options

![Wave Height vs. Sea Conditions](image)

- Natural Dispersion
- Mechanical Recovery
- Dispersant Application
- In-Situ Burning

![Average Oil Thickness](image)

Copyright 2012 Offshore Technology Conference

Courtesy of Al Allen

NOAA Regional Preparedness Training Workshop Texas
Dispersant Ingredients & Toxicity

Modern dispersants use ingredients found in household products

Relative Toxicity: Environment Canada Study
(*96 hr Rainbow Trout LC50*)

<table>
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<tr>
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*Lethal concentration to 50% of the test organisms

Dispersant Ingredients & Toxicity

Modern dispersants use ingredients found in household products

Relative Toxicity: Environment Canada Study
(*96 hr Rainbow Trout LC50*)

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*Lethal concentration to 50% of the test organisms

Subsea Injection of Dispersants

- Preliminary observations of Macondo experience
- Benefits of subsea injection
- Long-term fate and effects

![Subsea Injection of Dispersants Diagram](image-url)
Dispersant Use Approval

- May require a low inherent toxicity and a minimum level of effectiveness
  - Verified by test protocols before placement on an approved list if required

- Regulations require that permission be obtained before dispersants are used in certain locations, especially when close to shore and/or in shallow water
  - A pre-approval process may be used, especially for offshore and/or in deep water

- Documentation to support their use is often based on an environmental risk-analysis of relevant scenarios and is part of an approved contingency plan
  - Scenario-based contingency plans should demonstrate that the use of oil spill dispersants will give the best overall response for the environment (NEBA-approach)

- Potential for significant differences from country to country
Dispersant Use Across the Globe

- Dispersants are a first or second response option in many countries today

Many countries consider dispersants an important tool in oil spill response. However, there is global inconsistency in the types of approved dispersants and how and when to use them.

Summary

- Along with prevention, robust oil spill response is critical
- Highest priority in emergency response is human health and safety
- Basic strategy for addressing oil spilled from an offshore well
  - Respond as close to the source as possible
  - Utilize all appropriate tools to keep oil from reaching shorelines
- Dispersant use presents significant advantages over the limitations of mechanical recovery and should be considered as a primary response option
- Subsea injection can provide benefits over other oil spill response options
Questions?

Backup Slides
NOAA Regional Preparedness Training Workshop Texas

VOC Data from Vessels Near Well Site

May 30 – June 20, 2010

June 20 – July 15, 2010

Commercial Fish Catch in the GOM
(obtained from the US NOAA Fisheries website*)

10-year average

*Data available online as of November 2015 at http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html
Physical Transport
Flower Garden Banks NRPT Workshop

Christopher Barker, PhD

Emergency Response Division
NOAA Office of Response and Restoration
May 24, 2016

Oil Spill Transport: Takeaways:

- Oil properties play a major role in determining physical processes.
- Oceanographic and atmospheric conditions change with time and location.
- Need onshore winds to beach oil.
- As a spill progresses, oil concentration decreases.
- Because oil usually floats on the surface, it can collect in areas of surface convergence or along shoreline.
- Floating oil transport often dominated by winds
- Subsurface oil doesn’t “feel” the wind.
What happens to oil when it is spilled in the marine environment?

- Oil Weathering
- Spreading
- Transport

![Cartoon from SINTEF website](http://www.sintef.no/static/ch/environment/oil_weathering_model.htm)

Current Surface oil transport

Spreading due to gravity generally complete within first few hours then...

Subsequent oil movement results from:

- Winds
- Currents
- Turbulence

![Example of horizontal dispersion. Why does this happen?](A,B)
Advection

Can be estimated as the vector sum of:

- Wind Drift
- Surface Currents

Wind

- Surface of the water (and oil) moves at about 3% of the wind speed.
- Example:
  - In a 20 knot wind, the oil moves at about 0.6 knots.
- How might this change as the oil weathers?
Windage
How fast the wind pushes a floating object

<table>
<thead>
<tr>
<th>Object</th>
<th>Windage</th>
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<tbody>
<tr>
<td>Rubber rafts</td>
<td>7%</td>
</tr>
<tr>
<td>Large Cabin Cruiser</td>
<td>5%</td>
</tr>
<tr>
<td>Raft with drogue</td>
<td>5%</td>
</tr>
<tr>
<td>Sailboats, Fishing Vessel</td>
<td>4%</td>
</tr>
<tr>
<td>Fresh Oil</td>
<td>3%</td>
</tr>
<tr>
<td>Surfboards</td>
<td>2%</td>
</tr>
<tr>
<td>Weathered tarballs</td>
<td>1%</td>
</tr>
<tr>
<td>Subsurface oil droplets</td>
<td>0%</td>
</tr>
</tbody>
</table>

3% of wind speed is a handy “rule-of-thumb” for oil movement most applicable for fresh oil in light to moderate winds
- It parameterizes a number of very complex ocean-atmosphere-wave interactions
- Dependent on oil-type, wind strength, wave climate
- Changes over time due to weathering processes
Advection

Can be estimated as the vector sum of:
- Wind Drift
- Surface Currents

Next look at currents

Length and Time Scale for Currents
(or, how far the spill will move or spread over what time period)

<table>
<thead>
<tr>
<th>Current Type</th>
<th>Length Scale</th>
<th>Time Scale</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>River</td>
<td>10s of miles</td>
<td>Hours to days</td>
<td>Lowest</td>
</tr>
<tr>
<td>Tides</td>
<td>Miles</td>
<td>Hours</td>
<td>Low</td>
</tr>
<tr>
<td>Estuarine Circulation</td>
<td>10s of miles</td>
<td>Days</td>
<td>Medium</td>
</tr>
<tr>
<td>Coastal Flow</td>
<td>100s of miles</td>
<td>Days to weeks</td>
<td>High</td>
</tr>
<tr>
<td>Ocean Circulation</td>
<td>1000s of Miles</td>
<td>Months to years</td>
<td>Low-High</td>
</tr>
</tbody>
</table>

(but, don’t forget weathering!)
Coastal (shelf) currents

- Complicated dynamics
  - wind-driven flow
  - freshwater influence
  - deep ocean influences
  - tides
  - topographic interactions...
- Strong variability on multiple time scales (seasonal, event-scale)

Snapshot of measured currents (colored vectors) and modeled currents (white vectors) in 2010

Are tides important here?

...in the GoM

- The Loop Current is a warm ocean current that flows northward between Cuba and the Yucatán peninsula, moves north into the Gulf of Mexico, loops east and south before exiting to the east through the Florida Straits and joining the Gulf Stream

Where did these come from?
NW Gulf Bathymetry

Seasonal Winds

Morey et al., 2005, AGU Monograph: Circulation in the Gulf of Mexico: Observations and Models
River Plume

(a) Summer
(b) Winter

Xiaopin Zhang, http://pemium.tamu.edu/~zhangxq/

SSH-Derived Currents
Turbulence

- These are small scale currents that ocean models may not resolve
- Turbulence will tear apart a slick and result in a patchy distribution spread over a larger area

- Response challenge: encounter rate
- Volume?
The missing 3rd dimension (dispersion)

- Driven by wave energy – breakong waves
- Dependent upon oil type (viscosity, surface tension)
- Mixed to depth of ocean mixed layer
- Subsurface oil also subject to advective and diffusive transport, but:
  - No “wind-drift”
  - Diffusing in 3-dimensions
  - Vertical shear of currents
  - Less potential for convergence – i.e. concentrations reduce with time

Adcroft, et al., 2010

Rise Velocity

- Rise velocity is the balance between Buoyancy and Drag
  Buoyant Force: \( F_B = \frac{4}{3} \pi r^3 (\rho_W - \rho_O) \)
  Drag Force: \( F_D = C_D \pi r^2 V^2 \)
- Radius is cubed in Buoyant force, squared in Drag force
- Larger Droplets: Faster rise velocity.
- Small Droplets stay in the water column longer
- In a turbulent environment – they can stay under water forever
The Mixed Layer

- Region of relatively well mixed water:
  - Fairly constant temperature and salinity

- Dispersed Oil will mix relatively fast within this layer

- Very slow process for dispersed oil to get below the mixed layer.
The Mixed Layer

• So how thick is the mixed layer?

• Function of:
  Wind, Sun, Waves, Salinity, Currents – lots more.

• Regional, Seasonal, even Diurnal fluctuations

• Rule of thumb: ~ 10 m on the shelf.

• Offshore NW Gulf of Mexico:
  – Maxima of about 90–120m in February, and
    minima of about 20m from about May through
    October.

• Only way to know is to measure it.

Mass Conservation Always Holds

• The more water oil is mixed into, the lower the concentrations.

• You can have high concentrations in a small region, or
  effect a large region with low concentrations.

• You can not have high concentrations and a large
  region effected.

• In 3d there are no convergences – concentration
  always goes down.
0-D to 2-D to 3-D to 1-D

- Concentration of oil changes with how it spreads or converges
  - From a point
    - Initial release
  - To 2-D
    - Spreading
  - To 3-D
    - Dispersion
  - To 1-D
    - Convergence / Beaching

1 barrel = 42 gallons = 159 liters

2-D: Surface Slick

- 100 microns thick ("black oil", ~2.5 barrels per acre)
  Area = \( \frac{\text{Vol}}{\text{Th}} = \frac{0.159 \text{ m}^3}{1 \times 10^{-4} \text{ m}} = 1590 \text{ m}^2 \)
  ~22 meter diameter sheen (~1/3 football field)
- 1 micron thick ("dull sheen", ~0.025 barrels per acre)
  Area = \( \frac{\text{Vol}}{\text{Th}} = \frac{0.159 \text{ m}^3}{1 \times 10^{-6} \text{ m}} = 159,000 \text{ m}^2 \)
  ~225 meter diameter sheen (~30 football fields)
- 1/10 micron thick ("silver sheen", ~0.0025 bpa)
  Area = \( \frac{\text{Vol}}{\text{Th}} = \frac{0.159 \text{ m}^3}{1 \times 10^{-7} \text{ m}} = 1,590,000 \text{ m}^2 \)
  ~700 meter diameter sheen (~300 football fields)
3-D: Dispersion

- 20 m diameter sheen ("black oil") dispersed to 2 m depth
  Oil volume = 1 bbl = 0.159 m³
  Water volume = \(\pi \times (20 \text{ m})^2 \times 2 \text{ m} = \sim 2500 \text{ m}^3\)
  Concentration 60 ppm
- 700 m diameter sheen ("silver sheen") dispersed to 2 m depth
  Water volume = \(\pi \times (700 \text{ m})^2 \times 2 \text{ m} = \sim 3 \text{ million m}^3\)
  Concentration <1/10 ppm
  [10m depth: Concentration ~ 10 ppb]
  [100m depth: Concentration ~ 1 ppb]

1-D: Convergence

- Oceanic Convergence Zones
- Shoreline
  ~700 m long
  ~10 centimeter wide line
  ~2.2 millimeters thick
Other Droplet Size Considerations

Spherical Droplets:

Volume: $\frac{4}{3}\pi r^3$  
Surface Area $4\pi r^2$

Surface Area : Volume Ratio: $\frac{3}{r}$

The Smaller the droplet:  
The more exposed surface area.

Faster Dissolution and Bio-degradation

Blowout Plume Dynamics

- A well blowout can be a very energetic plume
- Driven primarily by Buoyancy:  
  - Oil is less dense than water  
  - Usually has a lot of gas – much less dense.
- In this turbulent environment, droplets are formed
- Dispersants: smaller droplets
- The resulting Droplet Size Distribution (DSD) determines where the oil goes.
Blowout Plume Dynamics

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• The resulting Droplet Size Distribution (DSD) determines where the oil goes.
Blowout Plume Dynamics

• “layer” of dissolved constituents and tiny droplets

  ![Visualization of the Simulation Results in a Weak Current](image1.png)

  ![Data from R/V Brooks McCall, Station BS4 “Benchmark” on May 30, 2010.](image2.png)

• Larger Droplets rise to the surface

Blowout Plume Dynamics

• Deep Gulf is much less energetic than the surface
• Less Mixing
• Slower Transport
• The “layer” will remain more or less at that depth.

• Concentration will decrease with:
  – Diffusion
  – Biodegradation
Fate of Spilled Oil

- “Big Picture” processes have not changed
- Oil weathers by:
  - Evaporation
  - Dissolution
  - Emulsification
  - Adsorption
  - Sedimentation
- Degradation:
  - Photochemical
  - Microbial (biodegradation)
Weathering

- Function of Environmental Conditions
  - Temperature
    - $(H_2O, Air)$
  - Wind
  - Oil Type
  - Currents, Tides
Today’s Focus: Biodegradation

• Tomorrow:
  • Some newer findings: adsorption/sedimentation and evaporation

Basics

• Oil biodegradation research has been conducted extensively since 1960s and 1970s
• Bursts of oil degradation and fate research associated with several key oil spills:
  • Exxon Valdez, AK
  • Deepwater Horizon, GOM
• Methods for studying microbial processes have evolved greatly over time
  • Growing microbes on different food sources
  • Examine nuclear material (e.g., DNA, RNA)
Basics

- Field of microbiology has grown
- Number of environmental microbiologists has also grown
- Number of microbiologists focusing on oil biodegradation has been cyclic
  - Exxon Valdez
  - DWH
  - National Science Foundation (NSF) funded almost no oil studies
    - Mostly hazardous waste, water and wastewater treatment microbiology

Caveats

- Result: Surge of microbiologists and new techniques into oil biodegradation research during and after DWH
- Scale of focus is often different
  - Oil spill response community scientists have worked with dispersed oil
    - e.g., water accommodated fraction (WAF)
Caveats

- Oil spill is bad situation - goal is to protect resources at risk as best as possible
- Responders are choosing “least bad” option
- Dispersants chosen as response option to protect resources at risk and minimize shoreline clean-up
  - Not for biodegradation

Why am I giving this talk?

- Since 2004, CRRC co-director and CSE director
  - Oil spill focus
- Education in environmental engineering microbiology
  - Research in 1980s - 2000s on biodegradation of chlorinated solvents in groundwater
- Editorial board of Microbial Ecology 1998 to 2013
- Facilitated all State-of-Science of DDO panels
  - Including degradation & fate
- Degradation and Fate was a contentious topic (lots of passionately held opinions)
Biodegradation of Oil

- Many species/consortia of marine microbes (e.g., bacteria) degrade oil constituents
- Mineralization = Organic C to CO$_2$ (lots of organic C + O$_2$ CO$_2$ + H$_2$O + Energy (simple oil constituent))
- Electrons ($e^-$) transfer from organic to O$_2$
  - Organic = $e^-$ donor (ED)
  - O$_2$ = electron accepter (EA)
- More complex oil compounds broken into simple compounds
  - Subsequent mineralization
- Oil constituents are naturally-occurring not exotic
  - E.g., natural oil seeps
- Oil constant biodegradation in oxygenated marine waters is relatively fast

Environment without O$_2$ microbes use

- When O$_2$ is not present in environment, microbes use EA that is available
  - e.g., marine sediments with lots of organic C
  - e.g., Fe$^{3+}$ NO$_3^-$, SO$_4^{2-}$, other organics
  - Most marine sediments have abundance of SO$_4^{2-}$
  - Organic C + SO$_4^{2-}$ → CO$_2$ + H$_2$S + Less Energy (simple oil constituents)
- When SO$_4^{2-}$ or other organics are EAs, biodegradation is much slower
  - Result - oil constituents in sediments are typically buried faster than they are biodegraded
    - Classic papers - return to marshes, etc. years later (30+)
      where no to very low O$_2$, oil constituents still present
Degradation of Oil

- Microbes can biodegrade
- Most hydrocarbon
  - \( \text{O}_2 \) is key
  - Constituents are degraded at different rates
    - Function of mass available/time, composition of constituents, nutrients available

Microbes Performing Biodegradation

- Lots with “Latin” names
  - Molecular methods (DAN/RNA) expanded knowledge of these
  - Most are ubiquitous
  - In low numbers until spill
    - GOM natural seeps
    - Succession in microbial community
Access to Oil

- Slicks have low available surface to volume
- Microbes work on droplet surface area or dissolved compounds
- All about access of microbes to oil constituents
- Droplets are key
  - Small droplets are best (Brakstad et al., 2015 (10 vs 30 µm))
- Chemical dispersants + turbulence foster small droplet formation

Sequential Biodegradation

- Lots of research on this
- Relatively non-controversial
- Solubilities of constituents vary
- Complexity varies
- Weathered oil hard to biodegrade (e.g., asphaltenes)
Dispersant Degradation

- Surfactants in dispersants (e.g., DOSS) biodegrade
  - Most studies on Corexit
- Some may degrade more slowly
- Some decay in sunlight - less known about by-products

Factors of Importance

- Nutrients - localized impact, but in water column less so
- Temperature - deep water cold water microbe adapted
- Trace metals
- Type of oil (light vs. heavy)
Current Disagreements

• Rates of biodegradation with chemical dispersion
  • Lab study conditions
  • Controls
  • Measuring oil constituents vs. surrogates
  • “Null results” bias
  • Dispersant and oil concentrations

Current Disagreements

• DWH is a rare event
  • Most spills are short-term and surface slicks
Current Disagreements

• What is the baseline comparison?
  • Chemical dispersion vs. ?
  • ? = slick
  • ? = physical dispersion
• Problem is physical dispersion is minimal especially of surface slicks

Current Disagreements

• Addition of chemical dispersants suppresses biodegradation vs. physical dispersion
  • ??
Current Disagreements

- Focus on Corexit
  - Other dispersants too

Bottom Line

- DWH is a rare spill
  - Most are surface slicks
- Chemical dispersants used to disperse oil
  - Protect resources at risk
  - Minimize shoreline oiling
- Physical dispersion for surface slicks is not typical
- Biodegradation of oil is enhanced by chemical dispersion vs. remaining as surface slicks
Oil Toxicity Documented in Literature: Numerous Lab and Field Studies

- Fish
- Invertebrates
- Birds
- Mammals
- Reptiles
- Plants
- Plankton
- Bacteria

- Death
- Reduced growth rates
- Impaired early life stage development
- Tissue impacts (e.g., liver and skin lesions)
- Developmental abnormalities
- Cardiac damage
- Reproductive impairment
- Immune effects
- Cancer
Assessment: What is considered an injury?

“Injury” includes adverse effects on:
- Survival, growth, and reproduction
- Health, physiology and biological condition
- Behavior
- Community composition
- Ecological processes and services
- Physical and chemical habitat quality or structure
- Public services, such as recreation

Oil Mixes, Disperses and Partitions in the Environment

Potential exposure-aquatic organisms:
- Oil in water
- Oil on water
- Droplets and particles
- Dispersant
- Diet
- Physical effects

Potential exposure:
- Multiple habitats
- Multiple species
- Multiple trophic levels
- Multiple life stages
Tested 40 species including fish, invertebrates, plankton, 2 freshwater turtle species, birds, and a mammal adrenal cell line study.

Adverse effects at sediment concentrations ~ 1 ppm (mg/kg) TPAH50 (reporting LC20s)

Adverse effects at water concentrations ~ 1 ppb (ug/L) for fish and ~ 13 ppb for invertebrates TPAH50

Early life stages most sensitive

Oil mixing methods: for a given species and life stage, the toxicity of DWH oil to fish was generally similar across WAF preparation methods when toxicity is expressed in terms of the concentration of TPAH50

Some toxic effects conserved across species
Physiological Oil Response Constellation

- Thin sheens (1 um or less) toxic to the sensitive early life stages (ELS) of fish and invertebrates
- UV enhanced toxicity resulted in 10x to >100x increase in toxicity under ambient UV for semi-transparent inverts, and early life stage fish

Source: Abt Associates

Source: NOAA
Surface Oil Observations Useful in Assessment

- Surface oil accumulates and persists in same areas as susceptible natural resources
- Many sensitive early life stages congregate at surface or in surface mixing layer or directly at or on surface
  - Planktonic
  - Neutrally or positively buoyant
- UV light penetrates in surface waters (15-30 m in GoM)
- Surface breathing animals (e.g., turtles and mammals and birds) inhale or aspirate oil

Many DWH Water Samples had TPAH Levels Exceeding Lethal Levels

- TPAH50 concentrations in water samples (green dots) plotted against LC20 values adjusted for photo-induced toxicity (red line).
- LC20 value (red line) increases (i.e., less toxicity) with depth because ambient UV light decreases.
- Samples in the gray-shaded area represent conditions in which mortality to ichthyoplankton would be expected to exceed 20%
Exposure to Low Concentrations of DWH Oil Causes Cardiotoxicity: Bluefin Tuna

- Impaired cardiac development (deformities)
- Impaired cardiac function (e.g., arrhythmia)
- Similar to congestive heart failure in humans
- Have demonstrated in pelagic fish species and standard test species

Other Developmental Deformities Documented

From: Incardona et al., (2014) Deepwater Horizon crude oil impacts the developing hearts of large predatory pelagic fish. PNAS
Swimming performance and aerobic scope in pelagic fish

Fully-weaned 34 dph Mahi-mahi  |  J. Stieglitz: 2012

Fluctuating or Juvenile Exposure to Deepwater Horizon Crude Oil Impairs the Swimming Performance of Mahi-Mahi (Coryphaena hippurus)
Edward M. Mager, Andrew J. Esbaugh, John D. Stieglitz, Ronald Hoenig, Charlotte Bodinier, John P. Incardona, Nathaniel L. Scholz, Daniel D. Benetti, and Martin Grosell
Publication Date (Web): May 23, 2014 (Article)
DOI: 10.1021/es501628k

Effects of Multiple Stressors

Oil exposure 4d
Followed by 1h bacterial challenge

Figure 4.3-13. Percent survival of juvenile red drum exposed to one of four treatments: 1) neither oil nor bacteria (Vibrio anguillarum), 2) DWH oil without bacteria, 3) bacteria without oil, 4) DWH oil and bacteria. Exposure to oil and bacteria caused considerably more mortality than in the other treatments (Ortell et al. 2015).
Surface Oil and Sargassum

Sargassum: designated as Essential Fish Habitat (EFH)

- Fish larvae and invertebrates, larger fish, sea turtles, sea birds rely on Sargassum as habitat, foraging area, protection from predators
- Sargassum concentrates in convergence zones -- as does surface oil
- Consider dispersant application sinks
  Sargassum (Powers et al. PLoS One)
- Loss of up to 23 percent of this habitat
- Total loss of Sargassum, including foregone area from lost growth is 4,300 square miles

Benthos are not charismatic!

“I don’t know why I don’t care about the bottom of the ocean, but I don’t.”
Larger quantities of floc were observed on the sea floor beneath areas experiencing persistent surface oil and application of dispersants.

Deepsea Coral Colony Injury Progression

Progression of coral injury from coverage by flocculent material in 2010, through hydroid colonization in 2011 and onset of terminal branch loss in 2012.

Map of locations of injured coral sites in relation to the DWH wellhead.
Mesophotic Reefs

- Injured mesophotic reefs located under surface slicks (AA and RTR closer to release)
- Long term pre-spill monitoring (video transect) data on these reefs indicate acute coral mortality post spill
- Approximately 1/3-1/2 large sea fan colonies experienced injury
- Associated order of magnitude decreases in planktivorous fish abundances
Generalized Turtle Lifecycle

- Beach response activities
- Oil persisting in sand exposing eggs, hatchlings, adults
- Sargassum-oil interaction
- Water column exposure
- Contaminated prey
- Oil on water- inhalation, aspiration, miring in oil

Turtles Ingest Oil

Figure 4.5-9: Photographs of turtles in each oiling category defined by extent of external oiling. Percentages of turtles documented in each category relative to all turtles assessed are shown next to representative photograph of each oiling category.
Marine mammals can be exposed to surface slicks
  - Exposed via inhaled, aspirated, ingested, physically contacted, and absorbed oil
  - Non-NRDA work evaluating role of surface dispersants on aerosol formation

- Oil damaged tissues and organs; led to adverse health effects including lung disease, reproductive failure, adrenal disease, poor body condition

- Mammal exposure to DWH oil contributed to the largest and longest lasting marine mammal Unusual Mortality Event (UME) on record in the northern Gulf of Mexico (>1,000 stranded)

- Dolphin population recovery estimated to take decades
2011 Dolphin Health Assessments – Barataria Bay (Schwacke et al., 2014)

- 5 times more likely to have moderate-severe lung disease
- Hypoadrenocorticism
- Overall poor body condition
- High prevalence of abnormal liver enzymes, other blood abnormalities
- 48% guarded or worse prognosis; 17% poor/grave
- Tooth loss
- 11/15 mature females were pregnant; 46% increase in failed reproduction
- Consistent with strandings data
- Consistent with literature and EVOS mammal effects

Birds (DOI lead)

- Field studies documented number and distribution of carcasses and live birds impaired by oil
- Modeling accounted for birds not observed directly
- Toxicity studies demonstrated reproduction, anemia, immune function, heart abnormalities, other endpoints
- Plumage oiling impaired flight capability and led to behavioral changes in controlled studies
Marsh live plant cover and vegetation biomass, reductions even in areas with as little as 10% documented oiling of plant stems

Effects persisted for 4 years of study

Live mangrove cover and growth rates reduced

Response activities such as washing, cutting, and raking of oiled shoreline vegetation, stranding of oil booms impacted marsh animals and coastal wetland habitat

Erosion
  • Areas of most heavy oiling and response actions had double yearly marsh edge erosion rates
  • Higher erosion rates also associated with areas that lost adjacent oyster habitat
Multiple indicator species had reductions in injury metrics including survival, reproduction, growth, biomass, abundance:

- Shrimp
- Amphipods
- Fundulus
- Juvenile southern flounder
- Red drum
- Fiddler crab
- Insects

4-8.3 billion subtidal adult ‘oyster equivalents’ lost Gulf-wide from combination of oiling and river-water releases.

Seagrass losses documented oiling + response.
Examples of Nearshore Faunal Effects

Source: Powers and Scyphers (2015). Figure 4.6-25. Growth rates of juvenile brown shrimp associated with marshes of various degrees of oiling. Growth rates were reduced by 27 to 56 percent compared to sites that did not experience oiling.

Fiddler Crab Larval Survival Following Maternal Exposure

Roberts et al., UNT, SETAC 2013
DWH NRDA publications

30+ peer reviewed publications and counting:
- Deepsea corals and benthos
- Dolphins
- Fish Toxicity
- Sea Turtles
- Oil in the environment

Publications available to public:
http://www.gulfspillrestoration.noaa.gov
https://dwhdiver.orr.noaa.gov

For More Information
http://www.gulfspillrestoration.noaa.gov
https://dwhdiver.orr.noaa.gov
State-of-Science on Dispersants and Dispersed Oil: Public Health and Food Safety

May 24, 2016
Flower Garden Banks
National Marine Sanctuary, Galveston Texas
Doug Helton

Basic Options

• All response tools have limitations and trade-offs

• All have health and safety implications
Changing the fate of the oil

- May be able to protect highly sensitive species and locations.
- Helps responders choose where the impacts are felt.
- Human impacts locations change too

Safety of Responders
U.S. Gulf oil spill poses public health threat: Response targeting workers, residents, food and air quality

Kim Krisberg

Described as the worst environmental disaster in U.S. history, the massive oil spill in the Gulf of Mexico poses serious risks to human health too — risks that could persist far into the future and about which little is known.
“Although all seven fishermen were hospitalized on the same day, we found that their symptoms could not be linked to the chemical dispersant... The seven fishermen worked on five different vessels, none of which were operating in the area of dispersant use.”
What are the risks for workers, public, and subsistence users?

Current evidence suggests minimal direct toxicity risks

Limited studies have been conducted to assess acute and chronic human health impacts
Possible Exposure Pathways

- Occupational and non-occupational
- Shorelines and Offshore
- Routes include inhalation, dermal absorption and ingestion.
- Offshore workers did come in contact with dispersants and oil
- Occupational exposures can be minimized by the appropriate use of personal protective equipment (PPE).

Uncertainties

- Hard to study in field conditions
- Limited epidemiological studies
- Baseline health status of workers unknown
- Conditions varied across region and job type and over time
- Hard to tease out oil versus dispersant versus other stressors:
  - physical stress, heat stress, psychosocial stress, ergonomic and other injury hazards; and pre-existing personal health risk factors.
Toxicity

- MSDS for dispersants warns against frequent and prolonged exposure to skin and inhalation risks
- Skin irritation and possible blood and kidneys
- Crude oil can cause similar conditions

Uncertainties

- Key chemicals are common in other products, so exposure hard to pinpoint
- Oils are complex mixtures with thousands of incompletely defined compounds
- Few long term studies
- But non-human studies raise concerns
  - endocrine disruption, reproductive failures, immune suppression and impaired cardiac development
  - But are they realistic doses?
**Food security and seafood safety**

- Biggest concern is for subsistence users, who by definition get a large part of their diet from a highly localized source.
- Sensitive subgroups in Gulf – (e.g., Vietnamese-American community)
- PAHs persists longer in molluscan shellfish versus finfish (weeks to months rather than days to weeks)
- Dispersant constituents did not accumulate in fish and shellfish tissues
- There is a risk from not consuming seafood if the diet shifts to less wholesome items

**Uncertainties**

- Bioaccumulation and depurations not well know for species and different species.
- Trade-off of more oil in coastal environments and possibly persisting for decades
- Humans are less willing to accept involuntary risk than voluntary risk (e.g., oiled fish vs. smoked fish)
- Risk communication is challenging
General conclusions

- None of the 6,000 water samples containing oil-dispersant exceeded EPA benchmarks for protection of human health.

- None of the seafood testing found levels of human health concern.

- “Although individuals directly handling dispersants or in the immediate area of dispersant applications during DWH may have been at greater risk of exposure and adverse effects than the general population, any adverse effects were expected to be mild.”
Gulf Long Term Follow-Up Study

A long term health study for oil spill clean-up workers, and volunteers

FOLLOW-UP UNDERWAY!

SCHEDULE YOUR CLINIC EXAM!

CALL US TODAY!
1-855-644-4853 (TOLL-FREE)

LEARN MORE
Appendix D: Workshop Agenda
NOAA’s Regional Preparedness Training (NRPT)
Environmental Tradeoff Analysis (ETA) for an Oil Spill Response
Impacting the Flower Garden Banks National Marine Sanctuary

May 25 – 26, 2016
Flower Garden Banks National Marine Sanctuary
Galveston, Texas

WORKSHOP AGENDA

Day 1: Wednesday, May 25

8:30 am Welcome and Introductions
  • Nancy Kinner, Coastal Response Research Center, University of New Hampshire
  • G.P. Schmahl, Flower Garden Banks National Marine Sanctuary
  • Charlie Henry, NOAA Office of Response and Restoration (ORR), Gulf of Mexico Disaster Response Center

8:45 am Background and Workshop Goals
  • Charlie Henry

9:00 am Participant Introductions

9:30 am Plenary Session: Flower Garden Banks National Marine Sanctuary
  • G.P. Schmahl, Flower Garden Banks
    ▪ Physical/Chemical Conditions
    ▪ Biological Conditions
    ▪ Regulatory Considerations

10:00 am Plenary Session: Oil Spill Response 101
  • Paige Doelling, NOAA ORR and Steve Buschang, Texas General Land Office

10:15 am Break

10:30 am Plenary Session: Natural Resource Damage Assessment (NRDA)
  • Lisa DiPinto, NOAA ORR, Assessment and Restoration Division

10:45 am Plenary Session: State-of-Science as Applied to Flower Garden Banks Marine Sanctuary
  • Mechanical Recovery, James Hanzalik, Clean Gulf Associates
  • In Situ Burning, Charlie Henry
  • Dispersant Overview (Surface and Subsea Application), Arden Ahnell, Exponent
  • Marine Snow/Oil Flocculation, Jeff Chanton, Florida State University (remote)
  • Air Quality, Ed Buskey, University of Texas at Austin (remote)

12:00 pm Lunch (on your own)

1:15 pm Plenary Session: Current RRT Area Contingency Planning for Flower Garden Banks, Marine Sanctuary Area
  • Mike Sams, U.S. Coast Guard

1:30 pm Plenary Session: Other Important Considerations, Process Subpart J Regulatory
  • Greg Wilson, U.S. Environmental Protection Agency

1:45 pm Plenary Session: Environmental Tradeoff Analysis (ETA)
  • Jim Staves, Environmental Consultant

2:00 pm Describe Scenario & Breakout Group Charge

2:15 pm Breakout Group Session I
  • Identify resources at risk
  • Establish initial response objectives and actions
  • Current pre-authorization and exclusion zones as it applies to the Flower Garden Banks
  • Identify NRDA activities during response

3:30 pm Group Reports

4:30 pm Adjourn
Day 2: Thursday, May 26

8:30 am    Recharge & Recalibrate

9:00 am    Breakout Group Session II
  • Identify initial response tradeoffs
  • Identify “external pressures” affecting decision-making
  • Discuss flow charts / decision trees for evaluating ETAs

11:00 am   Group Reports

11:30 pm  Lunch (on your own)

1:00 pm    Introduce Spill Scenario of ETA

1:15 pm    Breakout Group Session III
  • Decide on response options
  • Conduct ETA for spill scenario
  • Explore flow charts / decision trees

3:00 pm    Group Reports

4:00 pm    Wrap-Up and Path Forward

4:30 pm    Adjourn
Appendix E: Workshop Presentations
Flower Garden Banks
National Marine Sanctuary

NOAA Regional Preparedness Training
G.P. Schmahl – Superintendent
May 25, 2016
Reefs and Banks of the Northwestern Gulf of Mexico
Flower Garden Banks National Marine Sanctuary

- Northernmost coral reef in the continental United States
- Includes: East and West Flower Garden and Stetson Banks
- Located 93 to 104 nautical miles offshore in the Gulf of Mexico
- Area: 145 square kilometers (56 square statute miles)
- Water Depth: 17 – 152 meters

Remarkable Reefs of the Flower Garden Banks
Flower Garden Banks National Marine Sanctuary

Reefs and Banks in the Northwestern Gulf Of Mexico

- Stetson
- West FG
- East FG

Bathymetry courtesy of OKEE, Lihan, Gardner and WFAA

M. Nuttle, FGMR, July 2019
“Co” does not appear on versions from 1892, 1878 or previous years

“Co” = Coral

General Chart of the Gulf Coast 1910

Texas to the Tropics

“125 miles SSE of Galveston, and in the same latitude as Aransas Pass, are two tropical West Indian coral reefs. These reefs have been known for half a century as Flower Garden Banks to the snapper fishermen because of the colorful specimens they occasionally brought up when their lines snagged the bottom.” Dr. Thomas Pulley, - 1963
Gulf of Mexico “Loop Current” and Reef Features

[Map of the Gulf of Mexico showing the Loop Current and reef features]

REEFHAB MESOSCALE ALKINITY – 09/17/2015

[Map showing reef conditions with color-coded areas]

Legend:
- Approximate location of features
- Corridor for additional protection
- National Marine Sanctuary

Source: National Oceanic and Atmospheric Administration (NOAA)
Long-term region-wide declines in Caribbean Corals


Average hard coral cover reduced by 80%
(from 50% to 10%) in 30 years
Flower Garden Banks Long-term Coral Reef Monitoring

Historical Coral Cover Dataset

![Historical Coral Cover Dataset](image)
## Major Reefs Living Coral Cover

<table>
<thead>
<tr>
<th>Location</th>
<th>Percent Coral Cover</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flower Garden Banks</td>
<td>54</td>
<td>Johnston et al. 2015</td>
</tr>
<tr>
<td>Bonaire</td>
<td>10-38</td>
<td>Steneck et al. 2011</td>
</tr>
<tr>
<td>Bermuda</td>
<td>35</td>
<td>Jackson et al. 2014</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>7-36</td>
<td>Waddell and Clark 2008</td>
</tr>
<tr>
<td>Navassa Island</td>
<td>10-25</td>
<td>Waddell and Clark 2008</td>
</tr>
<tr>
<td>Florida Keys NMS</td>
<td>3–20</td>
<td>ONMS 2011</td>
</tr>
<tr>
<td>Jardín de la Reina, Cuba</td>
<td>7–19</td>
<td>Pina Amargós et al. 2008</td>
</tr>
<tr>
<td>Pedro Bank, Jamaica</td>
<td>5-19</td>
<td>Bruckner 2013</td>
</tr>
<tr>
<td>Cay Sal Bank, Bahamas</td>
<td>7-9</td>
<td>Bruckner 2011</td>
</tr>
</tbody>
</table>

Long-term coral reef Monitoring
Permanent Photo Stations
Percent Benthic Cover – East FGB

- **O. annularis complex**: 34%
- **Macro algae**: 24%
- **CTB**: 18%
- **Other coral**: 23%
- **Sponge**: 0%
- **Other**: 1%

Flower Garden Banks – *Orbicella (Montastraea)* complex

- O. faveolata
- O. franksi
- O. annularis
Acropora palmata - May 2005

Mass spawning events
“Mardi Gras Wrasse” – described from Flower Garden Banks
Manta Ray movement - FGBNMS

Whale shark migrations

- Holbox, Mexico (July 2008) to Bright Bank, NW GOM (October, 2008)
- Gladden Spit, Belize to Tampa, FL
- Honduras to Tampa, FL

Source: Dr. Rachel Graham, Wildlife Conservation Society
Reefs and Banks in the Northwestern Gulf Of Mexico

Seafloor Mapping and Characterization
Mohawk ROV at East Flower Garden Bank, November 2013
Mesophotic Coral Communities of the northwestern Gulf of Mexico
Biological Habitat Classification Scheme - FGBNMS

Dominated by brain and star coral boulders:
Montastraea franksi
M. faveolata
M. annularis
M. cavernosa
Diploria strigosa
Colpophyllia natans
Siderastrea siderea
Porites astreoides

Coral Reef/Coral Community Zone includes the following habitats:
Montastraea, Stephanocoenia, Madracis, sand community, mixed coral.
Algal Nodule Habitat, within the Coralline Algae Zone includes these habitats:
Sand communities, leafy algae/sponge, octocoral, algal pavements, mixed coral

Coralline Algae Reefs within the Coralline Algae Zone, includes these habitats:
Sand communities, leafy algae/sponge, octocoral, algal pavements, mixed coral, antipatharians
Deep Coral Zone, includes these habitats:
Octocoral, antipatharian, mixed coral, stony coral

Soft Bottom Community Zone, includes these habitats:
silt, fine, coarse, rubble
Cumulative Dissolved O2 Data
August 3 – September 16, 2010

SPMD – “Semi Permeable Membrane Device”

“Seabird” CTD Meter
Water Quality Analysis

Sea-Bird Annual Temperature Variation at East Flower Garden Bank, 2011-2012

Sea-Bird Annual Temperature Variation at West Flower Garden Bank, 2011-2012

NOAA Coral Reef Watch Subtropical Coral Bleaching Alert Area
30 Sep 2010

Coral Bleaching
Texas / Louisiana Shelf – 3/14/2009

Stetson Bank

Flower Garden Banks

Gulf of Mexico

Image courtesy of NASA

Stetson Bank – September 2011

Algal Mats
Flower Garden Banks National Marine Sanctuary Revised Management Plan

• Process began in 2007
• Draft released October 2010
• Final Plan released April 27, 2012
• Federal Register Vol. 77, No. 82
• Three Components:
  • Final Management Plan
  • Final Rule (New Regulations)
  • Environmental Assessment
• Regulations effective May 29, 2012

Management Action Plans:

• Sanctuary Expansion
• Education and Outreach
• Research and Monitoring
• Resource Protection
• Visitor Use
• Operations and Administration
“Notice of Intent” – Public Scoping / Draft EIS

• New Orleans, LA – March 3rd / Airport Hilton
• Houston, TX – March 5th / Bayland Community Center
• Galveston, TX – March 11th / FGBNMS Office

Public Comment period closed: April 6, 2015
### Public Comment Overview

<table>
<thead>
<tr>
<th>Comment Category</th>
<th>Number of Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>177</td>
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<tr>
<td>Organizational</td>
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<tr>
<td>General support</td>
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<tr>
<td>Resource-specific support</td>
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<tr>
<td>Use-specific support</td>
<td>54</td>
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<tr>
<td>Conditional support</td>
<td>15</td>
</tr>
<tr>
<td>Opposition</td>
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</tr>
</tbody>
</table>

*Reefs and Banks of the Northwestern Gulf of Mexico, in Relation to DWH*
Deepwater Horizon Final Programmatic Restoration Plan
Published February 2016
Outlines Restoration Strategies for Injured Resources within various categories
15 year timeframe

Injury Assessment Categories

Mesophotic and deep benthic coral communities
Design studies will ensure success of this technique by determining the optimal design for implementation and allowing responsive decision-making. Collateral injury to other natural resources is expected to be minimal due to the relatively small footprint of hard substrate placement on a vast open expanse of soft sediment substrate. The Trustees do not anticipate that the approach will negatively affect public health or safety and consider it likely to benefit other natural resources. Although the Trustees find this overall restoration approach to be appropriate under OPA, they will ensure project appropriateness by conducting and selecting projects based on a project-specific evaluation of the OPA restoration standards found at 15 CFR § 990.34(a).

D.7.2 Protect and Manage Mesoaphotic and Deep Benthic Coral Communities

This restoration approach focuses on establishing areas for spatially discrete management of and protection for mesoaphotic and deep benthic communities and associated resources. For some natural resources, projects that manage and prevent future injuries from known threats can often have more certain outcomes and be more cost-effective than projects designed to create these resources (Chapman & Julian 2005). The acquisition of equivalent natural resources or services for public management has long been considered as a viable restoration option (Woocham et al. 1999). The mesoaphotic and deep benthic coral communities would particularly benefit from a preventive restoration project because they are sessile and therefore susceptible to threats such as oil and gas activities, fishing activities, and marine debris. An MPA is defined as “any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide habitat protection for part or all of the natural and cultural resources therein” (MMS Executive Order 13158). Examples of marine MPAs include national marine sanctuaries (NMS), Essential Fish Habitat, habitat areas of particular concern, and oil and gas no-action zones. Establishing protections...
Response Methods and Responsibilities

Steven Buschang, TGLO
State Scientific Support Coordinator, Paige Doelling, NOAA Scientific Support Coordinator

Discussion Topics

- Regulatory - USCG, EPA, States, BSEE
  - Requirements- notifications, FRPs, OSROs, DCOs
  - Requirements- Jurisdictions, plans, liabilities, funds,
- Industry preparedness – e.g. Co-ops, MSRC, MWCC, HWCG etc.
- RRT
- Response methods
Natural Recovery

27 July 2010

3 July 2010

27 July 2010
Berms and Barriers

Photo: The Washington Post
Physical Herding

Manual Removal
Mechanical Removal

Sorbents
Sediment Re-working/Tilling

Mechanical Beach Cleaners for Sediment Sifting

- Beach Tech
- Barber 600 HD Surf Rake
- Cherrington
- Sand Shark
Vegetation Cutting

Flooding/Deluge
Low-pressure, Ambient-temperature Flushing

High-pressure Flushing
High-pressure, Hot Water Flushing

Surface Washing Agents
*in-situ* Burning

Dispersant Use
A Brief Overview of Natural Resource Damage Assessments

Lisa DiPinto, Ph.D.
Senior Scientist
NOAA’s Assessment & Restoration Division
Office of Response and Restoration

NOAA Regional Preparedness Training Workshop
May 24-26, 2016
Galveston, TX

Tragically, events happen
Introduction to Natural Resource Damage Assessment (NRDA)

What is NRDA?

- A legal process to determine
  - Injuries to or lost use of the public's natural resources
  - Appropriate amount & type of restoration needed to offset losses

- Goal is to "make public whole" following release of hazardous substances & oil

- Federal, state and tribal “Trustees” representing the public are required to demonstrate causality between release and resource injury and lost use

Who are Trustees?

- Federal authorities
  - National Oceanic and Atmospheric Administration (NOAA)
  - United States Fish & Wildlife Service (USFWS)
- State agencies
- Indian Tribes

- NOAA is Trustee for:
  - Commercial/recreational fisheries
  - Migratory fish
  - Endangered/threatened marine species
  - Coastal habitats (e.g., wetlands)
  - National Marine Sanctuary/National Estuarine Research Reserve Resources
NRDA Laws and Regulations

NRDA Statutory Authorities:
- CERCLA (Superfund)
- Oil Pollution Act
- Clean Water Act
- National Marine Sanctuaries Act (16 USC 1431 et seq.)
- Park System Resource Protection Act (16 USC 19 JJ)
- Applicable State laws

NRD Regulatory Authorities:
- CERCLA regulations, DOI (43 CFR Part 11)
- OPA regulations, NOAA (15 CFR Part 990)
- National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300)

States may also have NRDA Statutes

Potential Components of a Settlement

FINES, PENALTIES
OUTSTANDING RESPONSE COSTS
NATURAL RESOURCE DAMAGES
**Trustee Roles:**
- Coordinate w/response agencies (e.g., USCG, EPA)
  - Integrate Trustee concerns & science into cleanup
- Assess injuries
- Evaluate & scale restoration alternatives to:
  - Return resources to baseline
  - Compensate for interim lost resources & services
  - “To make the public whole”
- Oversee and/or implement restoration plan
- Recover assessment costs

**Causality:**
- Release
- Pathway
- Exposure
- Injury
Assessment:
What is considered an injury?

“Injury” includes adverse effects on:
• Survival, growth, and reproduction
• Health, physiology and biological condition
• Behavior
• Community composition
• Ecological processes and services
• Physical and chemical habitat quality or structure
• Public services, such as recreation

NRDA: The First 24 Hours

• Coordinate (NRTs, RPs, Contractors/Experts, SSC, OSC etc.)
• Integrate your efforts with ICS
  • Maximizes use of limited assets
  • Avoids duplication of efforts
  • Cost effective
• Develop and maintain situational awareness
• Share your data and findings
• Identify time critical data needs
• Cannot document every injury
Ephemeral Data Considerations

- Document wildlife animals (e.g., fish, turtles, birds)
- Document extent of oiling
- Beach closures, advisories, boat access restrictions
- Environmental samples
- Baseline (areas where oil predicted to impact, reference areas)
- Water column data
  - Fingerprinting
  - Support water column modeling (e.g., fate, transport, toxicity)

Transitioning beyond first 24h

- Focus sampling/design to conduct studies for longer term impacts and recovery trajectory
- Can consider response data to help determine areas for further study
- Determine timeline for data collection
  - Window of opportunity
  - One-time event vs collection over time?
- Coordinated effort
NRDA is Restoration-Focused

- Purpose is to determine type and amount of restoration needed to compensate the public for injuries to their resources
- Restoration is considered early and throughout the process
- Injuries are balanced against, and directly scaled to restoration

NRDA as a Cooperative Process

- Getting to restoration requires a common vision & coordination with Co-Trustees and the public
- Moves faster if Responsible Party shares the same vision and works cooperatively with the Trustees

NRDA is a Legal Process

- Trustees are required to demonstrate causality between release and resource injury and lost use; sound science is key to success!
- Strategy must be encompassing and flexible
A Good Assessment is the Key to A Good Restoration
Offshore Mechanical Oil Recovery Systems
NOAA NRPT
Galveston, TX
May 25, 2016

James Hanzalik
Clean Gulf Associates
MSRC Responder Class OSRV

- 210 ft (64m) length
- 12 knot speed of advance
- 4,000 bbl (636m³) temporary storage
- 2 Oil water separators

- 15 Dedicated Oil Spill Response Vessels nationwide
  - Dedicated special purpose
- High capacity skimming systems
  - Boom and containment
  - Storage
- Floating inventory of ocean boom for enhanced "U" skimming
  - ~2,240m on Gulf of Mexico OSRVs post DWH

- Berthing for 38
- Medical facility
- Helicopter deck
- Command and control capability

MSRC Spill Response Capabilities – OSRVs

- 15 Responder Class OSRVs (7 in Gulf of Mexico)
  - Dual option recovery systems
  - Significant on-board storage (4,000 bbl.) to ensure continuous operations
  - Accommodates 38 personnel for sustained offshore operations
  - 13 ft. draft design provides nearer to shore capability

Enhanced Encounter Rate with Norwegian Bester
J Configuration/Transom for debris laden conditions
**MSRC Deep Blue Program: Low Visibility Capability**

- Capability added to Gulf area OSRVs, OSRBs and PSVs
  - Rutter X-Band Oil Spill Detection & FLIR Infra Red
  - Communications on OSRBs
- Expansion to 8 remaining “Responder” Class OSRVs in ‘12

**95’ Fast Response Vessel**

- All Aluminum Construction with 200 mile range and speed in excess of 24 knots
- Equipped with Aptomar SECurus Integrated Oil Detection System
- Has (2) Sided Mounted 3-Brush Skimmers
- (4) GOM Based Vessels
APTOMAR–RUTTER INFRARED CAMERA/X-BAND RADAR

- Nitrogen-Cooled Infrared Camera
- X-band Radar
- Data Transfer capability for still and video images
- Gyro-Stabilized camera
- Accurate Geo-Referenced to chart information

24-Hour Skimming Operations

Infrared Image

X-band Radar

Geo-referenced
Oil Spill Response Barges (OSRBs)

- Converted from oil storage to skimming barges
- 19 Barges Nationwide
  - Dedicated
- High capacity skimming systems
  - New technology dual skimmers
  - Boom-oil containment
  - Storage
- Floating inventory of ocean boom for enhanced “U” skimming
  - Approximately 2,600 ft each post DWH
High Volume Open Sea Skimming System (HOSS)

- Constructed for Well Blowouts
- 72K Barrel/day recovery rate
- New (4) 5-Brush Lamor skimmers
- Massive Swath - 2,640’ 67” Sea Sentry Boom
- 4,000 Barrel Storage Capacity
- Helipad
- Based in Harvey, LA
High Volume Open Sea Skimming System (HOSS)

**Capable of Skimming 24/7**

- 12 personnel to operate
- Equipped with Aptomar-Infrared Camera/X-Band for low/no light tracking of spills

Offshore during MC-252 spill

**Converted Deep Blue Dual Mission PSVs:**

- Support Boat
- PSV-V00 Class
- Skimming System
KOSEQ Skimming Arms
Dutch High Seas Skimming System

- Developed, Constructed and Refined for over 46 Years
- Used during Sea Empress, Erika, Prestige & MC-252 Oil Spills
- Effective in 10 ft seas

KOSEQ Skimming Arms
Perfectly suited for large Platform or Offshore Supply Vessels

- Deployable on large Petroleum Industry Dedicated Vessels
- Rapidly transported by truck and easily assembled
- Simple to deploy and retrieve
- Requires no assist vessels
KOSEQ Skimming Arms
Efficient Brush or Weir Skimmer

- Provides 48-hour surge capability
- Can be fitted with a weir or brush skimmer

Enhanced Skimming

- Boom Barge -25K feet
- Offshore boom
- Boom “gated” for enhanced swath
**Fast Response Unit**

- Deployable on smaller (140’ or larger) Petroleum Industry Dedicated Vessels
- 100 barrels of storage
- Rapidly transported by truck and easily assembled
- Additional 440’ of offshore 67” Sea Sentry boom & Reel for enhanced swath width

**Offshore Surveillance Capabilities**

**Tactical Skimming Direction**

- Cessna CJ3 Citation
- 2,000 mile range
- Unique Rapid Assessment Capability
- Can Provide Direction to Deployed Skimming Assets
- Increases Oil Skimming Effectiveness
Offshore Surveillance Capabilities

UAS

- Conducted offshore test
- 15-20 minute duration
- Line of Sight
- 200’ Altitude
- UAS to be deployed major CGA skimming assets within the year

MSRC Level ABC Remote Sensing For Tactical Oil Spill Surveillance

- Level A – Aircraft Ocean Imaging Corporation
  - Provides wide-area spill detection, thickness interpretation, and oil distribution mapping
- Level B – Balloon Maritime Robotics
  - Tethered up to 500 ft. Medium range coverage with long “hang” time
- Level C – Close-In
  - Optimizes close-in recovery techniques

- Multispectral/TIR Cameras
- TIR and HD Cameras
- X Band Radar and TIR Camera
Tactics
Five Emergency Response Questions?

• What was spilled? (Oil Chemistry)
• Where is it going? (Oil Forecasts)
• What’s at risk? (RAR/ESI)
• How will it hurt? (Potential Impacts)
• What can be done to mitigate the hurt? (Alternative Response Technologies)

DO NO MORE HARM THAN GOOD
Was there any in-situ burns during the Exxon Valdez Response?
Burning Oil at Sea Research
Basics of Burning Oil at Sea

- Oil must be several mm thick to support sustained combustion on water – thicker better.
- Requires mechanical recovery prior to burning.
- Oil must not be emulsified (water-in-oil) more than 50% (maybe a bit higher water content if you can get a hot enough fire initiated).
- Ignition systems maybe hand deployed or helio-torch (jellied gasoline).
- Not 100% Efficient (is anything 100% efficient?)
Burn Effectiveness In General

- 90-98% Effective at removing surface oil.
- Primary products are CO2 and H2O.
- Some 5% of the oil removed from the surface are incomplete combustion by-products:
  - particulates such as smoke and soot
  - Polynuclear Aromatic Hydrocarbons (pyrogenic)
- Plume monitoring may be required (SMART).
- Surface residues are highly distilled oil residues and may sink especially after the begin to cool.
PROS:

- Removes a large amounts of oil very fast (>2000 bbl/hr) – much faster than a skimming system.
- No storage capacity issues.
- Removes the bulk of the oil from the water surface with no significant increase in dissolved hydrocarbons into the water column.
- Often has a relatively broad window of opportunity (often days).

CONS:

- Limited to same mechanical encounter rate challenges as skimming operations.
- Moves pollution from water to air.
- Highly visible plume (public is often alarmed).
- Combustible liquids only (not emulsified oil).
- Requires specialized fire boom systems.
- May require air monitoring (SMART and maybe other requirements).
- Will likely require wildlife monitoring.
CONS:

- May require RRT approval (Preauthorization)
- Residues may sink (often sink) – exclusion zones pre-identified in RRT6 Authorization (maybe these should be revisited -expanded).
Dispersants Overview

Presentation to:
NOAA Regional Preparedness Training Session
Galveston TX May 25 2016

1. Oil on Water Surface
2. Oil on Shoreline
3. Oil in Water Column

Waterfowl and seabirds are vulnerable to surface oil

Oil reaching shorelines threaten ecologically valuable nearshore habitats and coastal marshes.

Oil dispersed into the water column may increase exposures of fisheries resources.

Source: NOAA

Source: HDR

Source: USGS
And Response Method Strengths Vary

Relative Area Coverage in 2 Days of Operation

Source: BP

Oil Spill Dispersants Response Methods

Surface dispersants applied beyond 3 NM
And depths > 10m

Source: BP
FGBNMS and Oil Spill Dispersants

Busy Location
Reef Depth 16M+

Surface Dispersant Application

1-2 days 4 weeks

Advantages
- Rapid response time
- Large encounter rate
- Bigger window of opportunity
- Enhanced biodegradation

Chart from NOAA Response And Restoration Web Page
More than 11,500 Whole Water Samples were Collected for DWH between April 20 and August 3, 2010

Total PAH Concentrations Between April 20 and August 3, 2010 by Depth

- Geometric means were calculated to represent the central tendency of the data

From Morrison, Murray, Cook & Boehm, GoMRI Conference 2016
Depth of Entrainment Can Be Determined By Evaluating Photodegradation of PAHs

Depletion Difference C1-Chrysene–C4-Chrysene

- No evidence of photodegraded Macondo oil was found at depths below 4.5 meters in the water column

From Morrison, Murray, Cook & Boehm

Offshore and Deep-water Sampling Zones Dispersant Related Chemicals

- No exceedances of benchmarks for dispersant related chemicals (1mg/L)

- Detects for DPnB (one of the more persistent dispersant related chemicals) indicates a decreasing trend in concentrations over time

From Deepwater Horizon MC 252 Operational Science Advisory Team Report Dec. 2010
DWH SMART Tier III Dispersant Application M/V International Peace Study

- Sampling before and after surface dispersant at 1 and 10 M depth
- TPAH and TPH concentrations variable
  - TPAH <0.01–77.33 μg/L
  - TPH <0.01–5.1 mg/L
- DPnB concentration <0.03 μg/L to 100 μg/L
- 94% of data below TPH 5% hazard concentration

Data from Bejarano, Levine & Meams 2013

Subsea Dispersant Application Methods

Advantages
- On 24/7 once deployed
- Best encounter rate
- Biggest window of opportunity
- Surface VOC reduction
- Enhances Biodegradation

Source: BP
Subsurface release – **WITH** dispersant injection

Large oil droplets will give a more vertical stream of oil resulting in a thick surface oil slick directly above the release point.

**From SPE 2016 HSSE Conference Paper 179401 • Subsea Dispersant Injection • Brandvik**
Predicted vs. measured oil droplet sizes

Oil droplet sizes (mm) as a function of nozzle size, flow rate and dispersant injection

From SPE 2016 HSSE Conference Paper 179401 • Subsea Dispersant Injection • Brandvik

Predicted SSDI Droplet size distributions: full scale

Dispersant treated droplets ~0.6mm

Suggests
- Droplets still head to surface
- Easier surface dispersion
- Exposure to FGBNMS from surface oil dispersion

From Johansen, Brandvik, Farooq 2013
Summary

- FGBNMS Scenarios could involve surface or subsea dispersants
- Subsurface dispersants not likely to create direct exposures
- Surface oil entrainment with or without dispersants possible concern
  - DWH data suggests concentrations
    - Total PAH geomean of large data set ~ 0.1 ug/L in 0 to 10 M
    - Dispersant range - 0.1 to 300 ug/L
    - TPH can be in ppm range 1 M short term below dispersant application
    - Surface entrainment of oil observed during DWH was less than 5M

- Much new research on subsurface dispersant

_Closing Comment: review new dispersant research for realistic conditions_
- Rapid Sedimentation caused by
  - Oil interactions with marine snow
  - Oil interaction with microbes
  - Oil interaction with clay minerals

Assessing the Impacts of Oil-Associated Marine Snow
Formation and Sedimentation during and after the
Deepwater Horizon Oil Spill. *Anthropocene*,
http://dx.doi.org/10.1016/j.ancene.2016.01.006

Participants in this work were funded by GOMRI consortiums, Ecogig, and C-Image, Deep-C,

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Mechanism of oil sedimentation

- 1. Interaction of petroleum-derived compounds with the high concentrations of marine snow and suspended particulates at the surface *(Passow et al, 2012; Ziervogel et al, 2012; Joye et al, 2014; Kenner et al, 2014).*
Oil Sedimentation.

• 2. Surface burning likely consumed 5-6% of the oil (Lehr et al 2010), and allowed black carbon and ash to fall to the seafloor (see Koelmans et al 2006; Mari et al 2014).

• 3. Zooplankton can transport oil to the sediment in their fecal pellets following ingestion (Muschchenheim & Lee 2002).
Oil Sedimentation.

4. MOSSFA-like event in the deep water plume at 1000-1300 m.

Valentine et al., 2014

- Microbial density was high in this plume (Hazen et al. 2010).
- *Colwellia* produce floc consisting of oil, carbohydrates and biomass when incubated with MC-252 oil (Baelum et al., 2012).
- Microbial produced floc captures the suspended hydrocarbon-rich particles, formed OMAs, and led to the deposition on the seafloor.
- *Colwellia* was also abundant in the surface sediments in the area (Mason et al., 2014).

Hazen et al., 2010

Spier et al., 2013
A substantial enrichment in gene sequences from phytoplankton chloroplasts in the top 2 cm of deep sea sediment cores was consistent surface input.

Isabel Romero et al., 2015

D. Valentine et al., 2014

Again consistent with deposition from above
Fossil Carbon Penetration DwH

Seep sediment

Δ¹⁴C

-1000  -800  -600  -400  -200  0

Depth (cm)

Spill affected sediment
Confinned to upper cm

Below, pre-spill

Oil deposition from above

Brighter colors depict more ¹⁴C depleted petro-residues, Chanton et al., 2015

Environmental Science and Technology, 49, 847–854 es-2014-046524. doi. 10.1021/es5046524
Inverse Distance Weighing ArcGIS 10.2. Varied neighbor and weighting, also crosschecked with empirical Bayesian kriging (EBK).

Two endmember model for sediment studies

Mixing Line

-1000‰  -200 ± 29‰
Two endmember model for sediment studies

**Mixing Line Δ^{14}C‰**

-1000‰

Radiocarbon Dead
No \(^{14}C\)

-200 ± 29‰

Value of surface
Sediments prior to
The oil spill

Position on mixing lines gives % dilution with petrocarbon
1 more than 2, 3.

---

Two endmember mixing model

- Δ\(^{14}\)C of -1000‰ for petro-carbon
- Average underlying oiled surface layer, -200‰ (± 29‰)
- Measured value *1 = x (-1000‰) + (1-x) (-200 ± 29‰)
- Give fraction of organic matter that is fossil,

- *% OC, * (1-φ) times area of each section, integrate to 1 cm depth..... Gives fossil carbon flux 1.6-2.6 x 10\(^{10}\) grams oil-derived C
- Divide by amount of oil from spill

- Gives 0.5 to 9.1% of spill oil went to the seafloor.
- Best estimate, 3-5%.
- Valentine et al., 2014→ hopane approach 1.8 to 14.4% of total.
So what?

MOSSFA not included in 2010 Oil Calculator Oil Reckoning

No good model to predict it.

So What cont.

- Petrocarbon breaks down more slowly in sediments due to oxygen limitation
- Sediments may serve as long term storage for hydrocarbons for as yet unknown periods.
- With that storage, there is potential for re-exchange with the water column due to either chemical or physical processes that occur in surface sediments including benthic predation, chemical degradation and infaunal mixing.
Diagram illustrates the environmental gradients of material properties and fluxes associated with a point source of oil released in regions influenced by river outflow compared to offshore regions not influenced by riverine processes. Gradient shifts include the concentration and composition of suspended particles (clays to carbonate), the magnitude of particulate organic carbon (POC) and petrochemical fluxes to the seafloor, the depth of the sediment redoxcline, and the tolerance of benthic organisms, such as foraminifera, to different oxygen levels in sediments. Oil-mineral aggregations (OMAs) may sediment separately or in association with marine oil-snow (MOS). These environmental gradients overlap and interact with gradients generated by oil spills, e.g., oil and dispersant distributions, causing a complex temporal-spatial distribution of interactive effects.
Air quality, oily aerosols

Dr. Ed Buskey, Professor
University of Texas at Austin
Director of the DROPPS Consortium

DROPPS* Consortium: Overarching Research Goals

- Distribution, dispersion and dilution of petroleum under the action of physical and chemical processes
- Chemical evolution and biological degradation of petroleum caused by interaction with marine bacteria and plankton; effects of oil and dispersant on planktonic food web
- Production of oily aerosols and effects on human health
- Focus on small scale processes; link these to mesoscale with mesocosms and modeling efforts

*DROPPS: Dispersion Research on Oil: Physics and Plankton Studies
Presenting results from Johns Hopkins University

- Not my research or area of expertise!
- Early results of ongoing research
- Focus on physical processes that cause oil to splash into air
- Addition of dispersants create smaller aerosol droplets (sub-micron)
- Future studies on how far these aerosols travel
- Human health effects

On Phenomena Affecting Oil Droplets
Generation and Aerosolization:

People who did all the work
David W. Murphy, Cheng Li, Xinzhi Xue, Nima N. A-Mohajer, Kaushik Sampath, Vincent d'Albignac, David Morra .......

Presentation by
Joseph Katz
Department of Mechanical Engineering
Johns Hopkins University

Supported by
Gulf of Mexico Research Initiative

Johns Hopkins University
Droplet Generation by Wave Breaking Tilting (Small) Wave Flume Facility

Wave Tank
- Dimensions: 6 x 0.6 x 0.3 m
- Removable top (safety)

Wave maker
- maximum stroke: 1.3 m
- rms error: <0.9 cm
- wave height: 18.2 cm - 34.5 cm
- water depth: 20 - 30 cm
- wave celerity: 1.78-2.41 m/s

<table>
<thead>
<tr>
<th>Stroke (cm)</th>
<th>Height (m)</th>
<th>( V_{\text{max}} ) (m/s)</th>
<th>Frequency (Hz)</th>
<th>Intrusion Depth (m)</th>
<th>Energy dissipation ((m^2s^{-3}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.34</td>
<td>0.29</td>
<td>1.26</td>
<td>2.88</td>
<td>0.75</td>
<td>0.17</td>
</tr>
<tr>
<td>45.72</td>
<td>0.25</td>
<td>1.08</td>
<td>2.27</td>
<td>0.75</td>
<td>0.13</td>
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<tr>
<td>45.72</td>
<td>0.22</td>
<td>0.90</td>
<td>1.94</td>
<td>0.625</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Oil slick confinement system

Cam1 \( x=166 \) cm
Cam2 \( x=243 \) cm
Cam3 \( x=307 \) cm

Stroke: 53.34 cm; Frequency = 0.75 Hz; \( h=28.8 \) cm

Stroke = 45.72 cm; Frequency = 0.75 Hz; \( H=24.9 \) cm

Stroke = 45.72 cm; Frequency = 0.625 Hz; \( H=22.1 \) cm

High Speed Video Showing 3 Breaking Waves

- 10ml crude oil confined in 2.54x25.4 cm\(^2\) area introduced at \( x=150 \) cm
- Oil premixed with Corexit 9500, DOR: 1:25 for 3 case
Measuring Droplet Size Distributions

Subsurface Droplets (DOR1:25)
FOV=2.23 mm x 2.23 mm

Aerosol droplets (DOR1:25)
FOV=2.2 cm x 2.2 cm

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Density (kg/m³)</th>
<th>Viscosity (cSt)</th>
<th>Interfacial Tension (mN/m)</th>
<th>Surface Tension (mN/m)</th>
<th>Oh(50µm-500µm)</th>
<th>We(500µm)</th>
<th>Re</th>
<th># of runs</th>
<th>Multiresolution Imaging</th>
<th>Fluorescence Microscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>877</td>
<td>9.4</td>
<td>19</td>
<td>78</td>
<td>0.3-0.1</td>
<td>110.7</td>
<td>114.4</td>
<td>5</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Crude Oil DOR 1:200</td>
<td>877</td>
<td>10.1</td>
<td>2.35</td>
<td>22.5</td>
<td>0.9-0.3</td>
<td>882.5</td>
<td>106.4</td>
<td>4</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Crude Oil DOR 1:100</td>
<td>877</td>
<td>10.6</td>
<td>1.2</td>
<td>24.7</td>
<td>1.3-0.4</td>
<td>1088.1</td>
<td>101.4</td>
<td>6</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Crude Oil DOR 1:25</td>
<td>877</td>
<td>12</td>
<td>0.28</td>
<td>28</td>
<td>3.0-0.9</td>
<td>7239.2</td>
<td>89.6</td>
<td>4</td>
<td>V</td>
<td>V</td>
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<tr>
<td>Fish Oil</td>
<td>924.4</td>
<td>63.1</td>
<td>14.9</td>
<td>22.5</td>
<td>2.3-0.7</td>
<td>143.4</td>
<td>17.0</td>
<td>3</td>
<td>V</td>
<td>×</td>
</tr>
<tr>
<td>Motor Oil</td>
<td>877.6</td>
<td>306.5</td>
<td>19</td>
<td>24.7</td>
<td>9.3-2.9</td>
<td>106.0</td>
<td>3.5</td>
<td>3</td>
<td>V</td>
<td>×</td>
</tr>
</tbody>
</table>
Wave Tank System

Experimental set-up:

- Micron-sized and nano-sized aerosolized particles
  Detection of nano-sized particles in 2 modes: dry and at RH = 80%
- Total polycyclic aromatic hydrocarbons (PAH)
- Total volatile organic compounds (VOC)

Effect of Dispersants on Nano-scale Aerosol Concentration
H=45.7 cm (intermediate) Wave

Before wave generation

After wave generation

Crude oil slick
No Dispersants

seawater

Crude oil slick
Premixed with 1:25 DOR
Corexit 9500

seawater
Effect of Dispersants on Nano-scale Aerosol Concentration

H=53.3 cm (large) Wave

Before wave generation

After the 2nd wave

After the 8th wave

After 15 waves

Large Wave Tank – Conversion to a Wind-Wave Facility

Wind, >5 m/s
(Rain)drop Impact on a Floating Immiscible Oil Layer:
Splash Behavior and Droplet Sizes

Summary of Results presented in Murphy et al., 2015. J. Fluid Mech. 780, 536-577

- Marine Aerosol
  - Raindrop impact causes generation of marine aerosols
  - Marine aerosol production by rainfall has not not previously investigated
  - Might contribute to aerosolization of crude oil slicks

- Objective:
  - Investigate the effect of raindrop impact on an oil slick on generation of oily aerosols
  - Determine the effect of oil layer properties (thickness, oil properties) and raindrop scales (size and speed) on the splash behavior and size distributions of aerosolized droplets

Classification of Oil Layer Rupture
And Resulting Changes to Crown Behavior

Crude oil layers
\[ u = 7.2 \text{ m/s} \quad We_d = 2964 \]
\[ d = 4.1 \text{ mm} \quad Fr_d = 1288 \]
Classification of Oil Layer Rupture And Resulting Changes to Crown Behavior

No Oil 500 μm Oil Layer

No Crown Formation for High Viscosity Gear Oil

Effect of Dispersants

Gear oil layer
\[ h = 600 \, \mu \text{m} \]
\[ u = 5.2 \, \text{m/s} \]
\[ d = 3.8 \, \text{mm} \]
\[ We_d = 1450 \]
\[ Fr_d = 1689 \]

500 μm crude oil slick premixed with Corexit 9500A dispersant (DOR 1:25)
Lung epithelial toxicity assessment

Ramana Sidhaye, MD
Assistant Professor
Johns Hopkins University
Division of Pulmonary and Critical Care
Airway Epithelium

- In addition to the air, we breathe in all the various other components in the air.
- The airway epithelium is the first line of defense against the respirable environment.

Cellular Toxicity

Simple Method:

Pollutants

Exposure Chamber:
Need to make measurements during an actual oil spill

• Members of DROPPS have been meeting with and attending South Texas Coastal Zone Area Committee meetings

• We are trying to be prepared to either go out with oil spill responders, or have them make measurements for us

• Most interested in measuring aerosol droplets of oil downwind of oil slick

• Also interested in measurements of subsurface oil droplet size with submersible holographic system

Any questions?
(remember this isn’t my research!)
National Oil and Hazardous Substances Pollution Contingency Plan
Subpart J - Use of Dispersants and Other Chemicals

US EPA - Office of Emergency Management
May 2016

Disclaimer

• EPA participation in this workshop should not be interpreted to mean endorsement or agreement with its outcomes or recommendations, nor with specific planning, preparedness and response determinations
• Decisions for the use of dispersants or any other chemical agent are governed by provisions in the Clean Water Act and implemented through the NCP, including Subpart J
• In the event any material presented conflicts with the statute or regulations, the statute or regulations control
National Oil and Hazardous Substances Pollution Contingency Plan (NCP)

- Code of Federal Regulations (CFR), Title 40, part 300
- Divided into 11 subparts (Subpart K reserved for federal facilities)
  - Subpart A - Introduction
  - Subpart B - Responsibility and Organization for Response
    - Worker Health and Safety – 40 CFR 300.150
  - Subpart C – Planning and Preparedness
    - Area Contingency Planning (ACP) – 40 CFR 300.210
  - Subpart D – Operational Response Phases for Oil Removal
  - Subpart E – Hazardous Substance Response
  - Subpart F – State Involvement in Hazardous Substance Response
  - Subpart G – Trustees for Natural Resources
  - Subpart H – Participation by Other Persons
  - Subpart I – Administrative Record for Selection of Response Action
  - Subpart J – Use of Dispersants and Other Chemicals
- Covers both oil and hazardous substance removal
  - Certain subparts are tailored to respond to oil removal or to hazardous substance response

Figure 4

Relationship of Plans

![Diagram of relationship between plans](image)
Fish and Wildlife and Sensitive Environments Plan (FWSEP)

- All ACPs incorporate detailed annex containing FWSEP
  - Consistent with the RCP and NCP
  - Prepared in consultation with the USFWS and NOAA and other interested natural resource management agencies/parties.
- Among other requirements, the annex is to:
  - identify and establish priorities for fish and wildlife resources and their habitats and other important sensitive areas requiring protection from any direct or indirect effects from discharges,
  - provide a mechanism to be used during a spill response for timely identification of protection priorities of those fish and wildlife resources and habitats and sensitive environmental areas that may be threatened or injured by a discharge, and
  - identify potential environmental effects on fish and wildlife, their habitat, and other sensitive environments resulting from removal actions or countermeasures, including the option of no removal
    - Based on the evaluation of potential environmental effects, the annex should establish priorities for application of countermeasure and removal actions to habitats within the geographic region of the ACP.
Authority for Subpart J under the Clean Water Act

- 33 USC 1321 (d)(2)(G) – Prepare a schedule, in cooperation with the States, identifying—
  - (i) dispersants, other chemicals, and other spill mitigating devices and substances, if any, that may be used in carrying out the Plan,
  - (ii) the waters in which such dispersants, other chemicals, and other spill mitigating devices and substances may be used, and
  - (iii) the quantities of such dispersant, other chemicals, or other spill mitigating device or substance which can be used safely in such waters,

which schedule shall provide in the case of any dispersant, chemical, spill mitigating device or substance, or waters not specifically identified in such schedule that the President, or his delegate, may, on a case-by-case basis, identify the dispersants, other chemicals, and other spill mitigating devices and substances which may be used, the waters in which they may be used, and the quantities which can be used safely in such waters.

- EO 12777 delegates 33 USC 1321(d)(2)(G) to the EPA Administrator
- Implemented under Subpart J of the NCP

NCP Subpart J – Use of Dispersants and Other Chemicals

- Authorization of Use (40 CFR 300.910)
  - RRTs and ACs address the desirability of using appropriate dispersants, other products listed on the NCP Product Schedule, and burning agents
  - RCPs and ACPs shall, as appropriate, include applicable preauthorization plans and address the specific contexts in which such products should and should not be used
  - Pre-authorization plans require approval of:
    - EPA RRT representative
    - States with jurisdiction over the waters of the area to which a preauthorization plan applies and;
    - DOC and DOI natural resource trustees
  - Authorization of use for spill situations that are not addressed by the preauthorization plans requires:
    - Concurrence of the EPA representative to the RRT
    - As appropriate, concurrence of the RRT representatives from the states with jurisdiction over the navigable waters threatened by the release or discharge
    - Consultation with the DOC and DOI natural resource trustees
NCP Subpart J – Use of Dispersants and Other Chemicals

• Authorization of Use
  – Exception only to prevent or substantially reduce threat to human life
    • Insufficient time to obtain the needed concurrences/consultations
    • OSC must inform the EPA RRT representative and, as appropriate, the RRT representatives from the affected states and, when practicable, the DOC/DOI natural resources trustees as soon as possible
    • Not intended to circumvent preauthorization or case-by-case use authorizations
      – NCP addresses worker health and safety under 40 CFR 300.130
  – The use of burning agents on a case-by-case basis
    • Concurrence of the EPA RRT representative
    • As appropriate, concurrence of the RRT representatives from the states with jurisdiction over the navigable waters threatened by the release or discharge
    • In consultation with the DOC and DOI natural resource trustees, when practicable
  – Sinking agents not authorized for application to oil discharges

NCP Product Schedule Listing

• Includes data and information requirements for dispersants, surface washing agents, surface collecting agents, bioremediation agents, and miscellaneous oil spill control agents (MOSCAs)
• Specific to dispersants
  – Components and percentages (may be claimed CBI)
  – Effectiveness and acute toxicity testing
  – Recommended application procedures, concentrations, and conditions for use depending upon water salinity, water temperature and other application restrictions
• Listing does NOT mean that EPA approves, recommends, licenses, certifies, or authorizes the use of the product on an oil discharge
  – Only that product has met minimum requirements for listing
• 117 products (April 2016)
• https://www.epa.gov/emergency-response/national-contingency-plan-subpart-j
Subpart J Proposed Rulemaking

- Last major revision in 1994
- Proposed Rule - 80 FR 3380, January 22, 2015
- Public comment period closed on April 22, 2015
- Docket ID No. EPA-HQ-OPA-2006-0090
- Comments posted to the docket are publically available
  - https://www.regulations.gov
- 81,973 total comments including
  - 596 individual entries
  - 6 separate mass mailer campaigns
- Statues updates: http://www.reginfo.gov/public/
NET ENVIRONMENTAL BENEFIT ANALYSIS (NEBA)

THE EVOLVING STATE OF THE ART

WHAT IS NEBA?

• A STRUCTURED APPROACH USED BY THE RESPONSE COMMUNITY AND STAKEHOLDERS DURING OIL SPILL PREPAREDNESS PLANNING AND RESPONSE, TO COMPARE THE ENVIRONMENTAL BENEFITS OF POTENTIAL RESPONSE TOOLS AND DEVELOP A RESPONSE STRATEGY THAT WILL REDUCE THE IMPACT OF AN OIL SPILL ON THE ENVIRONMENT. (IPIECA, 2015).
4 STAGES OF THE NEBA PROCESS

• **Compile and Evaluate Data** to identify an exposure scenario and potential response options, and to understand the potential impacts of that spill scenario.

• **Predict the Outcomes** for the given scenario, to determine which techniques are effective and feasible.

• **Balance Trade-Offs** by weighing a range of ecological benefits and drawbacks resulting from each feasible response option.

• **Select the Best Response Options** for the given scenario, based on which combination of tools and techniques will minimize impacts.

NEBA PROCESS CAN BE APPLIED BEFORE OR DURING A SPILL

• **Planning Phase** – hypothetical scenarios.

• **Response Phase** – known scenario. Existing NEBAS may be modified or NEBA process can be used by environmental unit.

• **Drills** – Region VI has utilized “expedited NEBAS” as a way of simulating NEBA activities of an environmental unit.
USE OF THE NEBA PROCESS IN THE US

- CONSENSUS ECOLOGICAL RISK ASSESSMENT (CERA) – SIMILAR TO NEBA. TYPICALLY DOES NOT ADDRESS SOCIO-ECONOMIC OR CULTURAL CONSIDERATIONS (AURAND, ET AL., 2000).
- CERA GUIDANCE DEVELOPED BY US COAST GUARD IN 2000.
- SEVERAL CONDUCTED SINCE 1990S. NONE CONTEMPLATED AN UNCONTROLLED SUBSEA OIL RELEASE.

CHALLENGES TO THE USE OF NEBA

- LARGE COMMITMENT OF TIME AND FUNDING FOR VARIED STAKEHOLDERS.
- PERCEIVED BIAS TOWARDS NEAR SHORE ENVIRONMENTAL RESOURCES
- INCREASED RELIANCE ON USE OF WEB-BASED MEETING TOOLS IN PLACE OF PHYSICAL MEETINGS
EVOLVING GUIDELINES

• 2000 - DEVELOPING CONSENSUS ECOLOGICAL RISK ASSESSMENTS: ENVIRONMENTAL PROTECTION IN OIL SPILL RESPONSE PLANNING A GUIDEBOOK. U.S. COAST GUARD. WASHINGTON, D.C.

• 2013 - ASTM STANDARD NUMBER F2532 - 13: STANDARD GUIDE FOR DETERMINING NET ENVIRONMENTAL BENEFIT OF DISPERSANT USE. ASTM INTERNATIONAL, WEST CONSHOHOCKEN, PA. WWW.ASTM.ORG

• 2015 - RESPONSE STRATEGY DEVELOPMENT USING NET ENVIRONMENTAL BENEFIT ANALYSIS (NEBA). IPIECA-IOGP GOOD PRACTICE GUIDE SERIES, OIL SPILL RESPONSE JOINT INDUSTRY PROJECT (OSR-JIP).

• TBD – API. RESPONSE STRATEGY DEVELOPMENT USING SPILL IMPACT MITIGATION ASSESSMENT (SIMA) IN THE UNITED STATES

• TBD – API. GUIDANCE ON IMPLEMENTING NEBA (NEBA ENGINE)

EVOLVING PRACTICES

• USE OF NEBA PROCESS DURING RESPONSE ACTIONS BY ENVIRONMENTAL UNIT OF THE NIMS INCIDENT COMMAND SYSTEM (ICS)

• SOCIO-ECONOMIC IMPACTS ADDRESSED BY UNIFIED COMMAND, OUTSIDE OF THE NEBA PROCESS

• INCREASED RELIANCE ON “EXPEDITED NEBAS” OR “ENVIRONMENTAL TRADE OFF ANALYSIS” WITH FEWER STAKEHOLDERS DURING RESPONSE PLAN DEVELOPMENT AND DRILLS.

• COORDINATION WITH RESOURCE TRUSTEE EMERGENCY CONSULTATION PROCESSES
POTENTIAL ACTIVITIES FOR GULF OF MEXICO

- GULF–WIDE NEBA THAT CAN BE ADAPTED FOR INDIVIDUAL USE CASES
- COMPREHENSIVE “RESOURCES AT RISK” (RAR) DOCUMENT(S) THAT CAN BE USED FOR NEBAS, PLAN DEVELOPMENT, AND DRILLS
- DRILL OR INCIDENT SPECIFIC RAR’S TO BE POSTED ON NOAA WEBSITE
- “METHOD NEBA” SPECIFIC TO SUBSEA DISPERSANT INJECTION TO BE CONDUCTED BY API FOLLOWING D3 RESEARCH

POTENTIAL NAME CHANGE

- SPILL IMPACT MITIGATION ASSESSMENT (SIMA)
Appendix F: Breakout Group Members
NOAA’s Regional Preparedness Training (NRPT)
Environmental Tradeoff Analysis (ETA) for an Oil Spill Response
Impacting the Flower Garden Banks National Marine Sanctuary

May 25 – 26, 2016
Flower Garden Banks National Marine Sanctuary
Galveston, Texas

BREAKOUT GROUPS

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downstairs: Conference</td>
<td>2nd Floor: Library</td>
<td>Downstairs: Shelly’s Office</td>
<td>2nd Floor: Ballroom</td>
</tr>
<tr>
<td>Group Lead: Charlie Henry</td>
<td>Group Lead: Mike Sams</td>
<td>Group Lead: Paige Doelling</td>
<td>Group Lead: Mark Miler</td>
</tr>
</tbody>
</table>

| Arden Ahnell          | Darice Breeding          | Jorge Brenner            | Kris Benson              |
| Steve Buschang        | Marty Cramer             | Victoria Broje           | Patrick Cuty             |
| Lisa DiPinto          | Steve Gittings           | Michael Condon           | Andrea Grupe/Zoe Reed*   |
| Mike Drieu            | James Hanzalik           | Ronnie Crossland         | Dan Hahn                 |
| Chris Hale*           | Whitney Hauer*           | Matthew Johnson          | Joseph Kuehl             |
| Emma Hickerson        | Tony Knap                | Aaron Rice               | George Pontikos          |
| Joanie Steinhaus      | Tim Nedwed               | G.P. Schmahl             | Roger Prince             |
| John Temperilli       | Ellis Pickett            | Jim Staves               | Melissa Simpson          |
| Brandi Todd           | Steve Spencer            | Andy Tirpak              | Rusty Swafford           |
|                       |                          | Raven Walker*            | Thomas Tregle            |
|                       |                          |                          | Ann Hayward Walker       |

*note taker
Appendix G: Breakout Group Template
NOAA’s Regional Preparedness Training (NRPT)
Environmental Tradeoff Analysis (ETA) for an Oil Spill Response
Impacting the Flower Garden Banks National Marine Sanctuary

Breakout Group

Wednesday, May 25
2:15 PM Breakout Group Session I

Identify resources at risk

Establish initial response objectives and actions

Current pre-authorization and exclusion zones as they apply to the Flower Garden Banks

Identify NRDA activities occurring during response
**Thursday, May 26**  
9:00 AM Breakout Group Session II

<table>
<thead>
<tr>
<th>Identify response options</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify response tradeoffs for the options</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify “external pressures” affecting response decision-making</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify the key elements that would drive the decision-making process</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Knowledge gaps**

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
</table>

**Additional notes**

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
</table>
**Thursday, May 26**  
**1:15 PM Breakout Group Session III**

| Determine the response options that are applicable to the spill scenario |  |  |
| Discuss the tradeoffs that are applicable to the spill scenario |  |  |
| Capture the key elements that drove the decision-making process |  |  |
| List key elements not considered in the Session II discussion |  |  |

Based on these tradeoffs, recommend to the Federal On Scene Coordinator (FOSC) which response option(s) should be used in the spill scenario

Capture the common key elements that drove the decision-making process

Knowledge gaps

Additional notes
Appendix H: Group A Breakout Session Notes
NOAA’s Regional Preparedness Training (NRPT)
Environmental Tradeoff Analysis (ETA) for an Oil Spill Response
Impacting the Flower Garden Banks National Marine Sanctuary

Breakout Group A

Wednesday, May 25
2:15 PM Breakout Group Session I

Identify resources at risk

<table>
<thead>
<tr>
<th>Habitat types:</th>
<th>Species:</th>
</tr>
</thead>
<tbody>
<tr>
<td>benthic communities- shallow coral reef, mesophotic coral, deep sea corals, soft-bottom; brine seep</td>
<td>Mammals – orcas sighted many years ago, sperm whales deeper, atlantic spotted dolphin, bottlenose dolphin, Marine Mammal Protection Act</td>
</tr>
<tr>
<td>surface layers- Sargassum</td>
<td>Sea turtles – loggerheads, hawksbills (both t/e), potentially leatherbacks in the area</td>
</tr>
<tr>
<td>water column-</td>
<td>Fish – reef associated vs. more pelagic species. Wahoo is a seasonal fish highly targeted by rec fishers (aggregate along West &amp; East Banks), lionfish, marbled grouper (rare in the Gulf but utilize FGB)</td>
</tr>
<tr>
<td>Rigs – birds, turtles &amp; butterflies use rigs to feed/rest</td>
<td>Rays &amp; sharks- (hammerhead congregations, rays congregate as well), whale sharks, tiger sharks</td>
</tr>
<tr>
<td></td>
<td>Corals – black coral, elkhorn &amp; staghorn, star coral (4 listed; all are managed/protected)</td>
</tr>
<tr>
<td></td>
<td>Birds – migratory (FGB is a major corridor/flyway for birds)</td>
</tr>
<tr>
<td></td>
<td>Plankton of various spp. – early life stages are to be considered; (coral gametes float though over time they do sink/spread in water column); fish spawn (whale sharks feed off of fish spawn)</td>
</tr>
</tbody>
</table>

15 total species endangered & threatened (on ESL)
23 species of interest

Human use:
- Fishing (commercial and rec)
- Scuba diving
- Oil and gas
- Shipping
- Sailing
- Historical value (really old coral!)

*flyovers for coral spawn events – get baseline measurements
Establish initial response objectives and actions

- Protection of (1) public/ responders (2) control the source (3) containment & cleanup of oil spill (4) minimize & mitigate environmental impact (5) keep public and stakeholders informed

Actions:
- Coordination with FGB staff, Trustees
- Modelling trajectories – weather & oceanographic models
- Getting spill info – characteristics of oil, where is the spill, where it’s coming from, etc. & specifics of event (assessing the incident)
- Identifying the RP
- Notifications – required by law; based on RP or source of spill; phone tree is initiated
- Set up Incident Command – event based decision on location of Command Post (RP vs. Mystery source)
- Establish an envi. Data management plan for collection & storage

Current pre-authorization and exclusion zones as they apply to the Flower Garden Banks

- RRT: surface dispersant use or in situ burning in the GOM (NOT for subsurface use); exclusion zone around FGB (FGB has say on use of in situ burning since they are “owners”)
- DOI resources? USFWS covers Birds, sea turtles only when nesting

Identify NRDA activities occurring during response

- NRDA & NOAA DRC are alerted at the same time – coordinated response
- NRDA wants to document ephemeral info – time is of importance
- Scale is an issue; smaller scales are more manageable when it comes to coordination
- Samples sometimes have to be split between response agencies
- NRDA starts looking for experts on resources (species, habitats etc.) – what data exists and/or what data do we need; what methods are used to survey resources
- Operational data – NRDA relies on their contractors (because response personnel are busy!) to get operational details
- RP goes out on site with NRDA
- NRDA coordinates with Trustees, needs a cooperative agreement with RP, and has to go to NPFC
### Identify response options

<table>
<thead>
<tr>
<th>Mechanical removal – skimming, booming, suction</th>
<th>In situ burn</th>
<th>Surface dispersant</th>
<th>Subsurface dispersant</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>• +No additional chemicals being added</td>
<td>• +removes large fraction of oil from surface</td>
<td>• +speed of deployment</td>
<td>• At this time it is a secondary response option based on source location</td>
<td>• + Might be appropriate for very light oils</td>
</tr>
<tr>
<td>• +a fraction of the oil is removed from the env.</td>
<td>• +removes oil faster than skimming</td>
<td>• +high encounter rate</td>
<td>• +Less physical encounters with natural resources</td>
<td></td>
</tr>
<tr>
<td>• -time (it’s a slow process); time to mobilize also takes more time</td>
<td>• -must be done early in the process (emulsification)</td>
<td>• +effective</td>
<td>• Increases risk of oil coming to shore</td>
<td></td>
</tr>
<tr>
<td>• low encounter rate (you don’t treat as much as the oil vs. other methods)</td>
<td>• -Requires mechanical collection (herding) to burn the oil</td>
<td>• Weather dependent</td>
<td>• Increases risk of encounter to surface natural resources</td>
<td></td>
</tr>
<tr>
<td>• skimming is limited by sea state conditions</td>
<td>• -Requires specialized boom</td>
<td>• Limited by assets</td>
<td>• Persistence in the environment</td>
<td></td>
</tr>
<tr>
<td>• response fleet size (# available skimmers) is a limitation if the spill is very large</td>
<td>• -availability of equipment</td>
<td>• Toxicity</td>
<td></td>
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<tr>
<td></td>
<td>• -Burn residue sinks (impacts natural resources)</td>
<td>• Moving the oil deeper which could/will impact natural resources in Mixed Layer...but salvaging surface organisms/resources</td>
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<tr>
<td></td>
<td>• -adverse effect on air quality</td>
<td>• Potentially increases</td>
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<tr>
<td>Group A</td>
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<tr>
<td><strong>Identify “external pressures” affecting response decision-making</strong></td>
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<tr>
<td>- Public perception that mechanical removal is the preference</td>
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<tr>
<td>- Public &amp; political: time/getting the oil removed as fast as possible</td>
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<tr>
<td>- Other response options coming from public can interfere with response decision making</td>
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<tr>
<td>- Public concern if it’s nearshore</td>
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</tr>
<tr>
<td>- Exemptions/exclusion zones</td>
<td></td>
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<tr>
<td>- Cannot have a sensitive population down-wind (humans, corals [residue], anything...)</td>
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<tr>
<td>- RRT or pre-approval needed</td>
<td></td>
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</tr>
<tr>
<td>- Public perception that dispersants are extremely toxic to health (humans and marine resources)</td>
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<tr>
<td>- Political: time getting the oil removed as fast as possible</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Identify the key elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Weather</td>
</tr>
<tr>
<td>- Availability of assets</td>
</tr>
<tr>
<td>- Weather</td>
</tr>
<tr>
<td>- Availability of assets</td>
</tr>
<tr>
<td>- Weather</td>
</tr>
<tr>
<td>- Availability of assets</td>
</tr>
</tbody>
</table>

- **Public pressure to DO SOMETHING!**
- **Political**
<table>
<thead>
<tr>
<th>Knowledge gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hydrate zones – what is the effect of response options on hydrate zones? No empirical data.</td>
</tr>
<tr>
<td>• There is an evolving science related to use of subsurface disp. in the deep, deep sea.</td>
</tr>
<tr>
<td>• What is the safest vs. least safe response option for responders?</td>
</tr>
<tr>
<td>• How much residue from in situ burning actually sinks?</td>
</tr>
<tr>
<td>• Aerosols from surface dispersants – what is the real impact?</td>
</tr>
<tr>
<td>• Effect of dispersant on marine snow formation?</td>
</tr>
<tr>
<td>• Baseline information/data needed for FGBNMS resources.</td>
</tr>
<tr>
<td>• At what depth does sub-surface dispersant become successful vs. not?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Emergency responders hope for in subsurface dispersant use: 80% effectiveness (reduction in oil reaching the surface)</td>
</tr>
<tr>
<td>• Mechanical removal is the least efficient method of removing oil from the open water env. (experience supports that)</td>
</tr>
<tr>
<td>• For all response options: offers for assistance and solutions from public actually impedes response</td>
</tr>
<tr>
<td>• ADCPs &amp; knowledge of the various currents related to the Banks is crucial for decision making</td>
</tr>
<tr>
<td>• Dispersant + oil = sinking Sargassum</td>
</tr>
</tbody>
</table>
Thursday, May 26
1:15 PM Breakout Group Session III

<table>
<thead>
<tr>
<th>Determine the response options that are applicable to the spill scenario</th>
<th>No Response is not an option based on the trajectory and landfall</th>
<th>Mechanical recovery</th>
<th>Surface dispersant off the shelf</th>
<th>Surface dispersant after slick passes the Banks (morning application)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss the tradeoffs that are applicable to the spill scenario</td>
<td>•</td>
<td>• 5-6 hour minimal transit time (using CGA boats) • Get on scene 10 or 11 pm • Much more risk to responders – night operations</td>
<td>• 2-3 hour transit time • Natural dispersal vs. dispersed oil • Turtle vs. coral • Concern for air-breathers (turtles and mammals) vs. value of centuries old coral • Colonial bird nesting (rookery islands and on beach) • Kemp’s Ridley turtle nesting season</td>
<td>•</td>
</tr>
<tr>
<td>Capture the key elements that drove the decision-making process</td>
<td>•</td>
<td>• Very low success rate of mass spawners (fish &amp; coral) so prioritize older/mature wildlife (turtles,</td>
<td>• Plane access (2 planes) for aerial dispersal • Very low success rate of mass spawners (fish &amp; coral) so</td>
<td>•</td>
</tr>
<tr>
<td>List key elements not considered in the Session II discussion</td>
<td>•</td>
<td>• Pre-determined response rescue team specifically for spotting and capturing turtles (&amp; perhaps mammals) need to be On-Call</td>
<td>• In real life scenario, we would not advocate the use of dispersant until it had passed over the</td>
<td></td>
</tr>
</tbody>
</table>

- Surface-feeding animals need to be considered (manta rays, whale sharks)
- Evaporation by the time it hits the Banks
- Prioritize older/mature wildlife (turtles, mammals, air-breathers)
- Surface-feeding animals need to be considered (manta rays, whale sharks)
- Evaporation by the time it hits the Banks
- Surface currents
- Concentration of dispersants used
- Mixing zone – temperature layer marks the mixing layer (do we have proper instrumentation in place to confirm mixing layer?)
- Uncertainty re: coral impact

mammals, air-breathers)
- Surface-feeding animals need to be considered (manta rays, whale sharks)
- Evaporation by the time it hits the Banks
- Prioritize older/mature wildlife (turtles, mammals, air-breathers)
Based on these tradeoffs, recommend to the Federal On Scene Coordinator (FOSC) which response option(s) should be used in the spill scenario

**Minimal Regret**
1. Mechanical recovery of oil at night; mobilize megafauna rescue operations
2. Once the slick has passed the FGB, aerial and boat dispersant surface application (this happens next morning);
3. Continue mechanical recovery and on-water assets to treat remaining fraction of oil

**Capture the common key elements that drove the decision-making process**
- Value of coral vs. value of turtles – what is the ultimate cost of impact to either? Can a reef be replaced or restored? Can a turtle population be restored?
- Value of charismatic megafauna?
- Safety restriction zones are activated – fishing area closures

**Knowledge gaps**
- What is the dispersant concentration that causes negative impact to coral species? Duration vs. concentration
- We need better identification of mixing layer data (temp etc.) in and around the Banks (only 2 buoys currently within the Banks)
- Micro-movements of water around the Banks – water movement responds to the bathymetry. More data needed.

**Additional notes**
- We need teams of trained, pre-approved scientists that can deploy monitoring equipment on a moment’s notice – they need to get on scene to capture measurements that response personnel are too busy to capture
- Key take home from this drill - emergency responders tend to take aggressive action early on, BUT after consultation with the experts (in this case FGBNMS staff & scientists) the response decisions were altered based on local knowledge.
- We recognize that early dispersant deployment could result in a west-ward drift that could impact the West FGB
Appendix I: Group B Breakout Session Notes
NOAA's Regional Preparedness Training (NRPT)
Environmental Tradeoff Analysis (ETA) for an Oil Spill Response
Impacting the Flower Garden Banks National Marine Sanctuary

Breakout Group B

Wednesday, May 25
2:15 PM Breakout Group Session I

Identify resources at risk

- Seabirds and whales are not in the area
- Air: Seabirds (migration pattern is not in the Banks, but they could be attracted if they think it’s land with spill)
- Sea surface:
  - Sargassum communities—120+ species
  - Fish eggs (not a research priority for FGB) and larvae (coral is important)
  - Dolphins, sea turtles, whale sharks
- Water column
  - Jelly fish
  - Rays – Eagle and mobula
  - Fish eggs and larvae
  - Dolphins, sea turtles, whale sharks
  - Hammerhead sharks
  - Manta rays
  - Fish
- Benthic:
  - **Coral reefs 20-50 m**
    - 20+ species corals hard corals
    - Sponges
    - Associated invertebrates
    - Algae communities
    - (no shipwrecks)
  - **Deep corals: 50-70+ meters**
    - Coraline algae
    - Sponges
    - (as you go to further depths, lesser concentrations of communities, there are deep fish, anhiids are important group of fish)
- Ecosystem services: tourism, diving, commercial and recreational fishing
- Cultural resources: are none
Establish initial response objectives and actions

Response objective: minimize impact to RARs
Prioritize RARs:
  o  Protect the habitat (coral): loss to coral is a very long term impact
  o  Avoid surface contact to those organisms that need air contact

ID Response Actions:
  o  Trajectory/model -
    o  in-water measurement, buoys (2, 30 miles apart, currents are not correlated), gliders (not as effective)
  o  Mobilize response resources to mitigate effects of oil spill
    o  Start as far away from FGB as possible
  o  Surveillance (aerials)
  o  Monitor
  o  Analyze oil type and properties, oil weather, take oil sample

Initiate notification

Current pre-authorization and exclusion zones as they apply to the Flower Garden Banks

  o  FGB is a pre-auth for disp, but consultation should take place with the superintendent
    o  Effort should be made for applying disp as far away as possible
    o  FGBNMS requests notification, can be used for consultation for RARs
  o  In-situ burn is excluded

Identify NRDA activities occurring during response

  o  Water sampling
  o  Air sampling
  o  Passive sampling
  o  Document of the FGB, have a good baseline already but still document the corals
  o  Sediment samples
  o  Biota sampling
  o  Survey recreational activities
  o  Wildlife observations
  o  Source oil samples

Other thoughts:
  o  Environmental sensitivity index for FGB, include vulnerability
    o  Include in ERMA, make available shape file for other GIS platforms
  o  Want a geographic response plan for the Houston/Galveston and other ACP
## Identify response options

### No Action
- Takes longer to get out, 5-6 h (24 knots)
- Removing oil from the environment
- Deal with the waste
- Not as efficient offshore (<10% roughly)
- Weather dependent
- Logistics and responder safety and exposure risk
- A lot more equipment - risk of ship strike, increased air pollution, etc.

### Mechanical Recovery: containment and recovery
- The residue that sinks will smother the benthos, the subsurface trajectory would be important but difficult to predict, further off shore, the residue would breakup as it sinks
- In-situ burn offshore is unlikely
- Transfer to the atmosphere, air quality, smoke
- Remove up to 90% captured oil
- Herding agents (not stock piled), no boat, would take 12 h, may work at higher seas
- Fire boom w/ boat, 10-12 h from dock to location (12 knots)

### In-situ Burn
- The residue that sinks will smother the benthos, the subsurface trajectory would be important but difficult to predict, further off shore, the residue would breakup as it sinks
- In-situ burn offshore is unlikely
- Transfer to the atmosphere, air quality, smoke
- Remove up to 90% captured oil
- Herding agents (not stock piled), no boat, would take 12 h, may work at higher seas
- Fire boom w/ boat, 10-12 h from dock to location (12 knots)

### Surface Dispersant
- Subsea Dispersant

### Identify response tradeoffs for the options

- More certainty that benthic organisms would not be exposed
- Allowing oil to weather, emulsify, breakup and more difficult to treat later
- May hit shoreline
- Risk to human health, wildlife on surface, risking to shipping, boating, recreational/commercial impacts
- Disturb the shipping fairway
- Responder risk reduced

### Identify "external pressures" affecting response decision-making

- Public would not be happy
- Organizationally, fed and state would have political pressure

### Tradeoffs

<table>
<thead>
<tr>
<th>Identify response options</th>
<th>No Action</th>
<th>Mechanical Recovery: containment and recovery</th>
<th>In-situ Burn</th>
<th>Surface Dispersant</th>
<th>Subsea Dispersant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify response tradeoffs for the options</td>
<td>- Takes longer to get out, 5-6 h (24 knots)</td>
<td>- More certainty that benthic organisms would not be exposed</td>
<td>- The residue that sinks will smother the benthos, the subsurface trajectory would be important but difficult to predict, further off shore, the residue would breakup as it sinks</td>
<td>- 1.5 h to get out by flight</td>
<td>- Dispersed oil in water column is better that oil slick on surface</td>
</tr>
<tr>
<td>- Removing oil from the environment</td>
<td>- Allowing oil to weather, emulsify, breakup and more difficult to treat later</td>
<td>- In-situ burn offshore is unlikely</td>
<td>- In-situ burn offshore is unlikely</td>
<td>- Organisms that come to the surface, density of organisms greater than elsewhere (turtles not dolphins) v organisms in the water column above 10 m (mantas, eagle rays, whale sharks, plankton, fish species)</td>
<td>- Higher exposure to water column and benthos than surface</td>
</tr>
<tr>
<td>- Deal with the waste</td>
<td>- Not as efficient offshore (&lt;10% roughly)</td>
<td>- Transfer to the atmosphere, air quality, smoke</td>
<td>- Remove up to 90% captured oil</td>
<td>- Fish eggs/larvae at surface v adult species in water column</td>
<td>- Safety for responders</td>
</tr>
<tr>
<td>- Not as efficient offshore (&lt;10% roughly)</td>
<td>- Weather dependent</td>
<td>- Herding agents (not stock piled), no boat, would take 12 h, may work at higher seas</td>
<td>- Remove up to 90% captured oil</td>
<td>- Oil slick will stay on the surface and continue to have soluble components (1 ppb) will continue to be in the water column without the dispersant</td>
<td>- Efficient dispersant because applied to fresh oil</td>
</tr>
<tr>
<td>- Weather dependent</td>
<td>- Logistics and responder safety and exposure risk</td>
<td>- A lot more equipment - risk of ship strike, increased air pollution, etc.</td>
<td>- Remove up to 90% captured oil</td>
<td>- Acute exposure would be greater with dispersant for a shorter period of time with dispersant but sub lethal concentration might be greater with an oil slick for a longer period of time</td>
<td>- 3 days to get out</td>
</tr>
<tr>
<td>- A lot more equipment - risk of ship strike, increased air pollution, etc.</td>
<td>- Disturb the shipping fairway</td>
<td>- Responder risk reduced</td>
<td>- Reduce risk to responder and the public</td>
<td>- Requirements for monitoring is more complex, harder to monitor the subsurface</td>
<td>- Can use less dispersant (100:1) rather than surface (20:1)</td>
</tr>
<tr>
<td>Identify &quot;external pressures&quot; affecting response decision-making</td>
<td>(for spill of significance)</td>
<td>- Preferred option</td>
<td>- Concern that residue mass will sink and smother benthos</td>
<td>- Likelihood to sacrifice deep habitat organisms, near field</td>
<td>- Likely to sacrifice deep habitat megafauna</td>
</tr>
<tr>
<td>- Public would not be happy</td>
<td>- Pressures to maintain on scene presence despite limited vessel capability</td>
<td>- Perception that the smoke will impact wildlife</td>
<td>- (If used over the bank)</td>
<td>- 24 h operation</td>
<td>- Public perception is negative</td>
</tr>
<tr>
<td>- Organizationally, fed and state would have political pressure</td>
<td>- Concern that residue mass will sink and smother benthos</td>
<td>- Perception that the smoke will impact wildlife</td>
<td>- Perceived damage of dispersant (getting overspray to charismatic megafauna)</td>
<td>- Public perception is negative</td>
<td>- Politicians making the most of disaster to further their agenda</td>
</tr>
</tbody>
</table>
### Identify the key elements that would drive the decision-making process

<table>
<thead>
<tr>
<th>- size of spill</th>
<th>- time on scene</th>
<th>- Need to have confidence that any residue that may sink would be far away from FGBNMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- type of oil</td>
<td>- size of spill</td>
<td>- the timing on spawning, timing of species presence (probability of losing a year class of coral does not have long term implications)</td>
</tr>
<tr>
<td>- spill trajectory</td>
<td>- type of oil</td>
<td>- safety of responded, reduce VOCs at the surface</td>
</tr>
<tr>
<td>- weather, sea-state, cloud cover</td>
<td>- spill trajectory</td>
<td>- depth of well head (400 ft is too shallow bc of gas coming out of well)</td>
</tr>
<tr>
<td>- time of spill</td>
<td>- weather, sea-state, cloud cover</td>
<td>- proximity to shore</td>
</tr>
<tr>
<td></td>
<td>- time of spill</td>
<td>- type of oil</td>
</tr>
<tr>
<td></td>
<td>- location</td>
<td>- spill trajectory</td>
</tr>
<tr>
<td></td>
<td>- likelihood of using alternative response options</td>
<td>- weather is less of a driver</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- time of spill</td>
</tr>
</tbody>
</table>

### Knowledge gaps

- The effect of disp and disp oil (DDO) on adult species at low levels (e.g., whale sharks), likely will never know this, this is not a driver for decision-making.
- The trajectory of a sinking residue after in-situ burn

### Additional notes

- Bioremediation was discussed but not considered for the table
- Water column will have sub lethal concentration (1 ppb) even without the use of dispersant
- Explore feasibility of herding agents. Limited stock pile in GOM. Herding is only used for in-situ, doesn't last long enough for mechanical recovery
- Significant increase in capability since Macando and the ability to skim at night
- there is a near field impact to benthos around the area where subsea dispersant were applied (may be from additional factors than just the dispersant, sediment loaded flocculent material, the mud coming out from the well)
Thursday, May 26
1:15 PM Breakout Group Session III

Sunset: 20h11
FOSC would consult with NMS superintendent

| Determine the response options that are applicable to the spill scenario | Aerial surface dispersants until 1830 h leaving the airport today, trial test to see if dispersible, if dispersible, keep dispersing  
- mobilize right now from Houma  
- person on craft to do Tier 1 monitoring from NOAA, USCG  
- comms on plane can communicable on shore | Mechanical recovery leaving bw 14-1500 h. Thurs night and Friday is the time window to skim. Breaking waves on Sat  
- OSRP vessel to skim, w/ X-Band and IR  
- Get other 2 95s would be there Fri AM to skim  
- Vessel of opportunity skimming  
- Reduced skimming at night  
- 10-15% recovery possible |
|---|---|---|
| Discuss the tradeoffs that are applicable to the spill scenario | - Dispersant and disp oil would be in the upper mixing layer. The reef is 20 m deep but you have 10-12 mi away from reef when disp was applied.  
- Oil is not on surface: marine mammals, turtles, birds  
- Responder safety  
- Socio-economic, bird sanctuary, of gulf coast is at less risk  
- weather more suitable for disp over mechanical recovery  
Or, wait 1 day  
- No plume through FGBNMS but slick passes over may hit turtles | - Skim less as weather gets worse.  
- |
| Capture the key elements that drove the decision-making process | - mitigate exposure to RAR  
- Need a competent Tier 1 observer  
- NMS manager is OK with dispersant before slick hits FBG v wait until after the slick passes and then apply dispersant  
- 4 h more time delay before getting mechanical to arrive on scene  
- Encounter rate is much better  
- weather is optimal for dispersant use | - weather is driver |
| List key elements not considered in the Session II discussion | - Respect policy to use dispersant as far away from NMS as possible  
- Ability to get competent Tier 1 observer | |
Based on these tradeoffs, recommend to the Federal On Scene Coordinator (FOSC) which response option(s) should be used in the spill scenario

<table>
<thead>
<tr>
<th>Send out mechanical recovery and dispersant out ASAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>If NMS manager is OK</td>
</tr>
<tr>
<td>• Trial disp run</td>
</tr>
<tr>
<td>• If dispersible, dispersant as much as possible on Day 1</td>
</tr>
<tr>
<td>• Skim overnight</td>
</tr>
<tr>
<td>• If needed, apply dispersant on Day 2</td>
</tr>
<tr>
<td>• Anything passes by, mechanically recover</td>
</tr>
<tr>
<td>• If not dispersible, mechanically recover</td>
</tr>
<tr>
<td>If NMS is not OK</td>
</tr>
<tr>
<td>• Trial disp run</td>
</tr>
<tr>
<td>• If dispersible, deploy mechanical recovery on Day 1</td>
</tr>
<tr>
<td>• Skim overnight</td>
</tr>
<tr>
<td>• Wait until slick passes NMS before adding dispersant on Day 2 and Day 3</td>
</tr>
<tr>
<td>• Continue mechanical recovery to catch oil moving towards shore</td>
</tr>
<tr>
<td>• Bring in more shoreline protection and recovery resources e.g., booming sensitive areas, near-shore skimming assets by Day 4</td>
</tr>
</tbody>
</table>

Capture the common key elements that drove the decision-making process

- Reduce risk to FGB sanctuary resources surface dwelling organisms (turtles, marine mammals)
- Threat to shoreline and tourist

Knowledge gaps

Additional notes

- The current scenario is real life is much more complicated but for this drill it is simplified
- Assumed started weathering at 7 AM
- Bc no RP, don’t have to go through options
- in-situ burn is excluded bc the remaining residue may sink
- Beach can be cleaned pretty easily
- Longer you wait, emulsify more, heavier to pick up
- Bc no RP, there isn’t oil company skepticism on response option, or liability if dispersed and plume goes through FGBNMS and 1 ppb would cause impact. NRDA is a concern for deep pockets
- Shake test on boat for dispersant efficiency
- USCG needs to understand the hiring process for non-BOA contract
- If there is a trial run, what is the lag time from the Tier 1 observer communicating with the FOSC that the dispersant application is OK
- Assuming 100 dispersion in upper 20 m of the FGB NMS, it would be 130 ppb
Appendix J: Group C Breakout Session Notes
NOAA’s Regional Preparedness Training (NRPT)
Environmental Tradeoff Analysis (ETA) for an Oil Spill Response
Impacting the Flower Garden Banks National Marine Sanctuary

Breakout Group C

Wednesday, May 25
2:15 PM Breakout Group Session I

Identify resources at risk

- Coral reef (benthic, pelagic, surface); T&E species
- Benthic community (60m-120m) – deepest parts of sanctuary are comprised of soft-bottom
- Deep reef black coral and gorgonians (120m)
- Habitat v organisms
- Soft v hard corals- speed of recovery (depth dep)
- Potential sensitive biological features
- Deep reef (>300m) not a habitat of concern here
- Deep reef v mesophotic – mesophotic corals here
- Organisms – brittle stars, fish species (imp commercially and recreationally – yellow edge grouper & tilefish, grouper species), small populations are a concern or slow to recover species, and populations/species only found in FGB
- Identify depth, species, location, seasonality (spawning events) and level of concern (T v E)
- Life-stage cycles – stages more sensitive than others
- Months and species of aggregations
- Hammerheads aggregate in FGB (Winter to Spring), grouper spawning aggregations (spring – summer)
- Document seasonal, spatial, depth of spawning aggregations by species and species of concern -> temporal doc for concerns
- Focus on certain depths for areas of concern – what is most sensitive or important habitat
- 50m-20m is coral reef cap is most sensitive area
- Corals, concentration on econ important species assoc with corals (snapper/grouper complex), polychaetes, crabs, small fish (system drivers) – key organisms for diversity & success of reef
- Isolated – don’t understand recruitment very well -> many are prolific spawners so may have potential to re-colonize
- Seasonality components of habitat and organisms
- Turtles – loggerhead, hawksbill, and leatherback – typically in 50m or greater
- Pelagic community – additional fish, whale sharks, shark species, rays – especially manta rays, turtles, some transient mammal species (whale), spotted dolphins (important – not commonly seen in Gulf)
- Larval species – where located? Surface water v pelagic environment
- Whale sharks don’t aggregate in this area of GoM
- Not spawning area of other fish (outside of groupers and corals)
- Whale Sharks tend to be sub-adults, not juveniles but not full adults – same for Hammerheads
- Surface community:
  - Not concerned for birds – few offshore species
  - Sensitive coral larvae – short window of time
  - Sponges, brittle stars, polychaetes – broadcast spawning will allow for eggs in water column –
Establish initial response objectives and actions

- **Objectives:**
  - Human health & safety primary concern
  - Protection of most sensitive environ resources (see above)
  - Integrate overall response plan with FGBNMS response plan – advisory council for MS
  - Obtain situational awareness
  - Economic impact – maritime transits, commercial/recreational fishing, recreational diving
  - Source control

- **Actions:**
  - Wildlife observer/recovery team
  - Trajectory and fate
  - Determine response management
  - Potential removal of coral and relocation – likely not feasible
  - Initiate surveys – operational support, aircraft, satellites
  - Prevent oil from reaching FGB
  - Assess feasibility and impact of dispersants
  - Buoys for surface currents – ADCP’s for deep currents – oil companies can deploy on-call
  - Understand current movements
  - OSRP Plan – is it applicable?
  - Looking at possible solutions – mechanical removal, dispersants, ISB, nothing
  - Communication/Engagement with stakeholders
  - Evaluate response techniques

Current pre-authorization and exclusion zones as they apply to the Flower Garden Banks

- **Pre-authorized:**
  - Surface dispersants only
  - *Nothing for subsea at this point

- **Exclusion zones:**
  - Not specified
  - Is exclusion zones for ISB, not for dispersants

Identify NRDA activities occurring during response

- Situational Awareness – resources at risk, response actions, sampling, remote sensing of dispersal, wildlife damage assessment, baseline values/samplings, establish injury (monitoring program), long-term recovery, naturally occurring biological issues – doc injury as occurs if assoc with oil,
  - Deploy SPMDs
  - Communicate/identify with trustees; get input – general coordination with response
  - Apply/develop best management practices to minimize damage – related to response
  - Initiate federal consultations
<table>
<thead>
<tr>
<th>Identify response options</th>
<th>No action, Natural attenuation, Monitoring</th>
<th>Mechanical Recovery</th>
<th>Surface Dispersant</th>
<th>In-situ burn</th>
<th>Subsurface Dispersant</th>
</tr>
</thead>
</table>
| **Identify response tradeoffs for the options** | - Accepting risk natural dispersion of oil  
- Impact above 10m  
- Microbial degradation (weeks)  
- Possibility of returning  
- More extended surface impacts  
- Decrease toxicity, increase stranding/smothering  
- Size of oil droplets impacts  
biodegradation & persistence | - Encounter rate  
- Response time for assets  
- Will not remove all oil  
- Safety issues  
- Risk to wildlife  
- Ability to recover impacted wildlife  
- Health issues for responders  
- Disposal issues  
- Air pollution  
- Benign to environment for recovered oil  
- Can be effective in appropriate conditions | - Shift oil into water column  
- Remove oil from surface  
- More bio-available to small organisms  
- Easier biodegradation  
- Reduced dispersion size  
- Higher concentration in top 10m  
- Much higher encounter rates  
- Response time – faster  
- Short-term and local net loss of organisms  
- Increased potential for exposure to coral | - Shift oil into atmosphere  
- Encounter rate  
- Response time for assets  
- Will not remove all oil  
- Safety issues  
- Risk to wildlife  
- Potential wildlife recovery  
- Health issues for responders  
- Immediately reduces risk to surface organisms  
- Potential impact to coral  
- Quick removal from boom  
- Long-term persistence of sunken residue | - Ability to keep significant percent of oil from surface  
- Keep from surface but shift to water column/sediments/deep water  
- High oil concentrations in water column at spill location  
- Safety and well control  
- Oil dispersed elsewhere may travel to FGB at depth?  
- Marine snow  
- Potential to control dispersion below surface |
| **Identify “external pressures” affecting response decision-making** | - Potential shoreline impact  
- Political external pressures  
- Negative public | - Visibility of response action  
- Historically/publicly preferred option  
- Snake oil salesmen | - Certain vulnerable environmental windows  
- Public perception  
- Political/agency | - Regulatory requirements (monitoring)  
- Public perception  
- Visibility of | - Certain vulnerable environmental windows  
- Public perception  
- Political/agency |
| Identify the key elements that would drive the decision-making process | - Weather  
- **Safety**  
- Type of spill (size, location, scenario, trajectory, expected impact)  
- Time of year  
- Expected persistence  
- Natural Resources present  
- Response resources available | - Weather  
- **Safety of response personnel**  
- Type of spill (size, location, scenario, trajectory, expected impact)  
- Time of year  
- Expected persistence  
- Natural Resources present  
- Response resources available  
- Expected efficiency  
- Removes oil from local environment  
- Waste disposal options  
- Response time vs spill size | - Weather and extent of water column mixing & oil penetration  
- Weather forecast  
- Transport forecast  
- Public perception  
- Political response  
- Natural resources present  
- Seasonality  
- Expected efficiency  
- Type of spill/oil  
- Persistence in environment  
- Speed of response  
- Window of opportunity | - Safety  
- Availability of response resources  
- Weather and extent of water column mixing & oil penetration  
- Weather forecast  
- Transport forecast  
- Public perception  
- Political response  
- Natural resources present  
- Seasonality  
- Expected efficiency  
- Type of spill/oil  
- Persistence in environment  
- Speed of response  
- Window of opportunity | - Volume of oil dispersed  
- Scenario specific  
- Weather and extent of water column mixing & oil penetration  
- Weather forecast  
- Transport forecast  
- Public perception  
- Political response  
- Natural resources present  
- Seasonality  
- Expected efficiency  
- Type of spill/oil  
- Persistence in environment  
- Speed of response  
- Window of opportunity |

**Knowledge gaps**

- Fate of subsea dispersion
Group C

- Local oceanographic conditions
- Lack of fate & transport knowledge
- Lack of information of vulnerability in water column – assumptions mid-column less vulnerable
- Aspects of FGB resiliency – coral recruitment, speed of recovery
- Ability to assess long-term effect vs short-term effects
- Effect of dispersants – do they reduce, increase, or cause no change?
- Lack of deep water habitat knowledge – how is it effected?

Additional notes

- Highly scenario dependent
- Marine snow and volume of spill
**Thursday, May 26**  
**1:15 PM Breakout Group Session III**

<table>
<thead>
<tr>
<th>Determine the response options that are applicable to the spill scenario</th>
<th>Aerial dispersal (0-10hr)</th>
<th>Aerial dispersal (Day 2)</th>
<th>Mechanical (Day 1-3)</th>
<th>Boat dispersal (Day 2)</th>
<th>No Action</th>
</tr>
</thead>
</table>
| Discuss the tradeoffs that are applicable to the spill scenario | - Reduce some surface of oil before reaching FGB  
- Uncertainty of impacts to coral at FGB – may be minimal? | - All surface oil could be dispersed  
- Localized & temporary increase of oil concentration in water column  
- Can expect biodegradation | - May have oil reach shoreline  
- Reduction in surface oil  
- Reduce efficiency on day 3 due to wide spreading & thinning of oil & sea state | - Localized & temporary increase of oil concentration in water column  
- Some oil removed from surface |  |
| Capture the key elements that drove the decision-making process | - Trajectory/Proximity to FGB  
- Nightfall  
- Window of opportunity  
- % of oil can be dispersed? | - Past the FGB  
- A lot of surface oil can be dispersed quickly & prevent from moving to shoreline  
- Oil is still dispersible | - Response visibility  
- No approvals needed  
- Resources are available  
- Immediate deployment | - Option in toolbox in case other options are precluded by weather  
- Limited encounter rate |  |
| List key elements not considered in the Session II discussion | - Time-lag for dispersal discussions/consultation s | - Discussions completed | - | - |  |

Based on these tradeoffs, recommend to the Federal On Scene Coordinator (FOSC) which response option(s) should be used in the spill scenario:

Deploy mechanical recovery immediately (with approval for night operations); aerial dispersion application on day 2 if mechanical is predicted not to be able to recover all recoverable oil by day 2; use mechanical recovery to continue demonstrating response actions in vicinity of landfall.
Capture the common key elements that drove the decision-making process

Onshore:
- Sea turtles potentially nesting
- Heavy recreational beach use
- Environmental issues – effects to critical habitats (estuaries, mangroves, etc); retention of oil in SEDs of sandy beaches,
- Political & public concerns/pressure
- Potential oil sinking in near shore SEDs

Offshore:
- Wildlife risk at surface – sea turtles, mammals, sargassum patches
- Reduce damage to habitat (oil droplets on coral) – more important long-term
- Lack of stratification in water column
- Political concerns/pressure
- Essential fish habitat (entire GoM)

Knowledge gaps
- Biological impact of the concentration of physically or chemically dispersed oil (hydrocarbon effects on corals)
- How much will be dispersed prior to reaching FGB – will any go over FGB?

Additional notes
- ISB – not practical because of time constraints in scenario
- West Bank may be more effected than East Bank with dispersion concentrations??????
- Work through the night with mechanical removal (skimmers) if safe
- Methods most effective in first 48hrs
Appendix K: Group D Breakout Session Notes
NOAA's Regional Preparedness Training (NRPT)
Environmental Tradeoff Analysis (ETA) for an Oil Spill Response
Impacting the Flower Garden Banks National Marine Sanctuary

Breakout Group D

Wednesday, May 25
2:15 PM Breakout Group Session I

Identify resources at risk

- Sargassum mats, turtles, 15 threatened or endangered species of whales, coral species, and marine mammals. Birds, recreational diving spaces, fishing (recreational and commercial), shipwrecks, oil platforms, human health and safety/personnel (public and employees), ship channel traffic, essential fish habitat, water quality, plankton, habitat area of particular concern (subset of EFH). Fish, crustaceans. Nursery and spawning areas/habitats.
- Benthic: soft corals, hard corals, algae, other encrusting organisms, soft-bottomed habitat concerns.
- Pelagic fish species, zooplankton. Manta rays and whale sharks are specifically protected by marine sanctuary regulations. Sharks.
- Cephalopods

Establish initial response objectives and actions

- Establish Unified Command and issue notifications.
- Assess if this is an ongoing or one-time release and scale the incident in time and space.
- Secure the source (and identify and characterize the spilled oil and obtain a sample)
- Protect human health and safety.
- Establish safety zone.
- Identify specific environmental resources present/at risk. Identify environmental priorities and protection strategies. Identify and monitor current conditions and wind/weather conditions.
- Assess leak trajectory. Identify the resources available for reference for existing planning documents associated with previous responses.
- Assess booming/skimming/in-situ burning/containment measures and if it’s practical/necessary
- Define operational period and response planning.
- Identify stakeholders and information sources.
- Establish a joint information center.

Current pre-authorization and exclusion zones as they apply to the Flower Garden Banks

- Pre-approved, no exclusion for FGB. Coordinate with superintendent of the sanctuary.
- Identify existing current pre-authorization and exclusion zones as they apply to the FGB.

Identify NRDA activities occurring during response

- Collect baseline information, and, if appropriate, emergency rescue potentials.
- Start the NRDA pre-assessment which would allow for the decision of a full NRDA to be made.
Group D

- Water sampling in and around the slick.
- Identify stakeholders.
- Establish NRDA command.
<table>
<thead>
<tr>
<th>Identify response options</th>
<th>No Response (Natural Attenuation with Monitoring) – assuming crude oil</th>
<th>Mechanical Recovery – assuming crude oil</th>
<th>In situ burn – assuming surface oil – assuming crude oil</th>
<th>Dispersant application (surface) – assuming crude oil</th>
<th>Dispersant application (sub-surface) – assuming well blow out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify response tradeoffs for the options</td>
<td>-Any other response option would cause more injury than no action -Monitoring requirement: complex (water quality, aerial...) -resource prioritization -seasonality and species sensitivity and vulnerability -community scale impacts</td>
<td>-Logistical requirements (ships, resources, spatial scale, transit times, storage capacity...) -encounter rate -not a ‘green’ solution – must still dispose of waste (changing where it ends up in the environment – reused in industrial purpose) -personnel safety -community scale impacts</td>
<td>-Logistical requirements (ships, resources, spatial scale, transit times...) -no storage requirements that mechanical clean up requires -encounter rate -personnel safety more complex -in situ burn not allowed at FGBNMS (burn residue, wind direction) therefore additional actions needed -smothering effect of burn residue -specialized boom -not a primary response option (supplemental) -typically involves RRT (regional response team) conversation</td>
<td>-typically involves RRT (regional response team) conversation -not a primary response option (supplemental) -Logistical requirements (ships, resources, spatial scale, transit times...) -no storage requirements that mechanical clean up requires -high encounter rate -SMART monitoring required -moving pollution to different media -resource prioritization -seasonality and species sensitivity and vulnerability -marine snow</td>
<td>-requires RRT (regional response team) concurrence -not an initial response option (supplemental) -resource prioritization -seasonality and species sensitivity and vulnerability -marine snow -Logistical requirements (ships, resources, spatial scale, transit times...) -no storage requirements that mechanical clean up requires --high encounter rate (at point source, with mixing) -NRT monitoring protocol required</td>
</tr>
<tr>
<td><strong>Identify “external pressures” affecting response decision-making</strong></td>
<td>-shoreline impacts bias: FGBNMS offshore location -public and political perception: perceptions of risk equating into fear, wide range of process understanding</td>
<td>-public and political perception: positive -public and political perception (dirty smoke plumes) -political pressure (inexpensive in comparison to mechanical removal) -potential marine life impacts (turtles) -community scale impacts</td>
<td>-public and political perception: perceptions of risk equating into fear, wide range of process understanding -serious negative perception of chemical dispersants (adding chemicals to the environment...) -communication and changing public perception of negative perception (fear and mistrust) of chemical dispersants and offshore environment -environmental trade-off analysis -community scale impacts</td>
<td>-public and political perception: perceptions of risk equating into fear, wide range of process understanding -serious negative perception of chemical dispersants (adding chemicals to the environment...) -communication and changing public perception of negative perception (fear and mistrust) of chemical dispersants and offshore environment -environmental trade-off analysis -lack of independent/academic research support -community scale impacts</td>
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<tr>
<td><strong>Identify the key elements that would drive the decision-making process</strong></td>
<td>-resource prioritization -seasonality and species sensitivity and vulnerability -no response possible due to conditions (weather, environment...) -fate and trajectory</td>
<td>-weather -limited response possible due to conditions (weather, environment...) -fate and trajectory modeling -longer window of opportunity</td>
<td>-weather -fate and trajectory modeling -moving pollution to atmosphere -effects of smothering effect of burn residue -narrow window of opportunity</td>
<td>-weather less of an issue -fate and trajectory modeling (oil coming down)</td>
<td></td>
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<tr>
<td>Knowledge gaps</td>
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<tr>
<td>- Species toxicology (exposure, duration, and dosage)</td>
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<tr>
<td>- Fate and transport modeling (3D modeling [i.e. current modeling])</td>
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<tr>
<td>- No research (DwH funded) correlation to response decisions, yet</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Reminder not to calibrate to DwH (i.e. amount of burn residue from single release would be much smaller)</td>
</tr>
<tr>
<td>- Social media has made public opinion stronger</td>
</tr>
<tr>
<td>- Speed of information flow has changed response</td>
</tr>
<tr>
<td>- Public attention span short</td>
</tr>
<tr>
<td>- Traditional limitations on nighttime operations are changing</td>
</tr>
</tbody>
</table>
**Thursday, May 26**  
**1:15 PM Breakout Group Session III**

### Determine the response options that are applicable to the spill scenario

<table>
<thead>
<tr>
<th>Mechanical Cleanup</th>
<th>Dispersants</th>
<th>Shoreline Cleanup</th>
</tr>
</thead>
</table>
| • Weather conditions, locations of response vessels (Options: Galveston 3, Corpus Christi, Lake Charles) Leave LC on standby | • Potential for resource damage (specifically FGBNMS resources)  
• Recreational use of shore / beach | • Economic Impacts for recreational use |

### Discuss the tradeoffs that are applicable to the spill scenario

| • Mobilization (eta on scene 12-24 hours minimum)  
• Are there enough assets to respond on time?  
• Weather window based on forecast is 48 hours.  
• Decanting of oily water is an option in federal waters (behind the boom)  
• The potential for the slick breaking up is high  
• Mobilization of remote sensing equipment to guide ships to thickest portion of slick.  
• Make an estimate of what fraction of the oil you could collect in the best case scenario.  
• 24 hours on scene before weather becomes prohibitive. | • DC3 in Houma can be on scene in 4 hours  
• C130 in Stennis or Arizona can be on scene in 12 hours (pilots in Arizona)  
• “As far from the sanctuary as possible”  
• Spotter aircraft would precede and be launched from Houma  
• Dispersants must have SMART monitoring? (Tier 1 by plane)  
• Response window of 2 hours on day 1 to accomplish:  
• Window 4 to 6 hours of time = maximum of three runs  
• RRT approval must be made immediately.  
• Sanctuary consultation.  
• Initial  
• Sunset is 2015. | • We want to act to minimize the amount of oil that will reach the beach. Since it is possible that some oil will strand on the beach, we should prepare for shoreline cleanup. |

### Capture the key elements that drove the decision-making process

- Sunset is 2015.
• Storage capacity is adequate.

• Try as early as possible and/or wait until slick passes sensitive / protected areas.
  • Waiting to apply dispersants will minimize the potential risk to FGBMNS.

List key elements not considered in the Session II discussion

Based on these tradeoffs, recommend to the Federal On Scene Coordinator (FOSC) which response option(s) should be used in the spill scenario

1) Mechanical cleanup launching from Galveston and Corpus Christi and putting Lake Charles responders on standby.
2) There was not enough time to apply dispersants prior to reaching FGBNMS. There is still time to apply dispersants after the slick has passed FGBNMS.
3) Simultaneous application of dispersants while mechanical removal is underway will require careful management. (SIMOPS)

Capture the common key elements that drove the decision-making process

• Window for hitting it early was too tight

Knowledge gaps

• Estimate of amount of oil collection that is possible
• Ocean Current Information

Additional notes

• No response not an option; it would have impact on near/onshore
• Time zero is noon today
• In situ burning is probably not an option due to approval time (within the response time frame window)
• Minimal regret
• Should we consider standardized dispersant testing on vessels? (Like Sintef)
• This is in an area of Bluefin tuna spawning
Appendix L: Workshop Spill Scenario
Five Emergency Response Questions?

• What was spilled? (Oil Chemistry)
• Where is it going? (Oil Forecasts)
• What’s at risk? (RAR/ESI)
• How will it hurt? (Potential Impacts)
• What can be done to mitigate the hurt? (Alternative Response Technologies)

DO NO MORE HARM THAN GOOD

THIS IS ONLY A DRILL
NRPT Oil Spill Scenario – Garden Banks Mystery Spill

- Just before noon on 26 May, two BSEE employees in route to an offshore platform observe a slick 6 miles long by 0.5 miles wide that is greater than 60% dark oil coverage.

- The mystery spill was observed in the Garden Banks Lease Area. The source of the spill could not be determined by the observers. The leading edge was located at 27 degrees 45 minutes N Lat. 93 degrees 20 minutes W Long.

- Once the helicopter landed at the Shell Auger Platform, a National Response Center (NRC) notification was made. The BSEE employees also notified their HQ office in New Orleans and the USCG (note, the Shell Auger platform is not suspected – it was simply their destination).
The observers estimated that the volume of oil was 1000 bbls (42,000 gal), but the true volume could be as much as 2000 bbls or even 500 bbls as on-water estimations are difficult to make and prone to error because of the difficulty in estimating true oil thickness.

The NOAA Scientific Support Coordinator was notified and coordinated an initial trajectory analysis and spot weather forecast.

Given the threat to the Flower Gardens, the waters of the Gulf of Mexico, and Texas Coastal Zone, the USCG FOSC has initiated a response.

26 May 2016 - Noon
THIS IS ONLY A DRILL

• At Noon on 26 May 2016, the leading edge of the reported slick was located roughly 20 miles ESE of the East Flower Garden Bank of the Flower Garden Banks National Marine Sanctuary (FGBNMS).

• Winds are currently 10-15 knots out of the ESE and ocean currents along the shelf are running W at just under 0.5 knots. The slick is expected to pass over the East Bank of the FGBNMS overnight.

• The trajectory forecast predicts that the slick will develop a more NE track once it moves over the shelf and toward the Texas coast.

• Landfall of any remnants of the slick is possible on Memorial Day on beaches in the Bolivar - Galveston area and potentially even further to the south depending on the longshore current speed. Beach oiling will likely be sporadic tarballs and streamers of emulsified weathered oil.
THIS IS ONLY A DRILL
NRPT Oil Spill Scenario – WX

– Thursday, 26 May 2016
  ESE at 10-15 knots, Seas 2-4 feet
– Friday, 27 May 2016
  SE at 15-20 knots, Seas 3-5 feet
– Saturday, 28 May 2016
  SE at 15-20 knots, Seas 4-6 feet
  (frequent breaking waves and white caps)
– Sunday, 29 May 2016
  SE at 20-25 knots, Seas 5-7 feet
– Monday, Memorial Day (Sunny)
  SSE at 10-15 knots, Seas 3-5 feet

• What was spilled? (Oil Chemistry)

  • Unknown Crude Oil
  • Estimated API Gravity – 32 to 34
  • Estimated Evaporation – 30 to 35 % in the first 48 hrs.
  • Estimated Natural Dispersion – 10 to 15%