

Oil Spill Science: Improving Preparedness for Marine Oil Spills to Minimize Health, Social, and Economic Disruptions

by Martha Sibley and Christine Hale

In the United States, a widespread conversation about the impact humans have on the natural environment began with Rachel Carson's book *Silent Spring*, published in 1962. Her book examined the dangers caused by the misuse of the pesticide Dichlorodiphenyltrichloroethane, commonly known as DDT. The conversation continued with unease about air and water pollution following the 1969's Cuyahoga River Fire in Ohio and Santa Barbara Oil Spill in California. The Cuyahoga River experienced large amounts of pollution and a fire began when sparks from a passing train ignited floating oil slick debris (Ohio History Central). The Santa Barbara Oil Spill occurred 5.5 miles to the southeast of Santa Barbara and released an estimated three million gallons of oil over eleven days (NOAA). Following the Santa Barbara Oil Spill, some described an emergence of a new environmentally conscious political movement (Clark & Hemphill, 2002). The three previously mentioned events contributed to the increased interest of the United States government in environmental contaminants and thus formed the U.S. Environmental Protection Agency (EPA).

Since the 1969 Santa Barbara Oil Spill, stakeholders¹ increased investment in workshops, educational programs, and research related to the prevention, preparedness, and response for the oil industry and oil spills. Over the past four decades, the frequency of these efforts increased dramatically and their topic focus has expanded beyond the purely physical, environmental, and technical aspects.² Programs began including the cultural, economic, physical health, psychological, and sociological effects of oil spills and the oil industry.³ An example for each of these respectively is disruption of subsistence sharing networks, job loss, cancer risk, anxiety, and population displacement (Nicholls et al., 2017).

In 2017, the Gulf Research Program (GRP) and the Health and Medical Division of the National Academies of Sciences, Engineering, and Medicine (NASEM) hosted a workshop entitled "Preparing for a Rapid Response to Major Marine Oil Spills: Protecting and Assessing the Health and Well-Being of Communities".⁴ The workshop examined essential research opportunities for improving public health preparedness, response, and protection associated with oil spills; reflected on ways to work within and complement the conventional framework for oil spill response, to promote community health and well-being; and encouraged connections between public health workers, oil spill practitioners, disaster researchers, and leaders from affected communities (Giammaria, Nicholson, & Snair, 2018; National Academies of Sciences, Engineering, and Medicine, 2017). Workshop attendees identified potential challenges and opportunities for communities to support preparedness and resiliency after a spill and encouraged the GRP to convene similar meetings to gather input at the local level.

Based on the workshop discussion, the GRP is collaborating with the Sea Grant Oil Spill Science Outreach Program to host a series of regional workshops to identify opportunities to improve preparedness for the public health, social disruption, and economic impacts of oil spills. Many people

¹ Stakeholder here refers to anyone involved in the oil industry, has an impact on the oil industry, or stands to be impacted by some aspect of the oil industry.

² This was viewed from an in depth examination of workshop proceedings and review of the literature conducted for this paper. The search included an EndNote Library of 910 resources and a focused search of stakeholder websites for each regional location later discussed.

³ See the attached diagram presented at the 2017 NASEM workshop, "Marine Oil Spills: Array of POTENTIAL Human Effects".

⁴ The workshop brief is available at <http://www.nap.edu/24924>.

focus on the impacts of oil spills in the Gulf of Mexico region since the Deepwater Horizon Oil Spill of 2010. However, both small and large oil spills occur regularly all across the United States, as displayed in Figures 1 and 2. The National Oceanic and Atmospheric Administration (NOAA) says thousands of small oil spills occur annually in United States waters and 44 spills of over 10,000 barrels followed the 1969 Santa Barbara well blowout.

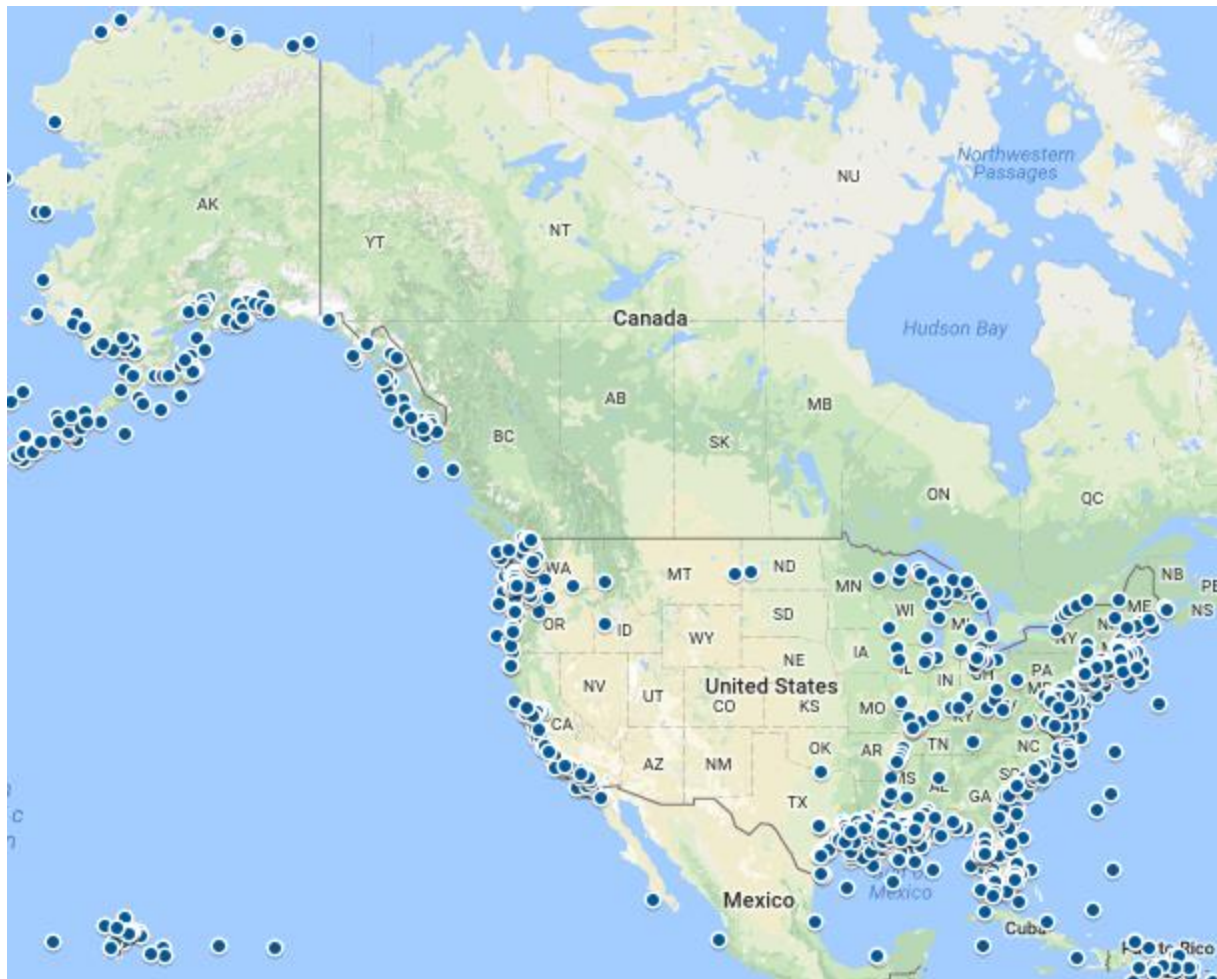


Figure 1: This map was generated using data collected by NOAA's Office of Response and Restoration. Each dot represents an oil spill related event for which they provided support.

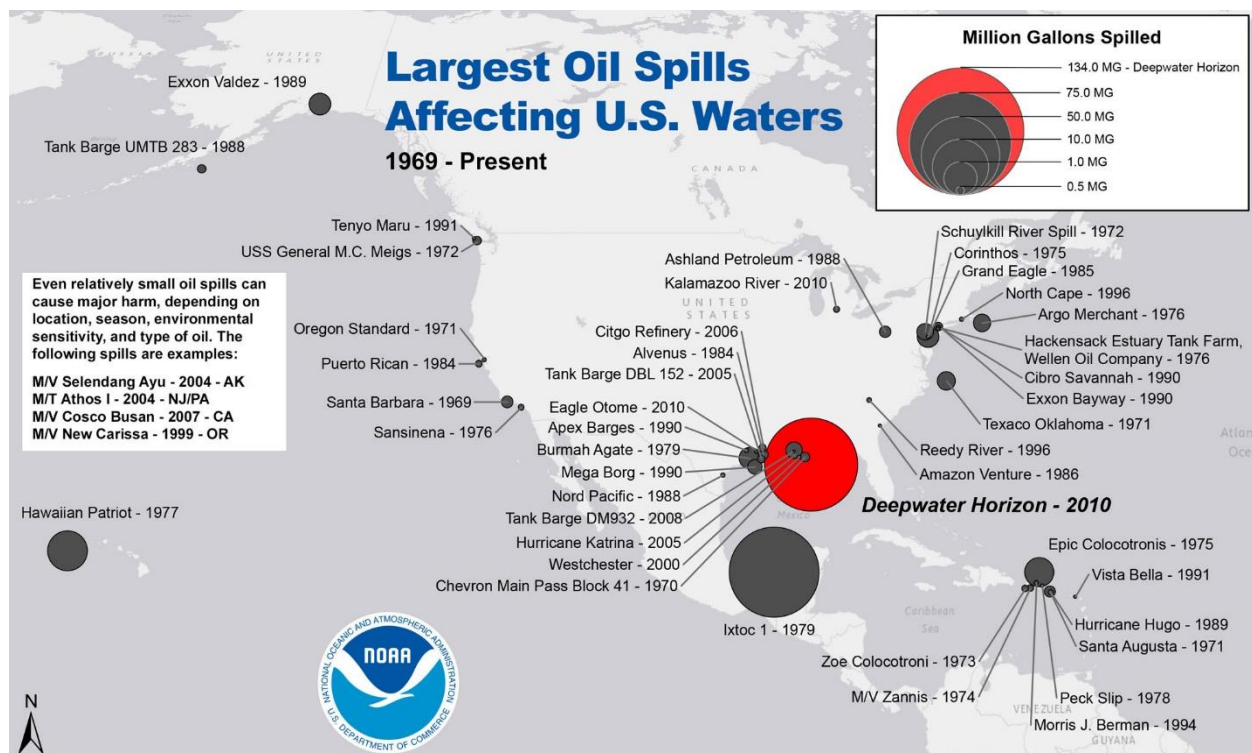


Figure 2. Largest oil spills affecting U.S. waters since 1969. (NOAA Office of Response and Restoration)

Acknowledging that each community is different, it follows that oil spill prevention, preparedness, response, and recovery continue to incorporate input from stakeholders on the local level, to include new information regarding human impacts. In total, five workshops will occur in the coastal regions of Alaska, the east and west Gulf of Mexico, Mid-Atlantic, and West Coast. To inform the work of the planning committee for these workshops, GRP staff completed a targeted search for priority concerns and recommendations identified at workshops and events hosted in each region, regarding the public health, social disruption, and economic impacts of oil spills. The following sections summarize the results found by region.

Alaska Region

According to NOAA, the 1989 Exxon Valdez Oil Spill was the largest single spill in U.S. coastal waters at nearly 11 million gallons, prior to the Deepwater Horizon Oil Spill in 2010. Between 2009 and 2014, Alaska produced nine percent of the total crude oil produced in the United States (Maung-Douglass et al., 2016). Retreating and thinning Arctic sea ice potentially increases the accessibility of Alaskan offshore oil and gas development. Changes in the Arctic have worldwide rippling effects, due to its place as a driver for some of Earth's large-scale systems and processes. According to a report by the National Academies of Sciences, Engineering, and Medicine, "Many competing forces coexist and collide in the Arctic: harsh environmental conditions, economic drivers, science and technology capabilities, logistical and infrastructure challenges, ecosystem protection needs, food security concerns, and the needs of

traditional cultures and societies” (Transportation Research Board and National Research Council, 2014:vii). Previous workshops examining oil spills and the oil and gas industry for Alaska detailed more specific concerns, challenges, needs, and recommendations for the area.⁵

Concerns, Challenges, and Needs

- Coastal erosion
- Decrease in ecotourism
- Delays in response due to travel and accessibility to equipment
- Difficulty to maintain cultural norms, like native language proficiency, hunting and fishing practices, summer fish camps, and food storage
- Disruption to subsistence practices and food security
- Disturbance to archaeological sites
- Implications of harsh environment on spill response, restoration, and recovery
- Job and income loss
- Limitations in spill infrastructure, training, and logistical support
- Threats to habitats and wildlife, such as whales, caribou, seals, polar bears, and lowland plants
- Transnational boundaries with Canada and Russia
- Trouble providing food and housing accommodations for response personnel

Recommendations

- Determine baseline⁶ information for communities, species, and habitats
- Develop effective communication plans within and between communities, agencies, organizations, and responsible operating bodies
- Fund local infrastructure to reduce fuel costs
- Identify locations of culturally significant sites
- Improve communication processes to allow daily updates about the response to communities
- Make use of local and indigenous knowledge
- Provide a directory of spill response contacts and their responsibilities
- Provide oil spill response training within local communities

“Because of the vast size of the state and the remote location of many of its cities and communities, local residents are frequently the first line of defense in responding to oil or hazardous substance releases. In many cases outside responders cannot arrive in time to deal with the immediate impacts.” –Rick Bernhardt, Alaska Department of Environmental Conservation (Wildlife Conservation Society, 2014:2)

Gulf of Mexico Region

Beginning on April 20, 2010, an explosion at the Macondo well destroyed the Deepwater Horizon drilling rig, which killed 11 people and released an estimated 4.9 million barrels (205,800,000 gallons) of crude oil (Austin et al., 2014). Between 2009 and 2014, the Gulf of Mexico region produced 55% of the total crude oil produced in the United States (Maung-Douglass et al., 2016). The Gulf of Mexico, Texas,

⁵ Alaska regional priority concerns and recommendations came from the Northwest Arctic Borough Oil Spill Workshop, North Slope Borough Oil Spill Workshop, Opening the Arctic Seas: Envisioning Disaster and Framing Solutions, and Community Oil Spill Response in Bering and Anadyr Straits. Web addresses to the full documents is located in the references.

⁶ Baseline refers to information collected prior to an oil spill or another disaster event.

Louisiana, Mississippi, Alabama, and Florida make up the Gulf of Mexico region for the United States. The economy for the region largely depends on tourism, shipbuilding and fabrication, fishing and seafood industries, and oil and gas extraction and manufacturing. The Gulf of Mexico region also consists of several major estuaries, beaches, and wetlands; diverse populations of immigrants, long-term residents, and Tribal communities; and frequently experiences storms, hurricanes, and flooding (Austin et al. 2014). Workshops and meetings conducted prior and post Deepwater Horizon discuss the concerns, challenges, needs, and recommendations for the area.⁷

Concerns, Challenges, and Needs

- Changes to vessel movement and safe navigation
- Collection of baseline data for communities and ecosystems
- Combined effects from a flood or storm with an oil spill on oil trajectory, containment, transportation routes, and prioritizing response for search and rescue
- Cultural impacts and loss of livelihood
- Disruption to fisheries and the seafood industry, which supports the economy by providing employment, food security, and recreational tourism
- Health of offshore and onshore workers, military, and volunteer responders
- Impacts on sensitive habitats, such as marshes, mangroves, beaches, and oyster beds
- Limitations to government funding to assist in cleanup
- Populations particularly vulnerable during oil spills: ethnic minorities, women, children, people with disabilities and preexisting conditions, fishermen/women, low-income families, medically underserved populations, and those affected by previous disasters
- Public concerns about shoreline protection, ability to recover spilled oil, and ability to return home and work
- Public health concerns for seafood consumption and beaches exposed to oil
- Threats to ecotourism and the associated income loss
- Vulnerability of cultural sites

Recommendations

- Improve communication between the public, scientists, response teams, Unified Command, and Incident Command System
- More training and equipment for local police departments, emergency responders, and hospitals
- Response practice drills for oil spills resulting from a natural disaster
- Use of social media and technology to allow the public to report oil sightings and receive information response efforts
- Use organizations like Sea Grant as liaisons between the public, response, and government agencies

⁷ The Gulf of Mexico regional priority concerns and recommendations came from Addressing Public Concerns During Spill Response, Assessing the Effects of the Gulf of Mexico Oil Spill on Human Health, Ecological Risk Assessment: Consensus Workshop, Natural Disaster Causing Technology Disasters in Mobile Bay Area, and Summary of Target Audience Input on Oil Spill Science Topics. Web addresses to the full documents is located in the references.

“The Gulf oil disaster follows closely on the heels of Hurricanes Katrina, Rita, and Gustav and an economic recession. For individuals that survived hurricane traumas, the cumulative effects of multiple traumas may increase susceptibility to psychological conditions or disorders.” –Howard Osofsky, Louisiana State University Health Sciences Center (Institute of Medicine, 2010:61)

Mid-Atlantic Region

In 1985, the Panamanian Tank Vessel Grand Eagle ran aground in the Delaware River near Marcus Hook, Pennsylvania, and released around 435,540 gallons of crude oil (NOAA). More recently, 94,000 gallons of jet fuel spilled in May of 2017 at Naval Air Station Oceana and into surrounding areas (U.S. Navy). The Mid-Atlantic region stretches from Virginia to New York and consists of beaches, wetlands, rich cultural and historical sites, immigrants, Tribal communities, and major metropolitan cities (Mid-Atlantic Regional Ocean Action Plan, 2016). Over 34 million people live in Mid-Atlantic coastal counties and the area provides social and economic benefits such as fishing, transportation, sand and gravel mining, national security activities, telecommunications, scientific research, tourism, recreation, and more (Bureau of Ocean Energy Management, 2016). Several reports and workshop proceedings explain the concerns, challenges, needs, and recommendations for the area, which includes a changing environment and emerging interest in renewable offshore energy.⁸

Concerns, Challenges, and Needs

- Accidents caused by increased marine traffic
- Boomtown effects
- Coastal erosion
- Commercial and recreation fishing as part of the region’s culture and sense of place
- Disruption to social cohesion
- Disturbance to socially-valued and cultural landscapes
- Exposure of workers and close proximity communities
- Focus placed on individual well-being and community well-being
- Impact on fishing industries
- Increased social conflict
- No single repository for oil spill incidents for the region
- Public health concerns
- Threats to the environment

Recommendations

- Collect baseline data and comparison groups prior to a spill
- Congressional action needed to allow the Port Captain greater authority to direct vessels in need of a place of refuge
- Funding for the Delaware River and Bay Oil Spill Advisory Committee to enhance its role and responsibilities in the prevention, preparedness, response, and recovery

⁸ Mid-Atlantic regional priority concerns and recommendations came from the Mid-Atlantic Regional Ocean Action Plan, Delaware River and Bay Oil Spill Advisory Committee Report, Scoping Meeting: Review of the Human Health Literature Related to Unconventional Oil and Natural Gas Drilling, Offshore Oil Anthropogenic Activity Background Document, Offshore Wind: Best Management Practices Workshop, and Health Effects Institute: Unconventional Oil & Natural Gas Third Public Workshop. Web addresses to the full documents is located in the references.

- Improve communication and consultation with Tribal communities

“The mid-Atlantic is an urban corridor with major ports and transportation hubs serving the nation, particularly eastern and Middle America. The risk of oil spills, particularly associated with higher volume oil port areas and transportation activities, offshore and through coastal areas, and its potential impact on human health, social, and economic conditions is relatively high because of the sheer volume of activity, population density, and the pockets of sensitive and stressed estuarine ecosystems.” – Troy Hartley, Director Virginia Sea Grant

West Coast Region

In 1969, a well blowout 5.5 miles southeast of Santa Barbara, California, resulted in the release of 4.2 million gallons of oil (NOAA). In 2017, vessels and barges transported approximately 61.9 million gallons of crude oil via waterways in California and Washington every day (Pacific States and British Columbia Oil Spill Task Force, 2017). The west coast region of the United States faces sea-level rise, ocean acidification, earthquakes, tsunamis, droughts, and electricity blackouts (San Juan County Marine Resources Committee, 2017; David & Lucile Packard Foundation, 2013). The area is home to Tribal communities, recreation and tourism, immigrants, diverse marine wildlife and ecosystems, and fishing communities (San Juan County Marine Resources Committee, 2017; David & Lucile Packard Foundation, 2013). Three workshops along the U.S. west coast provided the concerns, challenges, needs, and recommendations for the area.⁹

Concerns, Challenges, and Needs

- Communication issues during emergencies
- Cultural impact
- Damage to ecosystems for orcas, salmon, seals, and other species
- Earthquakes, tsunamis, and electricity blackouts can cause or further complicate an oil spill
- Harm to recreational sites
- Impact on mental health
- Income losses associated with oil spills
- Lack of baseline data
- Oil production on the West Coast is decreasing and imports are increasing
- Physical and psychological health effects
- Pleasure boats travel shipping channels and create risks to shipping traffic
- Port and vessel management
- Transnational boundary with Canada

Recommendations

- A County-wide human health and social system risk assessment for San Juan County and a contingency plan should be developed, funded, and implemented
- Develop a robust communication system to disseminate information during an oil spill emergency
- Include Tribal entities in protection legislation

⁹ West Coast regional priority concerns and recommendations came from the Marine Managers’ Workshop, 2016 Salish Sea Oil Spill Risk Mitigation Workshop, and Non-Floating Oil Spill Workshop. Web addresses to the full documents located in the references.

- Increase community competence, build political partnerships, support diversity, and build social capital.
- Preparation for response to a non-floating oil spill
- Transboundary agreement with Canada to pay for a tug to run south or east of Turn Point to lower risk and response times

“When I was responding to the Deepwater Horizon oil spill in the Gulf of Mexico, I was stationed two hours away from the nearest coast and lived almost 2,000 miles away in California. I found having an oil spill in your own backyard is much more personal and reminds me of how important it is to plan, train, and prepare for oil spills long before any oil hits the water.” –Gabrielle Dorr, NOAA (On the Front Lines of an Oil Spill in My Own Backyard: A Report from Santa Barbara, California)

Conclusion

Oil spills influence national policy and create cascading effects on communities across the United States. This document emphasizes the importance and significance of oil spill prevention, preparedness, response, and recovery. Over the past four decades, increased environmental awareness resulted in various research regarding oil spills. Information collected from reports and workshops for the Alaska Region, Gulf of Mexico Region, Mid-Atlantic Region, and West Coast highlights similarities and differences between each. The Sea Grant Oil Spill Science Outreach Program will host a series of workshops in each region to identify opportunities to improve preparedness for the public health, social disruption, and economic impacts of marine oil spills. Acknowledging that each community is different, the upcoming workshops are planned by representatives from each region with consideration for stakeholder needs.

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Appendix

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Marine Oil Spills: Array of Possible Human Effects*

* Spill-specific conditions determine occurrence, type, scale of effects

Figure by K. Nicholls, S. Picou, S. McCord (University of South Alabama); A. H. Walker (SEA Consulting Group); and D. Gill (Oklahoma State University), L.A. Olsen, Gulf Research Program. Workshop Proceedings: Protecting Communities from the Impacts of Marine Oil Spills (2017). Modeled after: J. Beyer et al., Marine Pollution Bulletin 110(2016) 28-51

- Increased vulnerability or effects due to:
- Natural or other technological disasters
 - Economic recession
 - General life stressors (health, family, job)

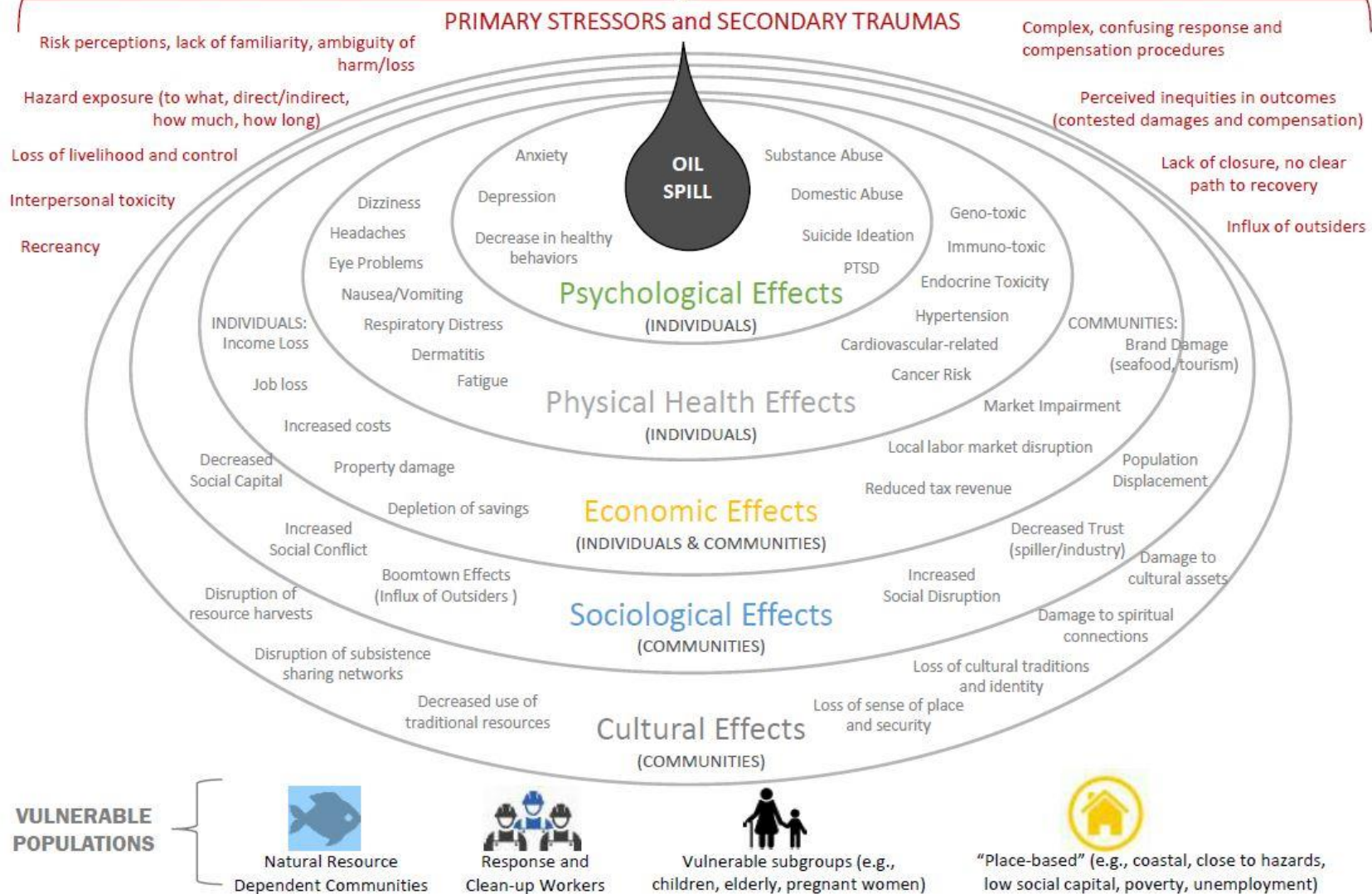


Figure development based on discussion at a 2017 workshop supported by the Gulf Research Program and a review of the literature

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NASEM WORKSHOP SUMMARY

Preparing for a Rapid Response to Major Marine Oil Spills

Protecting and Assessing the Health and Well-Being of Communities

CLAIRE GIAMMARRIA, ANNA NICHOLSON, AND JUSTIN SNAIR

Giammaria is Associate Program Officer, Board on Health Sciences Policy, Health and Medicine Division, National Academies of Sciences, Engineering, and Medicine, Washington, D.C. Nicholson is a science writer with Doxastic Communications, Chapel Hill, North Carolina. Snair is Founder and CEO, SGNL Solutions, Arlington, Virginia.

Every disaster affects community health. Oil spills have potential individual and public health consequences that include mental and behavioral dimensions for responders and for the affected communities. If oil spill preparedness, response, and recovery can address short- and long-term health concerns, many communities would be better prepared and more resilient after a spill.

The Gulf Research Program and the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine held a stand-alone workshop, *Preparing for a Rapid Response to Major Offshore Oil Spills: A Workshop on Research Needs*

to Protect the Health and Well-Being of Communities, on August 2–3, 2017. The workshop explored research needs and opportunities for improving public health preparedness, response, and protection related to oil spills; considered ways to work within and to complement the established framework for oil spill response, to improve protection of community health and well-being; and fostered connections between public health workers, oil spill

Oil spills, like the 2004 spill that occurred when the *M/V Selendang Ayu* ran aground off the coast of Alaska, can affect not only complex ecosystems but also regional economies and ways of life.



U.S. Coast Guard crews conduct oil spill response training with local agencies in New York. The federal government works with state and local governments to coordinate response management.

The 2014 *Deepwater Horizon* oil spill in the Gulf of Mexico threatened regional, water-based economies.

practitioners, disaster researchers, and leaders from affected communities. The workshop speakers and participants represented the range of stakeholders.

Response Framework

Two federal laws guide oil spill response—the Oil Pollution Act of 1990 and the Robert T. Stafford Act of 1988. Roger Laferriere, National Institutes of Health, explained that the Oil Pollution Act streamlined and strengthened the U.S. Environmental Protection Agency's (EPA's) ability to prevent and respond to catastrophic oil spills. The Stafford Act established the National Response Framework and the National Disaster Recovery Framework to provide federal assistance to state and local governments for alleviating the suffering and damage caused by national emergencies and disasters.

Rear Admiral Peter Gautier, U.S. Coast Guard (USCG), noted that the Incident Command System (ICS) of the National Incident Management System provides a top-down, structured, and established process for a unified command to coordinate response management. The unified command includes the responsible parties—or “spillers”—who pay for cleanup, restoration, the assessment of damages to natural resources, and economic and third-party claims, according to Yvonne Addassi, Office of Spill Prevention and Response, California Department of Fish and Wildlife. Laferriere pointed out that the ICS lacks a community health component, which could be incorporated in responses to future spills.

Community Health Impacts

Several speakers highlighted the interconnected effects of spills on individuals, families, networks, communities, and entire regions. David Abramson, New York University, observed that in contrast to natural disasters, which typically damage physical infrastructure, oil spills threaten complex ecosystems that support regional economies and ways of life.

Liesel Ritchie of the Natural Hazards Center at the University of Colorado, Boulder, reported that in both the *Exxon Valdez* and *Deepwater Horizon* spills, the strongest predictors of stress were concerns about family health, economic futures, and economic loss, as well as individual and group connections to the threatened renewable resources.

Keith Nicholls, University of South Alabama, illustrated the links between oil spill stressors and an array of economic, psychological, sociological, and physical impacts. For instance, the loss of a job



A member of the Federal Drug Administration meets with fishermen to discuss the impact of the *Deepwater Horizon* oil spill on their industry.



Vietnamese-speaking fishing families await information and government aid after the *Deepwater Horizon* oil spill. To build trust, it is critical to address specific community needs related to culture, language, and education level.

because of an oil spill can have impacts that extend beyond the loss of income and affect individual health through fear, anxiety, depression, and high blood pressure.

Sharon Croisant, University of Texas at Galveston, noted that disasters disproportionately affect vulnerable groups that already lack access to health care and other resources. She stated, moreover, that mental health impacts are often manifested over the long term.

John Tarpley, Office of Response and Restoration at the National Oceanic and Atmospheric Administration, described the Scientific Support Coordinator Program, which develops contingency plans, runs exercises and training, and responds to an average of 150 spills per year. In the past 30 years, oil spill responses have incorporated new aspects, he observed, but the time has come to expand the focus from the health and safety of workers and responders to the impacts on the public. He noted that EPA's National Response System, which addresses a range of oil and hazardous substance releases, is flexible and adaptable and can expand and contract to meet needs.

Many participants emphasized the importance of preparedness before oil spill events. Tarpley emphasized the need to have the science and procedures in place before a response. Duane Gill, Oklahoma State University, added that engaging communities before an oil spill is important so that "when an event occurs, we are in the community, we know what is going on in the community, and we are prepared to ameliorate the negative impacts of an event."

Potential Challenges

The workshop discussion identified and characterized four groups of challenges to incorporating the

protection of community health and well-being into oil spill response:

1. Complex and long-term impacts. Oil spill responders "come in and try to solve what [they] have to solve, but once [they] are done, [they] leave," said Thomas Dardar, Jr., Principal Chief of the United Houma Nation. Gill explained that when a community's social, cultural, and economic existence centers on renewable resources, spills that affect those resources have huge and lasting impacts. Nicholls noted that preexisting conditions, such as poverty, unemployment, and declining social capital, make communities less resilient to disasters.

2. Communicating and engaging at a local level. Participants identified language, literacy, and the limited reach of communications as some of the challenges in effectively connecting with and engaging communities. Dardar said that responders' messages often are full of jargon that is not translated appropriately. Linda Birnbaum, National Institute of Environmental Health Sciences (NIEHS) at the National Institutes of Health, observed that effectively communicating about risk can be difficult because of low levels of environmental and health literacy among the general public.

3. Gaps in knowledge for prevention and mitigation strategies. Nicole Lurie, former Assistant Secretary for Preparedness and Response, U.S. Department of Health and Human Services, noted that after 40 major oil spills, critical information gaps persist about how to prevent and mitigate the physical, mental, and behavioral health impacts. Several participants highlighted the need for baseline data to inform preparedness planning and to help track the impacts of an event.



A sixth-generation Louisiana fisherman waits to hear information about how the *Deepwater Horizon* oil spill will affect his livelihood.

Participants of the Preparing for a Rapid Response to a Major Offshore Oil Spills workshop examined the complex effects of oil spills on communities.





Then-Governor of Louisiana Bobby Jindal discusses the impact of the *Deepwater Horizon* oil spill on the seafood industry with local restaurant owners, fishermen, oyster harvesters, and seafood processors.

1. Competing priorities and sustainability.

Jonathan Waldron, Blank Rome, LLP, and Captain Joseph Loring, USCG Office of Marine Environmental Response Policy, summarized stakeholders and their roles as follows:

- Responders and responsible parties focus on immediate safety,
- Communities focus on local concerns and ensure that needs are understood, and
- Public health actors address safety, hazard detection, food source safety, and mental health effects.

Many participants suggested that involving a broader range of groups in preparedness and planning would help in aligning perspectives.

Potential Opportunities

Several participants acknowledged that a culture change would be necessary on many levels to expand the scope of oil spill response. The suggested opportunities can be grouped into four categories:

1. Aligning policies, funding, and systems. To effect a change of culture, Laferriere called for a national recognition that oil spills are community health incidents. Several workshop participants noted other opportunities within the current policy structure—for example, to improve and sustain preparedness between major spills, many underscored the need to align with social justice, community health, and disaster recovery and resilience efforts.

2. Improving communications and building trust. Ann Hayward Walker, Scientific and Environmental Associates, said preparedness efforts should leverage social capital structures to build lines of direct, open, and reciprocal communication through trusted messengers, community networks, and public health organizations. Walker observed that community associations and networks of nongovernmental organizations could help to disseminate information and to address community concerns in real time during a response. Thao Vu, Mississippi Coalition for Vietnamese-American Fisher Folks and Families, pointed out the need for messaging and materials that are appropriately packaged for communities' languages, cultural sensitivities, levels of education, and practical concerns.

3. Including communities in planning and response efforts. Walker said the response sector should reframe community engagement as part of planning and response efforts. She said outreach through area planning committees can acknowledge and make accommodations for underlying power imbalances. Local knowledge and community engagement are equally valuable in response efforts, and many participants suggested that knowledge of community concerns and values should inform operational decisions. Eric Baumgartner, formerly of the Louisiana Public Health Institute, suggested that local health or resilience officers could be assigned

Jamie Arleo, Florida Department of Environmental Protection, surveys the Gulf of Mexico and gathers data for recovery efforts.





Crews prepare to assess damage to the Mississippi River after an oil spill. Quick risk assessments—and prior research to assist—are vital.



Oil spill health impacts—including mental and behavioral impacts—affect responders and communities.

to preparedness efforts to map community systems and resources, to inform response, and to engender community confidence.

1. Improved understanding of oil spill science, impacts, and mitigation strategies. During an emergency, risk assessment decisions must be made quickly without time for consensus, stated Bernard Goldstein, University of Pittsburgh—therefore, laying a foundation of good science is a necessity. Dale Sandler, NIEHS, emphasized that research must be part of the response process. Aubrey Miller, NIEHS, suggested that collaboration across sectors was needed to collect data and to identify platforms for the development of protocols, tools, and methodologies related to human health and resiliency. Ritchie pointed out that what is known about oil spills is grounded in a large and longstanding body of research on the societal dimensions of hazards and disasters, and she cautioned that research should build on what is known and should focus on specific, unanswered questions.

Addressing Health Impacts

Oil spills have potential health and public health consequences, including mental and behavioral dimensions, for responders and for affected communities. Nevertheless, neither the command structure nor the compensation structure account well for responding to these health aspects of oil spills, as several workshop participants noted.

Participants also expressed concerns about the limited use of science-based decision making in oil spill responses and about the ways available for stakeholders to work with affected communities to prepare, prevent, and respond to oil spills. Although addressing the health effects of oil spills may encounter wide-ranging challenges, the opportunities are many for improving the long-term vital-

ity of the communities that could be affected—and that already have been affected—by oil spills.

Acknowledgments and Resources

The Gulf Research Program of the National Academies of Sciences, Engineering, and Medicine asked the Health and Medicine Division to convene the stand-alone workshop summarized in this article. The Board on Health Sciences Policy in the Health and Medicine Division oversaw the workshop as part of its mission to strengthen the preparedness, resilience, and sustainability of communities.

The workshop proceedings-in-brief is available at <https://www.nap.edu/catalog/24924/preparing-for-a-rapid-response-to-major-marine-oil-spills>. To learn more about the work of the Board on Health Sciences Policy, see www.nationalacademies.org/hmd/About-HMD/Leadership-Staff/HMD-Staff-Leadership-Boards/Board-on-Health-Sciences-Policy.aspx. More information about the Gulf Research Program is available at www.nationalacademies.org/gulf/index.html.

Planning Committee for Preparing for a Rapid Response to Major Marine Oil Spills: A Workshop on Research Needs to Protect the Health and Well-Being of Communities

Ann Hayward Walker, Scientific and Environmental Associates, *Chair*
 David Abramson, New York University
 Yvonne Najah Addassi, Office of Spill Prevention and Response, California Department of Fish and Wildlife
 Sharon Croisant, University of Texas at Galveston
 Elizabeth (Terry) Fontham, Louisiana State University
 Duane Gill, Center for the Study of Disasters and Extreme Events, Oklahoma State University
 Larissa Graham, Mississippi-Alabama Sea Grant Consortium