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**HEARING ON
“OUTER CONTINENTAL SHELF OIL AND GAS STRATEGY AND IMPLICATIONS
OF THE DEEPWATER HORIZON RIG EXPLOSION”**

**BEFORE THE
COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES**

May 26, 2010

Thank you, Chairman Rahall and Members of the Committee, for the opportunity to testify on the Department of Commerce National Oceanic and Atmospheric Administration's (NOAA's) role in the response to the Deepwater Horizon oil spill. My name is Dr. Jane Lubchenco and I am the Under Secretary of Commerce for Oceans and Atmosphere and the Administrator of NOAA. I appreciate the opportunity to discuss the critical roles NOAA serves during oil spills and the importance of maximizing our contributions to protect and restore the resources, communities, and economies affected by this tragic event. Before I move to discuss NOAA's efforts, I would first like to express my condolences to the families of the 11 people who lost their lives in the explosion and sinking of the Deepwater Horizon.

NOAA's mission is to understand and predict changes in Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs. NOAA is also a natural resource trustee and is one of the federal agencies responsible for protecting and restoring the public's coastal natural resources when they are impacted by oil spills, hazardous substance releases, and impacts from vessel groundings on corals and seagrass beds. As such, the entire agency is deeply concerned about the immediate and long-term environmental, economic, and social impacts to the Gulf Coast and the Nation as a whole from the Deepwater Horizon oil spill. NOAA is fully mobilized and working tirelessly 24/7 to lessen impacts on the Gulf Coast and will continue to do so until the spill is controlled, the oil is cleaned up, the natural resource damages are assessed, and the restoration is complete.

My testimony today will discuss NOAA's role in the Deepwater Horizon response, natural resource damage assessment, and restoration; NOAA's assets, data, and tools on-scene; the importance of preparedness; and necessary future actions.

NOAA'S ROLES DURING OIL SPILLS

NOAA has three critical roles mandated by the Oil Pollution Act of 1990 and the National Contingency Plan:

1. Serves as a conduit for scientific information to the Federal On-Scene Coordinator to provide trajectory predictions for spilled oil, overflight observations of oil on water, identification of environmental areas that are highly valued or sensitive, and shoreline surveys of oil to determine clean-up priorities.
2. Conduct a joint natural resource damage assessment with other trustees with the goal of restoring any ocean and coastal resources harmed by the spill. This includes fulfilling the role of Natural Resource Trustee for impacted marine resources.
3. Represent Department of Commerce interests in spill response decision making activities through the Regional Response Team.

The U.S. Coast Guard (USCG) has the primary responsibility for managing coastal oil spill response and clean-up activities in the coastal zone. During an oil spill, NOAA's Scientific Support Coordinator delivers expert scientific support to the USCG in its role as Federal On-Scene Coordinator. NOAA's Scientific Support Coordinators are located around the country in USCG Districts, ready to respond around the clock to any emergencies involving the release of oil or hazardous materials into the oceans or atmosphere.

Using experience, expertise, and state-of-the-art technology, NOAA forecasts the movement and behavior of spilled oil, evaluates the risk to resources, conducts overflight observations and shoreline surveys, and recommends protection priorities and appropriate clean-up actions. NOAA also provides spot weather forecasts, emergency coastal survey and charting capabilities, aerial and satellite imagery, and real-time coastal ocean observation data to assist response efforts. Federal, state, and local entities look to NOAA for assistance, experience, local perspective, and scientific knowledge.

NOAA serves the Nation by providing expertise and a suite of products and services critical for making science-based response decisions that prevent further harm, restore natural resources, and promote effective planning for future spills. Federal, state, and local agencies across the country called upon NOAA's Office of Response and Restoration (OR&R) for scientific support 200 times in 2009.

NOAA'S RESPONSE EFFORTS FOR DEEPWATER HORIZON OIL SPILL

NOAA's experts have been assisting with the response from the beginning, providing coordinated scientific weather and biological response services when and where they are needed most.

At 2:24am (central time) on April 21, 2010, NOAA's OR&R was notified by the USCG of an explosion and fire on the Mobile Operating Drilling Unit (MODU) Deepwater Horizon, approximately 50 miles southeast of the Mississippi Delta. The explosion occurred at approximately 10:00pm on April 20, 2010. Two hours, 17 minutes after notification by the USCG, NOAA provided our first spill forecast predictions to the Unified Command in Robert, Louisiana. NOAA's National Weather Service Weather Forecast Office in Slidell, LA received the first request for weather support information from the USCG at 9:10am on April, 21, 2010 via telephone. The first graphical weather forecast was sent at 10:59am to the USCG District Eight Command Center in New Orleans. Support has not stopped since that first request for

information by the USCG. Over the past few weeks, NOAA has provided 24/7 scientific support, both on-scene and through our Seattle Operation Center. This NOAA-wide support includes twice daily trajectories of the spilled oil, information management, overflight observations and mapping, weather and river flow forecasts, shoreline and resource risk assessment, and oceanographic modeling support. NOAA has also been supporting the Unified Command in planning for open water and shoreline remediation and analyses of various techniques for handling the spill, including open water burning and surface and deepwater application of dispersants. Hundreds of miles of coastal shoreline were surveyed to support clean-up activities.

Offices throughout the agency have been mobilized and hundreds of NOAA personnel are dedicating themselves to assist. In addition to these activities, I would like to highlight several of NOAA's assets that are assisting with the overall oil spill response and assessment efforts.

- NOAA's National Weather Service is providing critical 24/7 weather support dedicated to the spill, as well as on-site weather support at multiple command centers. Special aviation marine wind and wave forecasts are being prepared to support response activities. A marine meteorologist was deployed to the Joint Operations Center in Houma, LA on April, 27, 2010. Beginning on April 28, 2010, hourly localized 'spot' forecasts were requested by USCG and NOAA OR&R in support of oil burns and eventually chemical dispersion techniques. Longer range forecasts are a critical component to plan containment and response actions. NOAA's National Data Buoy Center data is also being incorporated into oil trajectory forecasts.
- NOAA's National Ocean Service is providing: custom navigation products and updated charts to help keep mariners out of oil areas; updates from NOAA's extensive network of water-level, meteorological, and near-shore current meters throughout the Gulf; in-situ observations data; economic assessment expertise; aerial photo surveys to assess pre-and post landfall assessments; and pre- and post- oil contamination assessments of oysters at Mussel Watch sites.
- NOAA's Office of Oceanic and Atmospheric Research (OAR) dispatched the R/V Pelican ship along with National Institute for Undersea Science and Technology cooperative scientists to collect samples as soon as possible. OAR is advising on airborne and oceanic dispersion modeling. NOAA and university scientists are also flying NOAA's P3 hurricane hunter aircraft to drop expendable probes to map the ocean current, salinity, and thermal structure from 1000 m depth to the surface that will refine and calibrate loop current modeling. These deployments will be critical for helping to track where the oil might be headed and whether other areas of the United States will be impacted by the Deepwater Horizon oil spill. In addition, NOAA-funded Sea Grant programs in Louisiana and other Gulf Coast states will be awarding grants for rapid response projects to monitor the effects of the oil spill on Louisiana's coastal marshes and fishery species.
- NOAA's National Marine Fisheries Service (NMFS) is addressing issues related to marine mammals, sea turtles, seafood safety, and fishery resources. On May 2, 2010, NMFS closed commercial and recreational fishing in oil-affected portions of federal waters in the Gulf for ten days. NOAA scientists are on the ground in the spill area taking water and seafood samples to ensure the safety of seafood and fishing activities.

- NOAA's National Environmental Satellite, Data, and Information Service is providing satellite imagery from NOAA's Geostationary Operational Environmental Satellites and Polar Operational Environmental Satellites, and is leveraging data from the National Aeronautics and Space Administration and international satellites to develop experimental and customized products to assist weather forecasters and oil spill response efforts. NOAA's National Data Centers are also providing data from its archives that are being used to help provide mapping services for the impacted areas, and temperature, salinity, current, and surface elevation (tides) with forecasts up to 72 hours out from the Navy Global Ocean Coastal Model.
- NOAA's Office of Marine and Aviation Operations has 3 aircraft providing support for overflights that are being conducted on a near daily basis.
- The NOAA General Counsel's Office is working closely with state and federal co-trustee agencies to undertake a natural resource damage assessment and other steps to prepare claims for response costs and damages for natural resource injuries associated with the oil spill. The Office is also addressing a wide range of legal questions that arise in conjunction with the spill.
- The NOAA Communications office has provided two to three communications specialists to assist in the Joint Incident Center with press and all communications efforts. Within NOAA, the staff has been facilitating scientist interviews with media and working with the Office of Response and Restoration to update daily a dedicated NOAA Deepwater Horizon response web site with the latest information and easy-to-use fact sheets on topics ranging from oil and coral reefs to an explanation of the booms being used.

NOAA'S ROLE IN DAMAGE ASSESSMENT AND RESTORATION

Oil spills affect our natural resources in a variety of ways. They can directly impact our natural resources, such as the oiling of marine mammals. They can diminish the ecological services provided by coastal and marine ecosystems, such as the loss of critical nursery habitat for shrimp, fish, and other wildlife that may result from oiled marshes. Oil spills may also diminish how we use these resources, by affecting fishing, boating, beach going, and wildlife viewing opportunities.

Stewardship of the Nation's natural resources is shared among several federal agencies, states, and tribal trustees. NOAA, acting on behalf of the Secretary of Commerce, is the lead federal trustee for many of the nation's coastal and marine resources, and is authorized pursuant to the Oil Pollution Act of 1990 (OPA) to recover damages on behalf of the public for injuries to trust resources resulting from an oil spill. OPA encourages compensation in the form of restoration and this is accomplished through the Natural Resource Damage Assessment (NRDA) process by assessing injury and service loss, then developing a restoration plan that appropriately compensates the public for the injured resources. NOAA scientists and economists provide the technical information for natural resource damage assessments and work with other trustees and responsible parties to restore resources injured by oil spills. To accomplish this effort, NOAA experts collect data, conduct studies, and perform analyses needed to determine whether and to what degree coastal and marine resources have sustained injury from oil spills. They determine how best to restore injured resources and develop the most appropriate restoration projects to compensate the public for associated lost services. Over the past 20 years, NOAA and other natural resource trustees have recovered over \$500 million worth of restoration projects from responsible parties for the restoration of the public's wetlands, coral reefs, oyster reefs, and other important habitats.

The successful recovery of injured natural resources depends upon integrated spill response and restoration approaches. The initial goals of a response include containment and recovery of floating oil because recovery rates for floating oil can be quite high under certain conditions. As the oil reaches the shoreline, clean-up efforts become more intrusive and oil recovery rates decline. At this point, it becomes important to recognize that certain spill response activities can cause additional harm to natural resources and actually slow recovery rates. Such decision points need to be understood so that cost effective and successful restoration can take place. NOAA brings to bear over 20 years of experience and expertise to these issues. Continued research on clean-up and restoration techniques and the recovery of environmental and human services after oil spills may improve such decision-making.

NOAA'S DAMAGE ASSESSMENT AND RESTORATION EFFORTS FOR THE DEEPWATER HORIZON OIL SPILL

At the onset of this oil spill, NOAA quickly mobilized staff from its Damage Assessment Remediation and Restoration Program to begin coordinating with federal and state co-trustees and the responsible parties, to begin collecting a variety of data that are critical to help inform the NRDA. NOAA is coordinating the NRDA effort with the Department of the Interior as a federal co-trustee, as well as co-trustees in five states and representatives for at least one responsible party (BP).

Although the concept of assessing injuries may sound relatively straightforward, understanding complex ecosystems, the services these ecosystems provide, and the injuries caused by oil and hazardous substances takes time — often years. The time of year the resource was injured, the type of oil or hazardous substance, the amount and duration of the release, and the nature and extent of clean-up are among the factors that affect how quickly resources are assessed and restoration and recovery occurs. The rigorous scientific studies that are necessary to prove injury to resources and services may also take years to implement and complete. The NRDA process

described above ensures an objective and cost-effective assessment of injuries — and that harm to the public's resources is fully addressed.

While it is still too early in the process to know what the full scope of the damage assessment will be, NOAA is concerned about the potential impacts to fish, shellfish, marine mammals, sea turtles, birds, and other sensitive resources, as well as their habitats, including wetlands, beaches, bottom sediments, and the water column. This may include national estuarine research reserves and national marine sanctuaries. The natural resources co-trustees may also evaluate any lost value related to the use of these resources, for example, as a result of fishery and beach closures.

VALUE OF READINESS

This event is a grave reminder that spills of national significance can occur despite the many safeguards and improvements that have been put in place since the passage of the OPA. Although the best remedy is to prevent oil spills, oil spills remain a concern given the offshore and onshore oil infrastructure, pipes and vessels that move huge volumes of oil through our waterways.

To mitigate environmental effects of future spills, responders must be equipped with sufficient capacity and capabilities to address the challenge. Response training and exercises are essential to maintaining capabilities. Continuous training, improvement of our capabilities, maintenance of our capacity, and investments in high priority, response-related research and development efforts will ensure that the nation's response to these events remains effective. Training and coordination with other federal, state and local agencies that might have response and restoration responsibilities is critical to success in mitigating effects of future spills.

Just two months ago, NOAA participated in an oil spill exercise that focused on a hypothetical spill of national significance. This type of exercise is held every three years to sharpen the Nation's ability to respond to major oil spills at all levels of government. Led by the USCG, this exercise included more than one thousand people from twenty state and federal agencies as well as industry. This year's exercise centered on a simulated tanker collision off the coast of Portland, ME resulting in a major oil spill causing environmental and economic impacts from Maine to Massachusetts. Lessons learned from this and similar drills have improved our readiness to respond to oil spills. One tool that was successfully incorporated into this recent exercise is called the Environmental Response and Management Application (ERMA). This tool was developed by NOAA to streamline the integration and sharing of data and information, and certain components of this tool are now being used in the Deepwater Horizon response effort. ERMA is a web-based Geographic Information System tool designed to assist both emergency responders and environmental resource managers who deal with events that may adversely impact the environment. In the recent drill, ERMA allowed for the integration of current science, information technology, and real-time observational data into response decision-making. It allowed the latest information that was collected from a variety of efforts related to spills of national significance to be integrated, displayed on a map and shared for use across the Incident Command structure. Although not fully functional in the Gulf of Mexico, ERMA is providing benefits for the Deepwater Horizon response, many of which were first tested during the recent oil spill exercise. This recent drill also incorporated the damage assessment efforts of the

trustees, which resulted in improved communications and leveraging of resources and information.

ACTIVITIES TO IMPROVE FUTURE RESPONSE EFFORTS

Activities that would benefit the Nation by improving our ability to quickly respond to and mitigate damages from future spills include:

- **Response capacity** — NOAA's Office of Response and Restoration is fully engaged in responding to the Deepwater Horizon spill. Although unlikely, if another large spill was to occur simultaneously in another location across the United States, NOAA would have difficulty responding to its complete ability. Additional expertise in analytical chemistry, environmental chemistry, biology, oceanography, natural resource damage assessment, administrative functions, and information management would help plan and prepare activities between spills including training, development of area plans and response protocols, drafting and reviewing response job aids, and coordinating with regional responders.
- **Response effectiveness** — The use of simulated drills and the continued development of tools and strategies can only increase the effectiveness of oil spill response. Specific activities that would increase response effectiveness include:
 - ***Environmental Sensitivity Index Maps*** — Environmental Sensitivity Index (ESI) maps provide information that helps reduce the environmental, economic, and social impacts from oil and chemical spills. Spill responders are utilizing NOAA's ESI maps to identify priority areas to protect from spreading oil, develop cleanup strategies to minimize impacts to the environment and coastal communities, and reduce overall cleanup costs.
 - ***Data Management Tools for Decision Making*** — The key to effective emergency response is efficiently integrating current science, information technology, and real-time observational data into response decision-making. NOAA has developed the ERMA, which integrates real-time observations (e.g., NOAA National Buoy Data Center data, weather data, shoreline data, vessel traffic information, etc.) with archived data sources (e.g., NOAA's National Oceanographic Data Center's historical data) to aid in evaluating resources at risk, visualizing oil trajectories, and for planning rapid tactical response operations, injury assessment and habitat restoration. Having access to retrospective data is critical to bring value to real-time observational data being collected. For the Deepwater Horizon oil spill, certain components of the Gulf of Mexico ERMA are functional and being used on an *ad hoc* basis. The only fully functional ERMA are in the U.S. Caribbean and New England.
 - ***Use of Relevant Technologies*** — Better use of remote-sensing technologies, unmanned aerial vehicles, and an improved ability to access and use real-time observation systems would optimize clean-up operations. For example, when oil spreads across the water it does not do so in a uniform manner. Oil slicks can be quite patchy and vary in thickness. The effectiveness of response options — the booms, skimmers, and dispersants — depends on whether they are applied in the

areas of the heaviest oil. NOAA's trajectory modeling and visual observations obtained through overflights are helping direct the application of spill technologies, but remote sensing technology could be used to more effectively detect oil, determine areas of heaviest amounts of oil, and then this information could be used to direct oil skimming operations and increase the recovery of spilled oil. Traditional methods of visual observation can be difficult at night or in low visibility conditions, as is the case with Deepwater Horizon. In such situations, enhanced remote sensing technology would allow NOAA to improve the trajectory models it produces for the Unified Command.

- ***Real-time Observation Systems*** — Real-time data on currents, tides, and winds are important in driving the models that inform us on the likely trajectory of the spilled oil. As the Integrated Ocean Observing System generates more data from technological advances like high frequency radar, the prediction of oil location can be improved by pulling these observations into trajectory models in real-time.
- **Research and development** — Research and development is critical to ensure the latest science informs response efforts. Priority areas for future research and development include:
 - ***Fate and Behavior of Oil Released at Deep Depths*** — A better understanding is needed of how oil behaves and disperses within the water column when released at deep depths, such as happened with the Deepwater Horizon oil spill. This is also true regarding the use of dispersants in deep water. This information is critical to develop oil spill trajectory models and improve our understanding of the potential short- and long-term effects of dispersants on the environment.
 - ***Long-Term Affects of Oil*** — Spilled oil can remain on the shoreline and in wetlands and other environments for years. More than twenty years later, there is still oil in Prince William Sound from the Exxon Valdez spill. Research is needed to improve our understanding of the long-term effects of oil on sensitive and economically important species. This understanding will improve decision making during a response and allow us to determine the best approach to clean up.
 - ***Arctic*** — Continued acceleration of sea-ice decline in the Arctic Ocean as a consequence of global warming may lead to increased Arctic maritime transportation and energy exploration that in turn may increase the potential of oil spills in the Arctic. Recent studies, such as the Arctic Monitoring and Assessment Programme's Oil and Gas Assessment, indicate that we currently lack the information to determine how oil will behave in icy environments or when it sinks below the surface. We also lack a basic understanding of the current environmental conditions, which is important for conducting injury assessments and developing restoration strategies.
 - ***Mapping Oil Extent*** — Current use of NOAA-generated experimental products suggest that data from space-based synthetic aperture radar could assist us in detecting and refining the areal extent of oil and provide information in the decisions about where resources could be deployed.
 - ***Oil Detection in Water Column and Seafloor*** — In addition to depth data, modern multibeam echo sounders record acoustic returns from the water column and acoustic backscatter amplitude returns from the seafloor. In limited research applications,

these systems have been able to detect oil in the water column and on the seafloor. Sensors on autonomous vehicles that detect the presence of oil and gas in the water column are another detection technology. If these technologies could be used to provide highly accurate information on where oil is, and where it isn't, such information would be of significant benefit to a spill response such as Deepwater Horizon, where timely and precise placement of limited resources are critical to mitigate spill impacts. This developmental effort could provide very useful data for later response and restoration efforts.

- o ***Human Dimensions*** — Research on how to incorporate impacted communities into the preparedness and response processes could help to address the human dimensions of spills, including social issues, community effects, risk communication methods, and valuation of natural resources.

CONCLUSION

NOAA will continue to provide scientific support to the Unified Command. NRDA efforts in coordination with our federal and state co-trustees have begun. I would like to assure you that we will not relent in our efforts to protect the livelihoods of Gulf Coast residents and mitigate the environmental impacts of this spill. Thank you for allowing me to testify on NOAA's response efforts. I am happy to answer any questions you may have.