WRITTEN STATEMENT OF

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AND OFFSHORE DRILLING

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Thank you Governor Graham, Administrator Reilly, and all the members of the Commission and staff for inviting testimony from the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). My name is Steven Murawski; I am the Director of Scientific Programs and Chief Science Advisor for NOAA's National Marine Fisheries Service. In addition to my normal duties I have been involved with a number of interagency groups that have been formed to coordinate spill-related science. I lead the National Incident Command's Joint Analysis Group (JAG) that

provides information and analysis of findings regarding the sub-surface monitoring of oil and oceanography. Additionally I am the lead for the interagency Executive Leadership group, which is coordinating the deployment of an enhanced sub-surface oil and dispersants monitoring program being developed through the Unified Area Command. My testimony today will discuss some scientific findings in the Gulf of Mexico related to the BP Deepwater Horizon oil spill, on-going impact research, and long-term monitoring plans, as well as the Administration's scientific coordination with industry, academia, and other state and Federal agencies.

THE ROLE OF SCIENCE

Science has been a critical component of all three major phases of this oil spill response and recovery effort: (1) the response to the presence of vast quantities of Deepwater Horizon oil with respect to the environment and human communities, (2) the Natural Resource Damage Assessment (NRDA) identifying direct and indirect impacts of the spill on the productivity, abundance, and use of ecosystem services in the Gulf, and (3) long-term recovery of the Gulf's ecosystems and communities dependent on natural resources. Early in this spill it was recognized that the scale and scope of the event would be so vast that it would touch virtually every aspect of life in and surrounding the Gulf. The challenges would be to document the quantity, movement, and fate of the oil;

the impacts of oil on ecosystems and people; and the success of any targeted recovery and mitigation efforts.

As the spill scenario had evolved, so too have the nature and emphasis areas for science supporting spill efforts. For example, initial sampling was aimed at quantifying surface oil and predicting its movements as an aid to the first responders and clean-up crews. Within hours of the spill the first surface trajectory models were being run to predict where oil may be found. Over the course of the spill, modeling of oil trajectories became more complex and robust with the development of six independent surface tracking models, and the addition of models predicting the fate of oil particles in the sub-surface. – . Similarly, issues of seafood safety testing, impacts on salt marsh, beach, and deep ocean habitats, living marine resources, air quality, and socioeconomic impacts have emerged as priority areas for science related to the spill. Below I detail some of NOAA's science efforts, the importance of interagency collaborations and the role of independent scientists in the overall effort.

THE BREADTH OF NOAA'S SCIENCE SUPPORTING RESPONSE TO THE BP DEEPWATER HORIZON OIL SPILL

Over the course of the spill literally thousands of NOAA employees and contractors have been involved in various aspects of clean up and impact analysis. From providing daily

weather predictions and hurricane outlook forecasts, to conducting shoreline impact assessments, capturing and cleaning oiled sea turtles, and monitoring the Gulf's seafood supply, the spill has touched every aspect of NOAA's diverse mission set. To date, NOAA has conducted nearly 120 sampling missions using a total of seven of its ships and six aircraft. These missions have been as diverse as dropping oceanographic instruments into the loop current to study oil transport and conducting air quality sampling from NOAA's P-3s to using the new fisheries survey vessel PISCES and its state-of-the-art acoustics monitoring capabilities to provide surveillance in the area around the well head for oil and gas plumes once the well was shut in. While these efforts have strained NOAA's ability to respond to such a diverse and intensive use of its resources, NOAA personnel have done so, knowing the importance of timely and accurate scientific information supporting the response.

NOAA's scientific experts have been assisting with the response both on-scene and through NOAA's headquarters and regional offices. The efforts by NOAA include all of its line organizations, appropriate Cooperative Institutes and Sea Grant collaborations involving many academic institutions. Coordinating all these various activities within the Agency has been a challenge, and new structures were created to manage these efforts.

The development of interagency collaborations by the National Incident Command (NIC) and the Unified Area Command (UAC) has facilitated greatly the ability to collect and interpret critical information. One case in point is the coordination of sub-surface sampling to track the location, concentration and movement of sub-surface oil. Once it was apparent that oil was in subsurface waters, a coordination unit was established at the UAC, first in Houma and then in New Orleans, Louisiana. The Sub-surface monitoring group (SSM, comprised of many agencies) was charged with overseeing the collection of relevant data, communication with all vessels conducting sampling in the area of concern and development of appropriate data sets. Once data began to flow from ships and other assets deployed for sampling, the National Incident Commander set up the Joint Analysis Group (JAG) to conduct analyses and to inform the responders, scientific community and the public about relevant findings. Initially collaboration among agency scientists with input of data from the contractors for one of the responsible parties, the JAG ultimately established working relationships with more than a dozen academic researchers to assist in interpreting of data and with combining information from all available sources. Three substantial information reports and numerous online databases have resulted from this collaboration, which continues to document the concentration of oil and dispersants in the environment: http://ecowatch.ncddc.noaa.gov/JAG/reports.html. The first of the JAG reports documented the chemistry information, particle size composition, oxygen levels and evaluated instruments used to sample for likely oil signatures. The second report

evaluated instrument findings from special UV lights that fluoresce in the presence of oil (fluorometers), and the third such report compiled all available information on oxygen levels calculated for the sub-surface, concluding that "dead zones" or hypoxia events, once feared possible as a result of sub-surface microbial activity had not occurred and were unlikely. These reports relied extensively on data collected and exchanged among government, academic and private researchers.

To ensure that the public and agency partners have the data they need to understand what is happening and to contribute their own expertise, NOAA has undertaken substantial efforts to quality control and post data online as soon as soon as possible after collection. A website has been created to serve as a focal point for accessing NOAA's data. NOAA continues to improve accessibility to data and is looking at ways, such as geoplatform.gov, to make information and visualization products available to everyone.

NOAA leadership continues to be briefed daily on emerging science activities, and close coordination with other federal agencies continues to occur at all levels.

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 collect a variety of data that are critical to help

inform the NRDA. NOAA is working with the Department of the Interior (another federal co-trustee), as well as co-trustees in five states and representatives for at least one responsible party, BP on this effort. NOAA and the co-trustees are in the initial phase of this process and are currently gathering data on resources such as fish, shellfish, birds, turtles, and mammals; their supporting habitats such as wetlands, beaches, and corals; and human uses of affected resources, such as fishing and recreational uses across the Gulf of Mexico.

Plans are already under discussion for how agencies will continue to maintain the necessary level of coordination through the long-term recovery phase.

COORDINATION ON SEAFOOD SAFETY SAMPLING AND RESEARCH.

NOAA has been coordinating with Food and Drug Administration (FDA), Environmental Protection Agency (EPA), the states, and industry on seafood safety and research. Fisheries closures remain in effect in some areas in the Gulf, and there is ongoing sampling to evaluate additional areas for potential re-openings. Seafood samples are derived from at-sea sampling and subjected to sensory and chemical testing for the presence of oil. NOAA is confident in the sensory and chemical testing currently being conducted to detect possible contamination in seafood. In response to ongoing public concerns about seafood safety and dispersants, we have been working together with our

scientific partners at FDA to develop a chemical test to detect dispersant in seafood. This test, once validated, will provide additional public confidence in the safety of Gulf seafood. All chemical samples obtained to date have tested below levels of concern identified by FDA and NOAA and the states.

The interagency science processes set up under the various commands have by and large worked well with a high degree of collaboration to assure the proper science is conducted to inform the response and NRDA phases and that the public is informed. We continue to look at ideas for more effective communication with stakeholders and the public.

COORDINATION WITH THE BROADER SCIENTIFIC COMMUNITY

While NOAA's efforts have involved collaborations with many academic researchers, there continues to be keen interest among the academic and private research communities for further involvement in oil spill efforts. There have been a few instances of apparent misunderstanding among academic researchers and agency information, leading to confusion among the public and the media about what is happening, particularly in the sub-surface. In order to address this issue , NOAA, along with EPA, OSTP, NSF, USGS, BOEMRE, and NIH recently convened a series of public discussion sessions with the external scientific community aimed at soliciting input to the goals, strategies, and implementation of the Unified Area Command (UAC)'s draft sub-surface oil and

dispersant monitoring plan, and discussing science collaborations more generally. The events, hosted by the University of South Florida, Mississippi State University (in partnership with Mississippi-Alabama Sea Grant and the Northern Gulf Institute), Tulane University, and Dillard University (in partnership with the NAACP) brought together a total over 300 people representing academic institutions, state agencies, private research consortia, non-governmental organizations, and private industry. The discussions covered a broad diversity of topics, including the need for continuing dialogue and enhancing the communication and flow of data and information, the need for a comprehensive plan that spans in-shore, near-shore, shelf, and deep-sea environments, the need for a robust integrated ocean observing system, and questions about the distinctions between the NRDA process, response efforts, and assessments of long-term ecosystem impacts.

NOAA is committed to continuing to engage with its scientific partners. As one example, NOAA and the other agencies that comprise the Joint Subcommittee on Ocean Science and Technology are planning a workshop on October 5-6, 2010, in St. Petersburg, Florida. This workshop is being designed to bring together scientists actively conducting research, sampling, and monitoring in response to the DWH oil spill. Input from the conference will be used to help federal agencies identify information needs and

plan short- and long-term research directions. Topics for the workshop will include: 1) oil/dispersant extent and fate; 2) oil/dispersant impacts and mitigation in coastal and offshore environments; 3) oil/dispersant impacts and mitigation on human health and socio-economic; 4) oil/dispersant impacts and mitigation of living marine resources; and, 5) use of *in situ* and remote sensors, sampling, and systems for assessing the extent, fates, impacts and mitigation of oil/dispersant.

We will also re-double efforts to communicate with and involve the external science community in oil spill science, to the extent we can.

ECOSYSTEM SERVICES STUDY

NOAA is under discussions with the National Academy of Sciences (NAS) regarding an NAS study of the long-term ecosystem service impacts of the BP Deepwater Horizon oil spill. Such a study would assess long-term costs to the public of lost water filtration, hunting, and fishing (commercial and recreational), and other ecosystem services associated with the Gulf of Mexico. Calculation of lost services in the Gulf will help inform the recovery goals and monitoring strategies likely to be developed.

LONG-TERM MONITORING PLANS

As NOAA transitions from response through the NRDA process to long-term restoration of the Gulf, it will be critical to monitor our restoration progress and adapt as necessary. NOAA, along with its agency and academic partners, has initiated a process to identify longer-term scientific needs so that recovery actions can be informed by the most comprehensive science possible.

INTERNATIONAL COOPERATION

There has been keen interest among the other regional international partners, as well as from other countries that support deep water drilling programs. NOAA and other agencies including the Department of State have engaged countries in the Gulf of Mexico region, particularly Mexico, the Bahamas, and Cuba. NOAA participated in meetings organized by the State Department with the Bahamian government, the Mexican government, and the Cuban Interest Section. All meetings have led to ongoing discussions and interest in more formal collaborations

In July, NOAA deployed the research vessel Nancy Foster on a two-week assessment mission in the eastern Gulf of Mexico and the Florida Straits to collect data critical to understanding the Loop Current system and its effect on the plume of the BP Deepwater Horizon oil spill. This mission was coordinated with Cuba and Mexico.

In addition, a Bahamian scientist spent four weeks at a NOAA laboratory, supported by the Department of Defense's NORTHCOM (Northern Command). It was a very successful visit, and an example of the benefits of collaboration among agencies within the U.S. and internationally.

CONCLUSION

Responding to the oil spill has necessitated an agile, robust and coordinated approach emphasizing inter-line office (within NOAA), inter-agency and broader government-academic/private partnerships. Coordinating the massive use of ships, satellites, laboratories, aircraft and personnel has required logistics on a scale rarely seen outside of war time. No one agency has had enough capacity to fulfill all the requirements necessitated by the response, and *ad hoc* mechanisms set up to coordinate among agencies have been extremely successful, resulting in more focused response efforts.

NOAA's science efforts are not winding down with the killing of the well, they are, rather transitioning into other stages of the assessment and recovery. The NRDA and long-term impacts assessment and monitoring activities will require substantial allocations of resources and personnel to adequately meet NOAA's trustee responsibilities with respect to the affected resources. The academic and private research communities have been and continue to make significant contributions. Results of

listening sessions and discussions among government, academic and private researchers have emphasized the importance of ongoing coordination of plans to take advantage of resources being deployed in the Gulf, and the expertise existing in all of these domains. We intend to continue these collaborations and there are ongoing and active discussions about how to best structure such collaborations.

Last, I want to acknowledge the enormous contributions that have been made by scientists in the various agencies, in universities and research institutes. Our understanding of the oil and dispersant fate and effects has increased greatly from the initial days of the spill, and the information, papers and studies completed, ongoing and yet to be deployed will significantly propel the science of oil spills forward as we search for ways to be better prepared for such disasters and in fact to decrease the probability of such events in the future.

Thank you.