TESTIMONY OF
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SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

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Good afternoon Mr. Chairman and Members of the Subcommittee. I am Suzanne Schwartz, Acting Director of the Office of Wetlands, Oceans and Watersheds, within the Office of Water, U.S. Environmental Protection Agency (EPA). I would also like to introduce to you Dr. Rick Greene of our Office of Research and Development, who is here with me as the Agency's technical expert on the subject of hypoxia and harmful algal blooms. Thank you for the opportunity to discuss some of the things EPA is doing to address the threats to human health and our marine and freshwater resources from harmful algal blooms (HABs) and hypoxia.

HARMFUL ALGAL BLOOMS AND HYPOXIA – THREATS TO HUMAN HEALTH AND ECOSYSTEMS

Harmful algae and hypoxia, or low dissolved oxygen, represent a serious and growing threat to freshwater and marine mammals and fisheries, as well as to human health. While the understanding of the causes and impacts of harmful algal blooms and hypoxic events is not complete, it is known that the death and decay of algal blooms can lead to oxygen depletion in the water, resulting in widespread mortality of fish, shellfish and other invertebrates. These algae can grow, displacing native species, and altering habitat. Public health officials and ocean resource managers have had to increasingly respond to the adverse impacts of harmful algae by

closing beaches, as well as shellfish beds, tracking the algal blooms, and informing the medically sensitive public.

There are over 405 hypoxic zones around the world (**Science, 2008)**, and the second largest zone in the world is located in the Gulf of Mexico. There is strong evidence connecting hypoxia and algal blooms with nutrient pollution – excessive nitrogen and phosphorus – in the water, with the most significant sources of nutrients coming from agricultural runoff, largely from the upper Mississippi River Basin, as well as residential/commercial fertilizers, animal waste, sewage treatment plants, and air deposition from utilities and vehicles. NOAA has provided a conservative estimate that the cost of hypoxia and algal blooms to the U.S seafood and tourism industries is approximately $82 million annually.

EPA RESPONSE

Programmatic

EPA has statutory authority under the Clean Water Act (CWA) and the Marine Protection, Research and Sanctuaries Act (MPRSA) to implement programs designed to provide protections for oceans and coastal waters and freshwater lakes, rivers and streams. For example, EPA and delegated States may issue permits for the discharge of pollutants to waters of the U.S., including the territorial seas, under section 402 of the CWA. In addition, EPA may issue section 402 permits for discharges to ocean waters beyond the territorial seas. For discharges to coastal and marine waters, section 403 of the CWA includes additional requirements related to permitting such discharges. CWA section 303 directs states to adopt water quality standards for their waters establishing the designated uses and water quality criteria to protect those uses. By regulation,

such state standards also must protect downstream state standards. Under section 304(a), EPA publishes scientific information related to water pollution. CWA section 312 addresses discharge of sewage and other materials from vessels. EPA also works with the Army Corps of Engineers to manage ocean dumping of dredged material under the MPRSA. Also under the MPRSA, EPA regulates the dumping of materials (other than dredged materials) into the ocean. Additionally, EPA has authority under the Safe Drinking Water Act to promulgate drinking water standards for the protection human health from exposure to contaminants, possibly including toxins created by harmful algal blooms, which might be present in public drinking water systems.

It is clear that the discharges of nitrogen and phosphorus, and their affect on the development of hypoxia and harmful algal blooms is a problem, now more than ever. In 2008, the Gulf of Mexico hypoxic zone was among the largest ever recorded since measurements began over twenty years ago. Last year, while it was smaller in size, it was more severe in terms of oxygen depletion. In response, since the introduction of HABHRCA, EPA has worked to adopt a watershed approach to reducing nutrient discharges that involves identifying high-priority watersheds and applying both voluntary and regulatory tools to achieve water quality goals. In the Mississippi River Basin States, EPA has approved a total of about 3500 nutrient-related TMDLs (Total Maximum Daily Loads), which identify the maximum amount of pollutant that a waterbody can receive and still achieve water quality standards. The nonpoint source grant program under CWA section 319, and the Targeted Watershed Grants provide financial assistance to states that are implementing their own nutrient management programs.

EPA is also working with the States to assess the condition of the nation's waters through a series of statistical surveys on rivers and streams, lakes and reservoirs, coastal waters and wetlands. The National Aquatic Resource Surveys are beginning to contribute significant information we can use to evaluate the extent and impact of toxic algae, nutrients and other key indicators. The National Lakes Assessment report, due for release in December, will include the first national picture of the occurrence of microcystin (the most commonly measured algal toxin), in lakes across the country. These data will provide valuable information in assessing the scope of toxic algal problem nationally. The Surveys also provide information on nutrient levels in our waters which can be related to land use, harmful algal bloom risk levels and other issues such as hypoxia.

EPA is also working with the States to support implementation of Clean Water Act regulatory tools through the development of numeric nutrient water quality standards. EPA is engaged in proposed rulemaking for numeric nutrient criteria for the State of Florida, following the Agency's January 2009 determination that numeric nutrient criteria are needed in Florida. EPA is also at this time carefully considering its response to a petition to establish nutrient criteria within the Mississippi/Atchafalaya River Basin. The great distances between the sources of nutrients contributing to hypoxia in the Gulf, and the impact that factors other than nutrients – temperature, precipitation and storm events – have on the size of the hypoxic zone, complicate the regulatory issues.

Harmful algal blooms are of concern in the Great Lakes and other waters because of their toxicity and impact on human and ecosystem health. A particularly toxic species is present in

Western Lake Erie and Saginaw Bay (Lake Huron) -- two areas of the Great Lakes that typically have significant cyanobacterial blooms. These blooms cause fouling of the beaches and shoreline, economic and aesthetic losses, taste and odor impairments of drinking water, and direct risks to human, fish and animal health. EPA's Great Lakes National Program Office funds research on harmful algal blooms research and coordinates with NOAA's Center of Excellence for Great Lakes and Human Health (CEGLHH).

EPA has had a long-standing collaboration with NOAA through the Interagency Ecology and Oceanography of Harmful Algal Blooms Program, authorized by HABHRCA in 1998 and 2004. A Memorandum of Understanding that is still in effect allowed the participating agencies, EPA, NOAA, NSF, NASA, and ONR, to fund competitive research on the causes and impacts of HABs and to develop methods of detection, prevention and control EPA funded nearly 30 projects between 1997 and 2006, several of them joint efforts with NOAA.

EPA continues to evaluate the human health implications from harmful algal blooms and the toxins they produce in drinking water. The Agency included cyanotoxins as a group and discussed the three algal toxins, anatoxin, microcystin, and cylindrospermopsin, on the draft Candidate Contaminant List published in February 2008. The CCL identifies contaminants that may occur in public water systems and may require a drinking water regulation. The Agency sought public comment and review by the Science Advisory Board of the draft CCL 3. EPA is reviewing comments on the draft CCL 3 and anticipates publishing a final list soon.

Scientific

In 2006, EPA's Office of Water requested that the EPA **Science Advisory Board (SAB)** convene an independent panel to evaluate the state of the science regarding hypoxia in the Northern Gulf of Mexico and potential nutrient mitigation and control options in the Mississippi-Atchafalaya River basin (MARB).

The SAB Panel found that the Gulf of Mexico ecosystem appears to have gone through a regime shift with hypoxia such that today the system is more sensitive to inputs of nutrients than in the past, with nutrient inputs inducing a larger response in hypoxia than has been evidenced in other coastal marine ecosystems such as the Chesapeake Bay. Further, the SAB suggested that changes in benthic and fish communities exposed to hypoxia are cause for concern. The recovery of hypoxic ecosystems may occur only after long time periods or with further reductions in nutrient inputs. If actions to control hypoxia are not taken, the SAB warned that further ecosystem impacts could occur within the Gulf.

In 2008 the **National Academy of Science** (NAS), published "**Mississippi Water Quality and the Clean Water Act**," which found that while the Clean Water Act had much reduced direct discharges from point sources into the Mississippi River, problems stemming from urban runoff, agriculture and other non-point sources had proven difficult to address. A second NAS study, supported by the EPA entitled, "**Nutrient Control Actions for Improving Water Quality in the Mississippi River Basin and Northern Gulf of Mexico,"** recommended more collaborative action between EPA and USDA. A third study, "**Clean Water Act Implementation Across the Mississippi River Basin**" is currently underway.

To respond to the challenge posed by hypoxia, the EPA's Office of Research and Development has ongoing hypoxia research and modeling activities that will help guide the science needed to address Gulf hypoxia and support nutrient management decisions. The goal of that effort is to develop a suite of model applications, data products and other tools to assess and predict the relationships between nutrient loads and Gulf hypoxia, quantify sources of error and uncertainty associated with nutrient load reduction targets, forecast the effects of nutrient management actions in the Basin on Gulf hypoxia, and provide defensible options to guide restoration and decision-making.

In addition, the Office of Research and Development has published multiple regression models that describe the relationship between the Gulf hypoxic area and nitrate and phosphorus concentrations and spring discharge in the Mississippi-Atchafalaya Rivers. These models explain much of the variability in the size of the hypoxic zone over the past 25 years and provide improved capabilities for evaluating dual nutrients management strategies to address Gulf hypoxia. However, model predictions indicate that with gradual nutrient reductions (e.g. 45% over 10 years), much more than a decade would be required before a significant downward trend in hypoxic area could be observed.

Harmful Algal Bloom and Hypoxia/Gulf Hypoxia Task Forces

In response to the human health and environmental risks posed by the threat of excess nutrient pollution to the nation's fresh and marine waters, EPA, NOAA, and other federal and state agencies have been working collaboratively to better understand, and ultimately, manage or respond effectively and efficiently to nutrient pollution and hypoxia in particular. EPA is an

active participant in the Joint Subcommittee on Ocean Science and Technology (JSOST) and the Interagency Working Group on HABs, Hypoxia, and Human Health (IWG-4H) led by NOAA, which, among other responsibilities, implements the reporting requirements of HABHRCA 2004.

Recently a **Scientific Assessment of Freshwater Harmful Algal Blooms** was developed through the Interagency Working Group on HABs, Hypoxia and Human Health (IWG-4H), which examined the causes, ecological consequences, and economic costs of freshwater HABs. It was based, in large part, on a workshop report from the International Symposium on Cyanobacterial Harmful Algal Blooms (ISOC-HAB) sponsored by EPA, and other Agencies , held September 2005, which focused on: 1) occurrence of freshwater blooms and toxins, 2) causes, prevention, and mitigation, 3) toxins, toxin kinetics and dynamics, 4) human health and ecological effects, 5) analytical methods for identifying and quantifying freshwater HAB organisms and toxins, and 6) risk and/or impact assessments for freshwater HABs.

In addition, the EPA chairs and manages the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, comprised of fifteen States and Federal Agencies, which work together to reduce, mitigate, and control hypoxia in the northern Gulf of Mexico and improve water quality in the Mississippi/Atchafalaya River Basins. In 2008, the Task Force published their second Action Plan, identifying three goals and eleven actions designed to accelerate the reduction of nitrogen and phosphorus in the Mississippi watershed, and ultimately reduce the Gulf hypoxic zone to 5,000 km. On September 23rd and 24th, the Gulf Hypoxia Task Force will meet in Des Moines, IA, to discuss a variety of strategic proposals that have the potential for significant

reductions in nutrient discharges to the Gulf. The Task Force will also be presenting its first Annual Report, and FY2010 operating plan in a public forum.

In conclusion, EPA believes that harmful algal blooms and hypoxia represent serious threats to human health and the environment and we have robust research ongoing that is targeting the causes and their impacts. In addition, EPA is using its regulatory authority under the Clean Water Act (including the Beach Act) to address the causes of harmful algal blooms where necessary, and ultimately to protect human health and the environment. The Gulf Hypoxia Task Force, which engages federal agencies and the states in a voluntary collaborative effort, is proposing innovative approaches to reducing nutrient discharges that could have significant results. At the same time, EPA appreciates the Subcommittee's efforts to improve the effectiveness of this overall effort, and to increase the focus on the freshwater impacts of HABs and hypoxia. We look forward to working with you in the future.

Thank you for the opportunity to address the Subcommittee. We will be happy to answer your questions.