CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

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"Harmful Algal Blooms: Action Plans for Scientific Solutions"

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Chairman Harris, Mr. Miller and members of the subcommittee, we appreciate today's invitation and your interest in this important topic.

For more than 40 years, the Chesapeake Bay Foundation has been working to protect and restore the Chesapeake Bay. The Chesapeake Bay is the nation's largest estuary, and its 64,000 square mile watershed – from Cooperstown, New York to Cape Henry, Virginia and westward to the Allegheny Mountains – is a large part of the Mid-Atlantic region. More than 17 million people live in the Chesapeake Bay watershed, a number that is increasing by roughly 150,000 each year.

Starting in 1998, the Chesapeake Bay Foundation has issued a State of the Bay report that grades the health of the bay on a scale from 1 to 100. Last year, the numeric score was "31" – a D+. The score was an improvement from the previous report card, but still indicates a Bay that is dangerously out of balance. The most systemic problem continues to be an overload of nitrogen and phosphorus pollution that fuel algae blooms that ultimately, lead to a lack of

dissolved oxygen – that is, hypoxia and anoxia – in many parts of the Bay and its rivers. On average, over the last 10 years, more than 75% of the Chesapeake Bay and its tidal rivers have had insufficient levels of dissolved oxygen.

These poor water quality conditions can result in mortality or stress to aquatic animals like crabs, oysters, and rockfish. In turn, these impacts have economic consequences.

For example, low oxygen levels can drive blue crabs from their preferred habitat and kill many of the small bottom organisms on which the blue crabs feed. A study by the University of Maryland demonstrated that decreases in dissolved oxygen can reduce crab harvests and revenue to watermen.

Another critical Bay species, commercially, recreationally, and as an important part of the Bay ecosystem, is the oyster. Unfortunately, a combination of overharvesting, disease, and poor water quality has decimated the oyster populations in the Chesapeake Bay. Extended periods of zero oxygen conditions can be fatal to oysters and recent studies have indicated that low oxygen levels can stress the immune systems of oysters, making them more susceptible to disease. The decline of the Bay oyster over the last 30 years has meant a loss of more than $4 billion for Maryland and Virginia.

The rockfish (striped bass) has been, and remains, the most popular commercial and recreational fish in the Bay, generating roughly $500 million of economic activity related to fishing expenditures, travel, lodging, gear and so on. Faced with a catastrophic collapse in the fishery, commercial and recreational fishing were banned in the Maryland portion of the Bay from 1985-89 and in Virginia during 1989. The dramatic decline of the population was due to

several factors including overfishing and low dissolved oxygen in deeper parts of the Bay. Today, the rockfish population is at its highest in decades. However, scientists are concerned about the high prevalence of disease which has been attributed to poor water quality and limited availability of its preferred prey.

Although arguably the Chesapeake Bay's most pervasive problem is anoxia and hypoxia, like many other coastal and estuarine systems, it also suffers from the effects of harmful algal blooms (HABs.) Scientists estimate there are more than 1,400 species of algae in the Chesapeake Bay and its tidal rivers; 34 are potentially harmful. HABs represent a significant threat to aquatic life, human health, and regional economies.

Probably the most notorious HAB species in the Bay is *Pfiesteria*. During the summer of 1997, this microbe, first found in North Carolina waters, drew a fury of media attention and public concern when it was blamed for fish kills and human health problems in the Chesapeake Bay, specifically the Pocomoke River in Maryland. This led to closures of public waterways to commercial and recreational use, resulting in substantial economic losses to the local seafood and tourism industries. Since that time, there have been no reported *Pfiesteria* outbreaks in the Chesapeake and the role that *Pfiesteria* played in the observed effects is still being debated in the scientific community. Nonetheless, the events triggered intense research into all types of toxic algae and, since then, state health officials in Maryland have set up surveillance systems and tried to be more vigilant about warning the public about HABs through websites (http://www.dnr.state.md.us/bay/hab/) and swimming beach notices - a model that other tidal Bay states would be well-served to emulate.

Other harmful algae in the bay include species that produce reddish-brown "Mahogany Tides," including *Prorocentrum minimum*, *Karlodinium veneficum*, and *Cochlodinium polykrikoides*. Blooms of these algae can cause dissolved oxygen problems, in addition to being directly toxic to fish and shellfish. In particular, *Karlodinium* is thought to be responsible for numerous recent fish kills in Maryland. In addition, recent studies have demonstrated that some species produce a toxin that is highly toxic to oyster larvae. As a result, several researchers have speculated that the increase in the distribution and magnitude of blooms of some toxic species in the Bay may be negatively impacting native oyster restoration efforts in Virginia and Maryland – an activity in which the Chesapeake Bay Foundation is heavily invested.

Blooms of blue-green algae, also known as cyanobacteria probably represent the most significant HAB-related risk to human health in the Chesapeake Bay. In particular, cyanobacteria produce toxins that have been associated with liver and kidney disease, vomiting, fevers, and skin rashes in people. A recent Chesapeake Bay study reported that between 2000 and 2006, 31 percent of the waters tested for cyanobacteria blooms had enough toxins to make them unsafe for children to swim in. The toxins can also cause fish kills, bird, pet, and livestock deaths. Typically associated with freshwater systems, cyanobacteria blooms have been causing problems in the Potomac River and other waterways at least since the 1930s. The first confirmed presence of toxins in the Chesapeake Bay's tidal waters came in 2000 in the Sassafras River on Maryland's Eastern Shore. Since then, state officials have issued no-swimming advisories or beach closures due to blooms on the Sassafrass, Potomac, and Transquaking rivers.

Research, Monitoring and Communication Needs

In our view, additional research is needed to understand factors involved in, among other things, bloom initiation and the effects of climate variability and change. Additional monitoring and communication is also important.

Understanding factors involved in bloom initiation. We know that nutrients certainly play a role in bloom formation, but the timing of nutrient input and the flow pathways are also critically important to bloom initiation and subsequent transport to adjacent waterways. From the management perspective, for example, understanding this relationship may help identify geographic areas and stormwater management approaches that should be targeted. Better understanding of bloom formation will also improve scientists' ability to predict the formation of blooms, thereby increasing the ability to protect humans from exposure.

Understanding the effects of climate variability and change. Warmer water temperatures appear to be expanding the range of HABs into the Chesapeake Bay and causing others to bloom earlier. For example, a toxic alga normally associated with Florida and the Gulf Coast, *Alexandrium monilatum*, in 2007 was believed to have been responsible for killing whelks (a species of sea snail) in the York River in Virginia. It was the first known bloom in this area. Increasing temperatures will also select for different species in the normal successional pattern in the Bay, with unknown consequences on the living resources. Better understanding of these likely effects will help the Bay region better adapt to the ecosystem changes caused by climate change.

Improved monitoring and communication. Probably because of their experience with "Pfiesteria hysteria", Maryland does a fairly good job of regular monitoring for common HABs, posting that information in "real time" on a web page where it is visible to the public, and providing a HAB hotline – accessible via the web and by phone – where the public can report unusual events such as HAB or fish kills. Virginia's program, while providing some periodic monitoring, a public hotline, and state agency response to reported HAB events, does not report real-time information to the public. Due to the apparent increase in the frequency and extent of HABs in Virginia's tidal rivers, particularly the James, we believe timely release of this information is critically important to inform and protect the public.

Draft Bill

The letter of invitation that I received from Chairman Harris asked me to comment on the subcommittee's draft legislation for the reauthorization of the Harmful Algal Bloom and Hypoxia Research and Control Act.

First, there is much that is good in the draft that was shared with us. It is virtually impossible to dispute the need for additional federally supported research, development and implementation of action plans for certain unaddressed aspects of the hypoxia/HAB challenge, and coordination of federal, State, and local government activities. As a general matter, the Chesapeake Bay Foundation supports reauthorization of the Harmful Algal Bloom and Hypoxia Research and Control Act.

Second, no one should be surprised that we believe that the Act deserves a special Chesapeake Bay section, parallel but not identical to the Northern Gulf of Mexico section. We have been on

the front lines of the Chesapeake Bay hypoxia and HAB questions for more than a generation. Scientists worldwide have recognized for decades that nutrient over-enrichment and hypoxia are the principal systemic water quality problems of the Chesapeake Bay. A better understanding of the underlying processes by which HABs are initiated will lead to better management strategies. That said, it is also time to address the underlying cause of these problems: excessive levels of nutrients.

We have one overwhelming concern with this draft legislation: its failure to acknowledge, or in any way support, the widely accepted strategy to get nutrients under control under the authority of the Federal Water Pollution Control Act (the Clean Water Act.) There is a detailed action strategy in place that has been developed and agreed to by the federal government and the Chesapeake Bay jurisdictions – New York, Pennsylvania, West Virginia, Virginia, Maryland, Delaware, and DC. It has been reinforced by the federal courts and by the Congress. It needs to be acknowledged and supported by this subcommittee. In a time of such concern about the federal deficit, we simply cannot afford to have some federal agencies, six states and the District of Columbia working on one part of the problem, and other federal agencies on another.

Expanding on that point, Section 8 of the draft bill is particularly problematic. “Nothing in this Act, or the amendments made by this Act, shall be construed to require a State, tribal, or local government to take any action that may result in an increased financial burden to such government.” We want to be very clear: successfully addressing the nutrient over-enrichment of the Chesapeake Bay in order to address the widespread hypoxia problem is going to require

changes at the individual, local, and State levels that will impose costs. Unless the federal government is prepared to fund every penny of every necessary change—a prospect far beyond rational consideration—there will be costs to individuals and governments. We believe that such costs are manageable and will create jobs and spur local economies, and that it is an appropriate role for the federal government to assist in supporting some of the costs of necessary pollution reduction activities. However, pollution from all sources must be reduced. Individuals, businesses, and units of government cannot expect to perpetually "externalize" their costs by polluting the public's commonwealth.

In sum, it is the view of the Chesapeake Bay Foundation that harmful algal blooms are a serious threat to ecological and human health in estuaries and coastal areas in North America and much of the rest of the world. Current policies that allow for externalization of the costs of pollution are at least in part to blame. While there is a need for more research, monitoring and communication, there is also a pressing need to reverse the policies that are substantially contributing to the harmful algal blooms in this country and abroad. In the Chesapeake Bay watershed, we have a strategy in place; it needs to be the principal means through which the federal, state and locals governments bring the Chesapeake Bay back into balance.

Thank you for the opportunity to address the subcommittee today. I look forward to the discussion.