



CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

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Prepared for a hearing entitled

“An Examination of the Impacts of Global Warming on the Chesapeake Bay”

United States Senate Committee on Environment and Public Works

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Chairwoman Boxer, Senator Inhofe, Senator Warner, Senator Cardin and other distinguished members of the Environmental and Public Works Committee, I am William C. Baker, President of the Chesapeake Bay Foundation. Thank you for inviting me, on behalf of CBF's board, staff, and 190,000 members, to participate in today's hearing.

I want to particularly acknowledge Senator John Warner for the work that he has done to improve the health of the Chesapeake Bay during the nearly thirty years that he has represented the people of the Commonwealth of Virginia. Even though the Bay still has many challenges, it is much better off than it would have been without Senator Warner's strong interest and effective assistance during all those years. Although he has announced his retirement at the end of this Congress, this hearing and the development of the Lieberman/Warner legislation are indications that he's a long way from being done. Senator Warner, thank you.

Moreover, although none of them is retiring – in any sense of the word – I also want to acknowledge the tremendous work done that Senator Mikulski, Senator Cardin and Congressman Gilchrest are doing here in Congress on behalf of the Bay. All three are doing everything they can to restore the health of the Bay, and I know they will continue to do so for many years to come.

For more than 40 years, the Chesapeake Bay Foundation has been working to protect and restore the Chesapeake Bay. The Chesapeake Bay is America'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 states. More than 17 million people live in the Chesapeake Bay watershed, a number that is increasing by roughly 150,000 each year.

If you follow the Chesapeake Bay Foundation's annual State of the Bay report, you know that the lack of progress being made to improve water quality and protect the living resources of the Chesapeake Bay continues to cause very serious concern. The numeric score that our scientists calculated last year to represent the overall health of the Chesapeake Bay – 29 on a scale of 100 – is only one point higher than it was in 1999. This means that the Bay is ecologically functioning at between one-fourth and one-third of its historic capacity, and is not improving nearly as fast as we would like. The most systemic problem continues to be an overload of nitrogen and phosphorus pollution creating a lack of dissolved oxygen in many parts of the Bay and its tributaries. Every summer, the mainstem of the Bay and several of its tributaries are plagued by dead zones, where not enough dissolved oxygen exists to sustain many forms of aquatic life. The volume of water

affected by these dead zones varies by year, but on average about 80% of the Bay and its tidal rivers have insufficient levels of oxygen.

The fact is that today's Chesapeake Bay ecological web is a pale reflection of what it was not so very long ago. Chesapeake Bay oysters, the great natural filter of the Bay's water, are currently less than 4% of their historic levels. The Bay's flagship species – the blue crab – is in such jeopardy that entire watermen communities are disappearing, and the great crab processing companies now survive on foreign imports. The underwater grasses so essential to life in the Bay are subject to massive die-offs related to increased water temperature, and the Bay's wetlands, critical to thousands of species in its web of life, are being destroyed yard by inexorable yard.

We have become complacent about the constant, slow deterioration of one of the world's great natural resources. The degree of stress on the system from pollution flowing out of our cities and farms is enormous, and the system certainly does not need more stress. Yet additional stress is exactly what the Chesapeake Bay ecosystem is already getting from rising water temperatures and sea level rise. When CBF embarked on its mission to "Save the Bay" four decades ago, we had no idea that carbon dioxide and other greenhouse gases would be a huge threat to the people and other living resources that depend on the Bay for their existence. We understand now, however, that fossil fuels burning in Indianapolis or in India, as well as a host of other greenhouse gas producing activities, will negatively affect the people and creatures of the Chesapeake Bay just as toxics and other well-known pollutants do. The policy choices you and your counterparts in other nations make will determine how severe those negative effects will be and how long they may last.

I will just touch briefly on what scientists believe will be the effects on the Chesapeake Bay unless action is taken to dramatically reduce emissions and sequester additional carbon. I know that my colleagues on this panel from the scientific community will fill in the details.

Warmer waters

Ocean temperatures are rising, and the water temperatures in the Chesapeake Bay are as well. Warmer water has less capacity to hold dissolved oxygen, and dissolved oxygen is critical for most life in the Bay, its rivers, and its streams. Thus, higher temperatures may exacerbate the Bay's dead zones, potentially expanding both the size and the duration of oxygen-deprived areas in the Bay.

In one of nature's characteristic cycles, oxygen-deprived dead zones in the Chesapeake Bay and its tributaries can actually contribute to additional greenhouse gas generation. Globally, estuaries emit approximately one third of the world's oceans' net emissions of nitrous oxide, a very potent greenhouse gas. In the few places where it has been studied, nitrogen pollutant loads to estuaries have been shown to contribute to increased nitrous oxide emissions. Similarly, estuarine production of methane, another greenhouse gas, also increases under low-oxygen conditions due to bacterial activity, so the Bay, in its overloaded and degraded state, is actually contributing to climate change.

Changes in water temperature can also affect the distribution and health of aquatic species in the Chesapeake. For instance, adult striped bass, also known as rockfish, try to avoid water

warmer than about 76 degrees Fahrenheit by finding refuge in the cooler temperatures of deeper water. During the summer, however, rockfish face what scientists call “temperature-dissolved oxygen squeeze,” when dissolved oxygen concentrations in these waters drop past the point where adult rockfish can survive. With predictions of higher water temperatures and expanded dead zones, rockfish will be increasingly squeezed, forced to live in uncomfortably warm water in order to “breathe.” Such stress can affect the health of fish by changing their feeding habits or making them more susceptible to disease.

Scientists still have much to learn about the effects of increased carbon dioxide and warmer water temperatures on the various types of algae found in the Bay, but it seems clear that some species, like the harmful algae *Cochlodinium* that plagued the Hampton Roads/Norfolk area last month, may prosper under the various climate change scenarios.

Storm intensity

Although climate change models are as yet inconclusive about whether more precipitation will fall in the Chesapeake Bay watershed, or exactly what seasonal variations in precipitation may look like, most models agree that storms will become more intense. Storm intensity has an important impact on the Bay region in terms of property damage as well as on Bay’s ecological health. Increased scouring and runoff from more intense rain events, regardless of season, will carry significantly higher loads of nitrogen, phosphorus, and sediment to tributaries, and thus to the Bay. Since it is this trio of pollutants that is primarily causing the continued decline in the

Bay's water quality, additional heavy loads of them during more intense storms in the Mid-Atlantic states can be expected to appreciably compound the Bay's water quality challenges.

Sea level rise and flooding

With more than 11,000 miles of coastline, much of the Chesapeake Bay area, including some large population centers, lies very close to water level. Worldwide, the Intergovernmental Panel on Climate Change predicts that sea level will rise between 8 inches and 2 feet by the end of this century. Many scientists consider those estimates to be conservative, evidence is mounting that ice caps and glaciers are melting at accelerated rates. If the trend continues, apparent sea level rise could be as high as several feet in the region by the end of the century.

Although sea level rise will affect many parts of the world, the Bay region may suffer even more. Why? Because, even as waters rise, much of the area is actually sinking due to geological processes that began during the last ice age. This combination of processes has resulted in approximately one foot of net sea level rise in the Chesapeake Bay over the past 100 years—a rate nearly twice that of the global historic average. As a result we are losing Tangier Island, Smith Island, and many other low-lying lands around the Bay. Thousands of acres of environmentally-critical tidal wetlands are now unable to trap sediments fast enough to keep pace with rising water levels.

In the future, the combination of several feet of global sea level rise, flat topography, and subsiding land mass could make the people who live here in the Mid-Atlantic region particularly

vulnerable. Demographic modeling correlated to projected sea level rise suggests that hundreds of thousands of people in low-lying coastal or river valley areas, including in several cities, could fall victim to serious floods, and these storms are likely to cause the most damage to socially vulnerable populations within the region. For example, a 2005 report by the Center for Integrated Regional Assessment defines areas within Hampton Roads that have high “numbers of children and elderly, and with a high number of mobile homes” as vulnerable. By a wide margin, these at-risk communities are the most likely to face severe flood and storm damage. Additionally, these storms—which are also predicted to increase in intensity— will not only increase demands on emergency services and rescue facilities in these areas, but literally flood those facilities as well. Essentially, those with the fewest resources to recover from a catastrophic storm will be among those hardest hit.

Clearly, the enormous challenge of reducing the effects of excess carbon dioxide and other greenhouse gas emissions requires a multiplicity of actions at every level of society to reverse our current destructive course.

One important way to improve water quality in the Bay and help to reduce the effect of greenhouse gas emissions is to maximize the use of common agricultural conservation practices to prevent nitrogen and phosphorus from running to the Bay while at the same time sequestering carbon. The Chesapeake Bay watershed states have already defined agricultural conservation as a key tool to achieve the pollution reductions necessary to remove the Chesapeake Bay and its tributaries from the Clean Water Act’s 303(d) list. As part of the Chesapeake 2000 Agreement—a

pledge to cut the amount of nitrogen, phosphorus, and sediment pollution discharged into the Bay and its rivers—Pennsylvania, Maryland, Virginia, Delaware, West Virginia, New York and the District of Columbia have each developed river-specific “tributary strategies” to achieve targeted pollution reduction goals. Region-wide implementation of these plans’ agricultural components would reduce the excess nitrogen entering the Bay by nearly 65 million pounds annually—approximately 60 percent of the reduction needed to restore the Bay and its tributaries.

A recent Chesapeake Bay Foundation report entitled “Climate Change and the Chesapeake Bay: Challenges, Impacts, and the Multiple Benefits of Agricultural Conservation Work”, drawing on a study conducted at the Yale School of Forestry and Environmental Studies, made the case that more widespread use of common agricultural practices such as planting winter cover crops, establishing riparian buffers, and practicing rotational grazing and no-till farming can help to sequester carbon while at the same time moderating the effects of adding greenhouse gases to the atmosphere. The Yale study estimated that approximately 4.8 million metric tons of carbon dioxide would be sequestered annually—the equivalent of mitigating the carbon dioxide emissions from residential electricity use across the state of Delaware. On a state-by-state basis, the greatest carbon sequestration benefits would be accrued in Virginia— approximately 2.3 of the 4.8 million metric tons. This large share is due to the prevalence of forest buffers and restoration programs in the Commonwealth’s tributary strategies. In Pennsylvania and Maryland, carbon benefits would come from a broader combination of conservation practices.

I am aware that farm bill reauthorization is not within the Environment and Public Works Committee's jurisdiction. However, within the next few weeks, each of you will have an opportunity to influence the language of the farm bill on the Senate floor, providing you with a powerful opportunity to enhance the mitigation of greenhouse gas emissions as you work toward more comprehensive solutions. Providing additional technical and financial assistance to farmers to increase the use of common conservation practices such as cover crops and buffers is a win-win strategy for the Chesapeake Bay, as well as for the global atmosphere. In fact, enhancing carbon sequestration on America's agricultural lands should be given more prominence as an objective of federal farm policy nationwide.

As I near the end of my statement, I want to focus particular attention on one element of the cap-and-trade bill that Senators Lieberman and Warner are developing. According to discussion papers I have seen, the Lieberman/Warner bill will allocate 24% of the proposed National Emission Allowance Account to the Climate Change Credit Corporation, rising to 52% over time. These allocations will be auctioned and the proceeds will be used for various purposes, including 10% to help mitigate the impacts of climate change on terrestrial wildlife and aquatic wildlife in the nation's great waters.

Certainly there are many potentially important uses for the funds produced by the climate change credit auction, but I want to encourage you to make sure that a significant share of the proceeds goes to projects that will help us to protect and restore the great multitude of plants and animals that we are destroying through our thoughtlessness – or worse. We are causing great harm

to the natural world through the actions that we take in the service of our prosperous lifestyles. It is only appropriate that we do our best to compensate. And, as I have outlined today, the Chesapeake Bay ecosystem, already on the brink, will be harmed even more by global climate change. It is critical that some of the proceeds from the credit auction go to the nation's great waters, including the Chesapeake Bay, to address the impacts we are discussing here today.

In conclusion, I want to simply reiterate that the Chesapeake Bay, an ecosystem in serious trouble, will be subject to very significant additional stresses in the coming years from the effects of global climate change. There is much we do not yet know, and a great deal of what will happen to the Chesapeake Bay depends on the actions that you and other policymakers choose to take, but the outlines are very clear. I urge you to work hard over the next few weeks for a 2007 farm bill authorization that allows farmers more ability to address the Bay's nitrogen and phosphorus problem while at the same time sequestering carbon. As has already been recognized by the House of Representatives, the Chesapeake Bay watershed is a perfect national pilot area to simultaneously address water quality and carbon sequestration. Above all, I urge to you quickly consider and pass an aggressive cap-and-trade bill that will begin to force dramatic emissions reductions and provide a source of funds to help address the changes that we are already seeing in the Chesapeake Bay ecosystem.

Thank you once more for the opportunity to be here today. I am happy to answer any questions that you might have.