Written Testimony of
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Mr. Chairman and Members of the Committee, my name is Rebecca Hanmer and I am the Director of the Chesapeake Bay Program Office. Thank you for the opportunity to testify today.

The Chesapeake Bay is North America's largest and most biologically diverse estuary, home to more than 3,600 species of plants, fish and animals. For nearly 400 years, the Bay and its tributaries have sustained the region's economy and defined its traditions and culture. It is a resource of extraordinary productivity, worthy of the highest levels of protection and restoration.

Accordingly, in 1983 and 1987, the states of Virginia, Maryland, Pennsylvania, the District of Columbia, the Chesapeake Bay Commission and the U.S. Environmental Protection Agency, representing the federal government, signed historic agreements that established the Chesapeake Bay Program partnership to protect and restore the Chesapeake Bay's ecosystem.

For two decades, the Chesapeake Bay Program partners have worked together as stewards to ensure the public's right to clean water and a healthy and productive resource. We have sought to protect the health of the public that uses the Bay and consumes its bounty. The initiatives we have pursued have been deliberate and have produced gains in the health and productivity of the Bay's main stem, the tributaries, and the natural land and water ecosystems that compose the Chesapeake Bay watershed.

While the individual and collective accomplishments of our efforts have been significant, even greater effort will be required to address the enormous challenges that lie ahead. Increased population and development within the watershed have created ever-greater challenges for us in the Bay's restoration. These challenges are further complicated by the dynamic nature of the Bay and the ever-changing global ecosystem with which it interacts. Let me stress this point: the progress that we have made has been real, but the amount of work ahead of us is enormous. By most of the key measures that we use to evaluate the health of the Bay, we are less than half-way to where we need to be to have a truly restored Chesapeake Bay.

The health of the Chesapeake Bay

The Committee has asked us to provide an assessment of the health of the Bay. But the Chesapeake Bay is a complex ecosystem, and the Chesapeake Bay Watershed, of which it is the defining element, is even more complicated. Trying to assess the health of the system is, necessarily, a difficult task.

Nevertheless, there are a number of ways to measure the Bay's health. Let me review some of them with you.

The simplest assessment of Bay health can be found on EPA's Clean Water Act 303(d) list, which is the list of the nation's impaired water bodies. Most of the Bay's waters do not attain their designated uses and fail to meet the states' water quality standards. They are currently on the 303(d) list.

But to say that the Bay is "impaired" fails to define the scope of the challenges we face.

For more specific assessment of the Bay's health, the Chesapeake Bay Program has a national, indeed an international, reputation for having developed an extraordinary suite of environmental measurements. The Program has literally one hundred "indicators" that we use to assess the health of the Bay and the restoration effort. The majority of these are based on monitored data. Only eleven are based almost exclusively on our computer models, but even these are calibrated with data gathered from monitoring stations.

The Bay Program's Watershed Model is perhaps the finest of its kind in the world. It has received recognition from outside experts as diverse as the Smithsonian Institution and the supercomputer makers, Cray, Inc. The model itself is developed by a collection of some of the top people in the field, including scientists and engineers from the EPA, United States Geological Survey, the University of Maryland, and a host of private sector contractors. All of their work is done in public and all the documentation of their work is available on the chesapeakebay.net website. Hundreds of people have provided input. I will let my colleague from USGS speak for that leading science organization. Let me point out, however, that in correspondence following the recent Washington Post articles, USGS notes that their monitored data, adjusted for annual flow variations, also show a downward trend in nutrients as does the Bay Program's model. That is not to say that the model always mirrors monitored data. Neither method can claim 100% accuracy; both are based on different approaches, and they serve different functions. Having said all of that, we also know that we must constantly evaluate our assessment methods and strive for further improvements. That's why for several years now we have been developing the next generation of the computer model that we use to analyze the Chesapeake Bay Watershed. Simultaneously, we've been working with USGS and the Bay states on improving both our tidal and non-tidal monitoring networks. We have already asked the Program's independent Scientific and Technical Advisory Committee (STAC) to "establish an expert group to review the model and provide advice as the Chesapeake Bay Program makes its Phase 5 model revisions." In addition, we have asked STAC to provide us with "advice broadly on the Program's data gathering and our use of data and modeling information in our decision-

making and indicators for Program evaluation and reporting."

These indicators allow us to assess the health of the Bay.

- **Dissolved oxygen (DO)** levels in the mainstem of the Bay become dangerously low every summer. While lower dissolved oxygen levels in the deep waters of the Bay are a natural phenomenon during the warmer months, the dramatic extent of the low oxygen levels that we have documented for years are largely due to the vast amount of nutrient pollution that still finds its way into Bay waters annually.

- Last year high rainfall contributed to areas of low oxygen waters in the Bay reaching record levels in terms of range. In the summer of 2003 low oxygen levels stretched over 150 miles from Baltimore to the York River and covering an area of about 250 square miles. This year, with less rainfall washing non-point source pollution into the Bay, the size of the low oxygen zone has decreased, although the total volume of low oxygen waters is still enormous. Scientists inside and outside the Program differ on whether we are beginning to see small, but statistically significant improvements in DO levels. But there is no disagreement, however, that solving the dissolved oxygen problem is one of the central challenges in restoring the health of the Bay.

- **Bay grasses**, or submerged aquatic vegetation, are another key indicator of Bay health. Bay grasses are important because they produce oxygen, are food for a variety of animals (especially waterfowl), provide shelter and nursery areas for a variety of fish and shellfish, reduce wave action and shoreline erosion, absorb nutrients such as phosphorus and nitrogen, and trap sediments. Bay grasses had been on a sustained upward trend for several years. Then in 2003 we saw a record decline of 30% in a single year, down to 64,709 acres, at least partly due to high rainfall and runoff volumes. Even with that dramatic drop, we still had more than a 50% increase in Bay grasses last year than we did back in 1984. The data on grasses for this summer are still being collected. We have some encouraging reports in several areas that the grasses are rebounding, but we also have reports that Hurricane Isabel last fall scoured out some areas and they have not recovered. Overall, we are making some progress. To have a restored Bay, however, we need to get that number up to 185,000 acres, so we are only about 35% of the way toward our goal.

- **Water clarity** is another key measure of Bay health. And here, the news is mostly bad, although there have been some recent extraordinary improvements in some tributaries in the Upper Bay. Plants require light and, therefore, water clarity is particularly critical to Bay grasses. Water clarity as measured by Secchi depth is degrading in many parts of the basin. While most of the mainstem Bay,

larger embayments and lower regions of large tributaries meet the minimum light requirement for Bay grasses, upper regions of the large tributaries and many minor tributaries fail.

· This summer we have seen some extraordinary and rapid improvements in water clarity in some Maryland waters, with some rivers showing water clarity improvements of 100% and even 200%. Watermen, local boaters and scientists alike are reporting water clarity of five and six feet in some of these areas. These are the kind of clarity depths that we think we should be seeing in the shallow waters throughout a restored Bay ecosystem. I wish I could tell you why we are seeing these remarkable developments. Initial theories include the role of macroalgae and the appearance of large numbers of dark false mussels, but Bay scientists are still sorting through the data and the theories. We need to be careful not to extrapolate this short-term phenomenon into a Bay-wide trend, but we will continue to keep a keen eye on this development.

· There are literally scores of other assessments that can be brought to bear in analyzing the health of the Bay. The number of nesting pairs of Bald eagles in the watershed has grown more than ten-fold, from 72 active nests in 1977 to 760 in 2003. Similarly, striped bass were officially designated as "restored" in 1995 by the Atlantic States Marine Fisheries Commission. Crabs and especially oysters, on the other hand, are at critically low levels. My colleagues from the National Oceanic and Atmospheric Administration (NOAA), our academic partners from the Virginia Institute of Marine Sciences (VIMS), Old Dominion University (ODU) and the University of Maryland Center for Environmental Science (UMCES), and some professional watermen will discuss some of the key living resources of the Bay such as oysters, crabs and finfish.

· As I noted earlier, there are 100 different indicators on the chesapeakebay.net website, and we encourage you and your staff to review them all. They are the result of a remarkable collaborative effort of scientists from the federal and state government, academic and nonprofit organizations, and even private citizens. One of the great strengths of the Bay restoration effort is the extraordinary watershed wide collaboration and these indicators are a good example of the ways we are all working together with a common purpose.

· So what can we say about the condition of the Chesapeake, beyond the fact that the Bay is "impaired"? Overall, I think it is a fair assessment to say that we have made modest progress. As I will be outlining later in my testimony, the key pollutants of nutrients and sediments are down, although not nearly far enough. Some important living resource indicators like Bay grasses show improving trends. In the face of a population that has grown by 20% since 1985 and all the attendant pollution that means, these gains are not inconsequential. But we need

to be measuring ourselves against what the Bay needs, not how much effort we have made. And using that method, we have a substantial amount of work ahead of us, as outlined below.

What do we need for a healthy Chesapeake Bay

In a healthy Chesapeake Bay the waters will be clear and well-oxygenated. Vast beds of Bay grasses will provide essential habitat to thriving populations of shellfish and finfish. Essential plant food will be in abundance, and harmful algae will be limited. The Bay Program has always recognized that the health of the living resources of the Bay is the final measure of our success. But in the past we had been limited in defining exactly what that meant, so we have relied heavily on measures of our progress in reducing the pollutants into the Bay. That has been an enormously useful approach, helping us to define the management strategies that will work and to measure the effectiveness of different pollution control methods.

The landmark *Chesapeake 2000 Agreement*, however, has set us on a different course. We have completed a three year review of how best to measure the health of Bay waters. The new criteria that we have developed:

- dissolved oxygen concentrations in different habitats;
- water clarity, especially in shallow water areas;
- the extent of Bay grasses, and
- the amount of chlorophyl *a* in the water column

give us specific environmental endpoints rather than pollution reduction targets.

This change is extremely important. These new criteria for measuring water quality have been developed in a collaborative fashion with our state partners as well as leading academic and nonprofit scientists. They are very ambitious and represent perhaps the best scientific work of its kind done anywhere in America. All of the states with tidal waters of the Chesapeake are in the process of adopting new designated uses and water quality standards. As they complete this process over the next several months, we will have four specific yardsticks to use as we assess the water quality of the Bay.

In *Chesapeake 2000* we committed ourselves to removing the nutrient and sediment impairments to the Bay by 2010. When we assess the health of the Bay then to determine if it can be removed from EPA's impaired waters list, we will be using specific monitored results of these environmental criteria. Arguments about computer models vs. monitored data will, no doubt, still be raging in the scientific community. But the ultimate measure of our success will be actual field measurements of these crucial parameters.

Accounting for pollution reductions

Since 1987, the Chesapeake Bay Program's top priority has been controlling and reducing the Bay's number one problem - the overabundance of the nutrient pollutants nitrogen and phosphorus. Excess nutrients are a problem because they nourish algae blooms which cloud the

water, deprive underwater Bay grasses of sunlight, and rob the water of oxygen needed by Bay creatures.

In the 1987 Chesapeake Bay Agreement, the Bay Program partners committed to reducing controllable nutrient loads 40% by the year 2000. This is the frequently cited 40% reduction goal that the Program promoted. In the *Chesapeake 2000* agreement, however, the Bay Program committed to reduce nutrient loads further and reduce sediment loads in order to correct all nutrient and sediment-related problems in the Bay by 2010.

When we set the goal in 1987 of a 40% reduction, there wasn't consensus on what the 40% should be measured against. We had little scientific understanding of the role of air pollution and how large a role it played in polluting the Bay. And the Bay partners said that they could only take responsibility for pollution originating in their states. Both of these were reasonable assumptions, especially nearly 20 years ago. But by 2000, we knew that we needed to more accurately account for the pollution coming from our headwater states of West Virginia, New York and Delaware as well as the atmospheric pollution, including substantial sources of nitrogen, that was coming into our airshed and contaminating our waters. In effect, we said that we needed to be playing on a bigger field.

We also realized that a 40% reduction of the controllable nutrient pollution originating from the Bay states would simply be inadequate to restore the Bay. In effect, we were saying that not only did we need to play on a bigger field but also that the goal line needed to be further away.

In 2003, the Bay Program partners agreed to reduce nutrient loads so that by 2010 (and every year thereafter) no more than 175 million pounds of nitrogen from all sources and 12.8 million pounds of phosphorus from all sources will be delivered to the Bay in an average hydrology year. We also agreed to reduce land-based sediment loads so that no more than 4.15 million tons will be delivered to the Bay in 2010 (and every year after). The estimated loads for these pollutants in our base year of 1985 were 338 million pounds of nitrogen, 27.1 million pounds of phosphorus, and 5.8 million tons of land-based sediments. These reductions in nutrients and sediment are expected to result in improved water quality conditions necessary to support the living resources of the Bay. All of these goals were established using the Bay Watershed Model, and this is an excellent example of the indispensable role this tool plays in the Program.

Using this more encompassing geographic scope and the even more stringent pollution reduction target, we now estimate that between 1985 and 2002, annual phosphorus loads delivered to the Bay from the entire watershed are projected to be reduced by 7.6 million lbs. Annual nitrogen loads are projected to be reduced by 60 million lbs and sediment loads by 0.8 million tons. In order to achieve the new goals, an additional 6.7 million lbs of phosphorus, 103 million lbs of nitrogen and 0.9 million tons of sediment will need to be reduced by 2010. All of these numbers are based on monitored data from things like wastewater treatment plants in the

tidal reaches of the Bay and projections from the Watershed Model based on management changes on the land and other variables. Using these various assessment methods, we can project that we have taken the necessary management actions to achieve one-third of the nitrogen and about one-half of the phosphorus and sediment reductions that are needed to restore the Bay.

Good science tells us that the new Program goals are the right ones for the Bay. But we are using a new set of parameters rather than ones that the public had grown accustomed to over the years, and that change has resulted in some confusion about assessing the progress we have made in reducing pollution over the last twenty years. Five years ago we were telling people that some jurisdictions were nearing their 40% reduction targets. When we reassessed what would be required to achieve a healthy Bay, we said our new targets would have to be much more ambitious, closer to 50% of ALL the nutrients, regardless of where they originated and whether we thought they were "controllable." The earlier accounts of pollution reduction projections were based on our best estimates of the time, but the benchmarks had changed so considerably that the percentage comparisons became skewed. That's one of the reasons that we have changed our reporting so that we now simply use actual annual load targets expressed in pounds or tons rather than percentages. These measurements will be based on outputs from the Watershed Model, and together with our extensive monitoring data, they will continue to provide us with excellent management tools to help us gauge whether we are on track for recovery. But the actual measure of recovery will be the monitored data of Bay water quality criteria and assessment of living resource stocks.

Where do we go from here

If reductions of nutrients and sediments are the keys to improving water quality, and improved water quality is a key component in the restoration of the living resources of the Bay, then what can and should be done to reduce the pollution loads coming into the Bay?

All of the Bay watershed states, including the headwater states, have embarked upon an ambitious tributary strategy exercise. Secretary Murphy will be able to give you a more detailed look at the Virginia strategies. This watershed-wide effort, though, is designed to take the overall pollution reduction goals for the Bay and have each of the 30+ subwatersheds design plans to reduce their inputs to the system. These "trib strategies" are all based on the new, more aggressive pollution reduction goals. And the pollution reduction efforts they are planning are impressive in their scope and depth.

Agriculture is a vital part of the economy and cultural makeup of the Chesapeake Bay Watershed. It is also the largest single sector source of nutrient and sediment pollution flowing into the Bay. A plurality of the nitrogen and phosphorus loads coming into the Bay originate on agricultural lands, and a majority of the land-based sediment run-off does as well.

- All watershed states have made significant commitments to working with farmers in reducing nutrient loads. In the tributary strategies, the jurisdictions have committed to

accelerate implementation of conservation tillage, nutrient management, and cover crops on close to 100% of available lands. In many cases, we have a good start on these agricultural best management practices, but overall our level of effort will need to increase.

- We must employ new approaches. Jurisdictions have made a strong commitment to employ new approaches that hold great promise for the Bay, such as enhanced nutrient management which provide incentives to farmers to apply less fertilizer. There is a watershed-wide commitment to employ some level of nutrient management on close to 92% of all available land -- 16% of which will have enhanced nutrient management.

- The President's FY05 budget request included an additional $10 million for Chesapeake Bay nutrient reduction using trading and innovative approaches to non-point source runoff.

- USDA recently provided $5 million in additional funds for Delmarva peninsula nutrient reduction actions under the Farm Bill conservation programs.

Our point source commitments are just as strong.

- Before the tributary strategies were written, 97 out of the 360 significant municipal facilities in the Chesapeake Bay watershed were using advanced nutrient reduction technologies. New technologies are capable of reducing nutrients by more than 80% compared to traditional secondary treatment. The Chesapeake Bay region is a leader in new technology upgrades of wastewater treatment plants. The State of Maryland recently enacted legislation that was proposed by Governor Ehrlich that will finance new technolgy upgrades for Maryland's significant municipal facilities.

- With the tributary strategies, at least 330 out of the 360 significant municipal facilities will implement nutrient reduction technologies. To make sure that these tributary strategy promises become reality, EPA Region III recently announced a draft permitting strategy that will require nutrient pollution limits in the NPDES permits for virtually all the major waste water treatment plants in the watershed. Construction of needed upgrades would have to be complete by 2010.

- When the tributary strategies are fully implemented, they will result in an additional 23 million lb/yr reduction of nitrogen from the facilities and an additional 2.04 million lb/yr of phosphorus from the facilities.

On urban and suburban lands, we will need unprecedented pollution control efforts as well.

- Currently these lands contribute 17% of the nitrogen, 27% of the phosphorus and 18% of the sediment going into the Bay.

- The Maryland tributary strategy plan calls for every homeowner in the state to stop over-fertilizing their lawns. In Washington, the District envisions a major increase in the use of Low Impact Development techniques to slow the flow of pollution from city streets. Every one of the trib strategies will have to include similar levels of effort.

The President's Clear Skies Proposal would provide dramatic reduction in NOx emissions in the Chesapeake Bay watershed both improving air quality and reducing nitrogen entering the Bay.

- Oxidized nitrogen deposition to the Chesapeake Bay watershed would be reduced by up to 20%. We estimated in 2001, using 2000 land use patterns, that this would have resulted in an annual eight million pound reduction in the nitrogen load to the Bay by 2010. This is equivalent to more than half of the reductions it took 15 years to achieve through improvements to publicly owned treatment works.

- Chesapeake Bay States, including NY, VA, MD, PA, DE, WV and DC, recently agreed to incorporate the nitrogen reductions resulting from Clear Skies legislation as part of their overall plan to reduce nutrient loadings to the Bay.

- Congress has yet to enact Clear Skies thus EPA has proposed regulations that are similar to Clear Skies – the Clean Air Interstate rule – which will cut nitrogen emissions from coal-fired power plants by about 65 percent from today's levels.

- Under CAIR and other Clean Air Act programs - most notably the NOx SIP call - 50 counties in the six-state (plus District of Columbia) watershed will be brought into attainment with the new 8 hour ozone standard by 2015.

Conclusion

The Chesapeake Bay and its watershed are incredibly complex and dynamic. The resource is under tremendous stress. We have made modest gains in reducing the number of pollutants flowing into the Bay, especially in the face of rapid population growth. But the amount of work still ahead of us is truly daunting. To restore the Bay we will need unprecedented levels of effort. That means that governments at all levels, federal, state and local, will need to do more. The entire watershed will need to change their practices, sometimes dramatically. Homeowners and apartment dwellers alike will need to reduce their impacts on their local environment. We'll need help from academia to make sure that we get the science right, and from the nonprofit community to hold our collective feet to the fire.

While the task ahead of us is challenging, I truly believe that the Chesapeake Bay Program has developed the expertise and the partnerships that will enable us to succeed. But it won't be cheap, easy or fast. With your leadership and that of those in other key positions throughout the 64,000 square mile watershed, we can succeed.

Thank you for the opportunity to testify. I am happy to answer any of your questions.

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