Testimony of
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Chairwoman Johnson and members of the Committee, I am Donald Boesch and am pleased to appear before you today to offer observations on how we can make more progress in protecting and restoring one of America's truly great waters, the Chesapeake Bay.

By way of background, I am an environmental scientist who has conducted research along our Atlantic and Gulf coasts and in Australia and the East China Sea. I have spent nearly thirty years of my career either studying or managing people and programs that study the Chesapeake Bay, but also have extensive experience in scientific guidance of the restoration of other degraded ecosystems, including the Everglades, Mississippi delta, and Baltic Sea. I am a long-time member of the Scientific and Technical Advisory Committee of the Chesapeake Bay Program and as, President of the University of Maryland Center for Environmental Science, serve on the Governor's Chesapeake Bay Cabinet.

Addressing Deficiencies in Restoration Progress

Now, some 25 years since the first Chesapeake Bay Agreement and only two years from the "witching hour" of 2010, what can be done to accelerate progress in restoring this treasured ecosystem? After 2010 some level of mandatory actions are presumably required by the Chesapeake 2000 Agreement if the Bay's waters remain impaired, which appears highly likely. The various Government Accountability Office (GAO) and EPA Office of Inspector General (OIG) reports thoroughly describe the deficiencies and the challenges ahead for the Chesapeake Bay Program. While these reports represent an excellent body of investigation and analysis, few if any of their findings and recommendations come as any surprise to those of us who have been part of this Program for many years. That alone is telling. If we knew of these problems all along, why haven't we resolved them?

Sure, funding has been a limitation, but it is not the only or even the most important one. In my estimation, we have generally lacked a relentless and uncompromising drive toward the restoration goals based on brutally honest appraisals to improve the effectiveness of our actions and on the required alignment of policies at all levels of government with these goals. I will touch on these points, but let me first address the three specific challenges identified in the OIG's recent summary report: uncontrolled land development, limited implementation of agricultural conservation practices, and limited control over air emissions affecting Bay water quality.[1] These challenges are not, as the report describes them, "new" or "emerging," but rather are chronic and recalcitrant.

Uncontrolled Land Development

The effects of sprawl on runoff of nutrients and sediments work to diminish restoration progress on other fronts. The OIG offered the headline finding: "development growth outpacing progress in watershed efforts to restore the Chesapeake Bay." But this masks the fact that, at least judged by the criterion of nutrient loadings, the outpacing results mainly from the slow pace of progress in controlling these watershed nutrient sources rather than overwhelming increases in loadings from suburban nonpoint sources. Still, controlling land development is critically important to the environmental integrity of the watershed and the Bay. Recent studies have shown how increases in impervious surfaces (roofs, driveways, parking lots and roads) have a dramatic effect on the amounts and velocities of stormwater runoff and the ability of streams and wetlands to filter wastes from washing to the Bay. Additional research has shown that even low-density development close to tidal shores has a surprising impact on shallow-water ecosystems.

Controlling land development clearly requires better alignment of policies and actions across Federal, state and local governments. Efforts to require consistency of the comprehensive plans of local jurisdictions with the state-level commitments to Chesapeake Bay Program tributary strategies, such as the water resources plan element of Maryland's Local Government Planning statute, are a start, but stronger requirements and incentives are required.

In my view, this opportunity may be coming soon as a result of the increasingly obvious need to dramatically lower greenhouse gas emissions, as well as a result of the increased costs of energy. When we are finally required to evaluate development and transportation infrastructure through the lens of limiting greenhouse gas emissions, different decisions emerge and present opportunities to control land development more effectively. As it considers legislation to address climate change, energy efficiency, and transportation infrastructure requirements, the Congress should consider the benefits of smarter growth, not only for reducing the carbon footprint, but also for restoring our Great Waters and improving the social fabric of communities.

Limited Implementation of Agricultural Conservation Practices

Significant strides have been made in reducing point-source emissions of polluting nutrients in the Bay through the application of the "polluter pays" principle—meaning that ratepayers like me who contribute to the waste stream are the ones who should pay for cleaning it up. However, less progress has been made in reducing nutrient pollution from agriculture, which remains the largest source of both phosphorus and nitrogen. Over much of the last 20 years, the implementation of agricultural practices to reduce nutrient runoff took more or less of a "don't ask, don't tell" approach. Best management practices (BMPs), largely developed for other reasons, were prescribed and enrolled, but their efficacy and degree of implementation seldom questioned or appraised. We have now discovered that BMP effectiveness was not always what was advertised and have begun to promote and subsidize more effective practices such as cover crops and riparian restoration. Although Chesapeake Bay Program (CBP) computer models estimate that about one-half of the agricultural nutrient reduction goals have been achieved, most scientific experts do not believe this to be the case. The CBP and implementing agencies have underinvested in assessing the actual results of BMP implementation on scales from farm fields to small watersheds and in piloting innovative and more effective technologies.

There is now a significant infusion of new funds, including some $188 million over the next five years authorized from the new Farm Bill, and a sizeable part of the $50 million per year authorized by Maryland's Chesapeake Bay 2010 Trust Fund, and assistance programs in other states. However, we must dramatically change how the agricultural conservation programs are implemented if we are to attain the expected results. Rigorous accountability, targeting the hot spots of nutrient losses and most effective practices, and innovation for continuous improvement must be the guiding principles. Regulatory mandates are an anathema to agricultural interests and are, in any case, difficult to enforce, but should not the public deserve documented results from its substantial investments? The Federal government and states should examine approaches that require outcomes as a condition of financial support such as have been implemented in some European countries. Denmark, for example, has been able to achieve a 50% reduction in the loss of nitrogen to the environment through national statutes and regulations that require farmers to meet certain fertilizer efficiency standards, plant cover crops over the majority of their fields, and manage animal wastes effectively as a condition of eligibility for any government subsidies.[2]

Limited Control over Air Emissions Affecting Bay Water Quality

Atmospheric deposition contributes at least 25% of the nitrogen reaching the Bay, but has historically been considered "uncontrollable" by the Chesapeake Bay Program. Yet, the Federal and state governments have mechanisms for controlling the emissions that are sources of this

atmospheric deposition. Notable among these is implementation of the Clean Air Act. Driven primarily by the commitment to improve air quality rather than water quality, significant reductions in emissions of nitrogen oxides from power plants and other stationary sources have been achieved and this is reflected in significant reductions of more than 25% in atmospheric deposition (both wet and dry) of nitrogen in the Chesapeake Bay watershed over the past ten years. This will result in reduced runoff of nitrogen from both forested and developed parts of the watershed. There are more gains ahead with the implementation of CAA programs, however the ruling earlier this month by the D.C. Circuit Court to vacate EPA's Clean Air Interstate Rule (CAIR) represents a significant setback to efforts to further reduce nitrogen oxide emissions if it stands. The nutrient reduction strategy of the Chesapeake Bay Program was counting on CAIR to close the gap between the reductions included in the Tributary Strategies and the Program's nitrogen reduction target. While final legal outcomes are pending, the Congress should consider legislation to affirm and strengthen EPA's regulatory authority to reduce nitrogen oxide emissions, as is it is critical in attaining air quality goals and has significant benefits to water quality in the Chesapeake Bay and other of the Nation's Great Waters.

While point source emissions have been greatly reduced, unfortunately mobile source emissions of nitrogen oxides have not declined and now account for a majority of the nitrogen deposition in the Bay watershed. Significant reductions of emissions from trucks and other heavy duty diesel vehicle are required. Stricter vehicle emission standards (for example adoption of the California standards by Maryland and Pennsylvania) and incentives for gas-electric hybrids and other low emissions vehicles help, but the big challenge is to reduce the vehicle miles driven. Again, Federal legislation that addresses greenhouse gas emissions, energy conservation, and transportation is probably the only way this is going to be achieved and should be aligned with the objectives of the CAA and Clean Water Act.

Finally, with regard to atmospheric sources of nitrogen to the Bay, the deposition of ammonia has increased in contrast to the declines in deposition of oxidized nitrogen. This is largely due to the intensification of animal production and the release of ammonia from animal wastes. Controls on ammonia releases are an understudied and undermanaged need for Bay restoration.

Increasing Accountability through Adaptive Management

The GAO and OIG have recommended that EPA improve reporting to Congress and public on the actual state of the Chesapeake Bay and actions necessary to improve its health. In response to a GAO recommendation the Chesapeake Bay Program began annually (from 2005) to report separately on the health of the Bay and progress in implementing management actions. This was done to clarify previous reporting that confused and often conflated the two. However, more

accurate, clearer, and more timely reporting is only the first step of accountability, which also requires demonstration that the best efforts are being made to accomplish the objectives effectively and efficiently. In that regard, perhaps the Bay Program overreacted to the criticism in strengthening the firewall between management actions and the health of the Bay. A close connection among management decisions informed by predictive models, the implementation of these decisions, and observations of outcomes is at the heart of what is known as adaptive management.

A few years ago I chaired a committee of the National Research Council concerning Adaptive Management for Water Resources Project Planning,[3] which noted that most major ecosystem restoration programs had adopted an adaptive management framework and were working to implement it. For a variety of reasons, the Chesapeake Bay Program was a notable exception. In response to the GAO reviews, the Chesapeake Bay Program has, as directed in the Consolidated Appropriations Act, 2008, submitted to Congress this month a report that presents a Chesapeake Action Plan (CAP) that embraces adaptive management as a means to better target limited resources. This is an encouraging sign, but, of course, the proof is in the implementation.

Toward that end, lessons can be learned and practices adapted from Maryland Governor Martin O'Malley's BayStat[4] that he initiated shortly after taking office last year. BayStat is intended to advance accountability and coordination among key government agencies, to evaluate state initiatives directed at improving the health of the Chesapeake Bay on a regular basis, and to ensure these programs are coordinated and operating at the highest efficiency. I am one of the BayStat principals and seen firsthand the development of common frameworks (such as a fully integrated mapping tool), performance metrics, and unblinking and direct accountability that this approach has brought to Maryland's efforts. BayStat has been tasked by the Governor and mandated by the General Assembly to strategically implement the newly dedicated resources of the Chesapeake Bay 2010 Trust Fund programs. The BayStat process also provides government a mechanism to integrate the achievement of multiple objectives, beyond, say, just water quality, to deal with habitats, resources, development, education, commerce and the sustainability of all of these, leading ultimately to ecosystem-based management.

The New Role for Science

It is frequently stated that the Chesapeake Bay Program has done an excellent job of developing and applying science, but what has been lacking has been implementation driven by political will and financial resources. Some have gone so far as to suggest that the science is done and it is now time to focus solely on implementation. These views have always struck me as curiously wrong for several reasons. First, despite popular misconceptions, the Chesapeake Bay Program

has never had a scientific research program, but has benefited by the long-term public investments in academic research centers such as mine and the entrepreneurial talents of the scientists we have assembled. While this has led to the development of much practical understanding, it has been only marginally better than a random walk. The most important remaining scientific and technical challenges are almost all inherently interdisciplinary and will require a more focused and goal-oriented, yet flexible, approach. I assure you the science this requires has not all been done and the Chesapeake Bay needs a highly strategic R&D program. Secondly, innovative and efficient monitoring, interacting with models that assimilate the observations, is a requirement for effective adaptive management. This will challenge scientists and managers alike if we are ever able to seal the deal to achieve Bay restoration. Members of the Subcommittee, I sincerely hope that we can make significant headway toward that destination while I am still on watch!

REFERENCES

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[2] R. Grant, K, Nielsen and J. Waagepetersen. 2006. Reducing nitrogen loading of inland and marine waters—evaluation of Danish policy measures to reduce nitrogen loss. *Ambio* 35:117-123.

[3] National Research Council. 2005. *Adaptive Management for Water Resources Project Planning.* National Academies Press, Washington, DC.

[4] http://www.baystat.maryland.gov/