STATEMENT OF
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Before the
COMMITTEE ON NATURAL RESOURCES

SUBCOMMITTEE ON NATIONAL PARKS, FORESTS, AND PUBLIC LANDS
and
SUBCOMMITTEE ON INSULAR AFFAIRS, OCEANS, AND WILDLIFE

Joint Hearing on
IMPACTS OF CLIMATE CHANGE ON THE CHESAPEAKE BAY

Edgewater, MD
June 23, 2009

Chairman Grijalva, Chairwoman Bordallo, Ranking Members Bishop and Brown, members of the subcommittees. I appreciate the opportunity to appear before you today. My name is William A. Stiles, Jr. and I am the executive director of Wetlands Watch, an environmental group based in Norfolk, Virginia, working statewide to protect and conserve wetlands. I am also vice president of the Virginia Conservation Network, a statewide coalition of over 120 conservation groups in Virginia. Our group is a member of the newly formed Choose Clean Water Campaign in the Chesapeake Bay. Finally, I was a member of the Virginia Commission on Climate Change that met during 2008 and produced its final report in January of this year.

I feel somewhat out of place on this side of the microphone, having spent 22 years as a staffer in the House of Representatives, often working on hearings similar to this one. Today I toil at the other end of the policy continuum, at the local government level in Virginia, working on community-level adaptation strategies to address sea level rise.

Wetlands Watch's work on climate change began in 2007 when we became aware of estimates for a 2-foot relative sea level rise in the mid-Atlantic region of the United States over the next century. We were concerned about the potential impact of this accelerated rate of sea level rise on the coastal ecosystem and started looking for some factual analysis of how this change would affect the coastal environment of the Chesapeake Bay.

We hoped to find some data coming from the Chesapeake Bay 2000 Agreement, wherein the signatory governments committed to look at climate change impacts on wetlands when they agreed to: *"Evaluate the potential impact of climate change on the Chesapeake Bay watershed, particularly with respect to its wetlands, and consider potential management options."*

We discovered that Virginia had done no evaluations, nor could we find any of the signatory governments to the Chesapeake Bay 2000 Agreement who met this commitment.

We saw that in the Coastal Zone Management Act (CZMA) there is a provision at U.S.C. 33 § 1451(l) mandating sea level rise planning: "*Because global warming may result in a substantial sea level rise with serious adverse effects in the coastal zone, coastal states must anticipate and plan for such an occurrence*."

Again we found no activity in Virginia resulting from the CZMA mandate. Without available state or federal analyses, we had to undertake our own evaluation of climate change impacts on the coastal ecosystem, with the help of the Virginia Institute of Marine Sciences (VIMS) and others.

As we tried to estimate these impacts, we were immediately frustrated by the lack of data in Virginia. Unlike Maryland and North Carolina, Virginia does not have digital LIDAR (light detection and ranging) maps to provide precise vertical elevations allowing inundation modeling to be done on flat coastal landscapes. This forces smaller, rural counties and towns in Virginia struggle with maps of fairly coarse resolution. In addition, Virginia's natural resources inventories are spotty at best: VIMS's tidal wetland inventory is 30 years old, plotted on hand-drawn tracings from topographic maps.

Tidal ranges in the Chesapeake Bay run from .3 to 3 feet, meaning a sea level rise of two feet could have significant impacts upon wetlands in the intertidal zone, adjacent beds of submerged aquatic vegetation (SAV), mudflats, and primary dunes along the Chesapeake Bay and Atlantic Ocean shorelines. Wetlands can accrete and move vertically to keep up with sea level rise, if the wetlands are healthy and have enough sediment. We looked at the few studies available on Chesapeake Bay wetlands and they showed many of our existing tidal vegetated wetlands would probably not keep up with a two foot sea level rise due to the compromised health and productivity of the wetlands and/or inadequate sediment in some ranges of the Bay.

We assumed that if vegetated tidal wetlands and adjacent ecosystems could not move vertically, they would have to move landward or "uphill" as sea level rose. We knew that about 85 percent of the Bay's shoreline is privately owned, and increasingly "hardened" with erosion control structures, development, roads, and other barriers blocking this landward migration. If wetlands cannot colonize the land at a higher elevation from their existing location, they will drown in place.

We read research showing that sea level rise of the magnitude expected could result in a 30 to 40 percent reduction in submerged aquatic vegetation (SAV) due to lower light penetration through the higher water column. We also learned that the Chesapeake Bay's key SAV species, eelgrass, is already under stress from warmer water temperatures, and the Bay will only get warmer with climate change.

We used this available information to make a rough estimate that the then-projected increase in the rate of sea level rise to 2 feet per century would eliminate between 50 and 80 percent of Virginia's remaining tidal wetlands and have significant impacts upon the rest of the coastal ecosystem.

The coastal ecosystem complex is the most productive in North America, rivaling the productivity of tropical rain forests. Threats to this ecosystem directly threaten the Chesapeake Bay and the economies and communities that depend upon a healthy Bay. Estimates show that 70 to 90 percent of the finfish and shellfish in the Chesapeake Bay and mid-Atlantic coastal ocean use tidal wetlands and SAV beds for spawning, recruitment, food, or other habitat functions. Losses in these ecosystems would produce severe consequences for the Chesapeake Bay and Atlantic Ocean commercial and sport fishery and the communities and economies dependant upon that fishery.

In Virginia alone, the commercial fishery is worth $130 million a year, the saltwater sport fishing industry generates $1.2 billion and 9,000 jobs, waterfowl hunting is a $14 million sector, and wildlife watching – much of which takes place in coastal areas along the Atlantic flyway – generates $941 million a year and supports 23,000 jobs. One significant sector threatened by sea level rise is the hard shell clam aquaculture industry on the Eastern Shore of Virginia. This industry, located in the shallow coastal ecosystem, produces an economic output of $48.8 million a year and employs 620 people in coastal communities. If tidal wetlands and the coastal ecosystem are threatened by climate change, so is all of this economic activity.

In the course of our analysis, we also noted adverse impacts on the US Fish and Wildlife Service's (USFWS) refuge system in the mid-Atlantic from climate change as we projected significant potential tidal wetland habitat loss in each of the refuges. Given that these impacts were occurring in each of the refuges simultaneously, we saw a potentially significant cumulative impact on the mid-Atlantic section of the Atlantic migratory bird flyway, from Cape May through Cedar Island National Wildlife Refuges. We spoke to USFWS refuge managers in Maryland, Virginia, and North Carolina all of whom had observed habitat losses occurring at their sites with current rates of sea level rise. Higher rates of sea level rise and temperature stress can be expected to accelerate this rate of habitat loss.

We then wrote Virginia's Governor Kaine in May of 2007 (Attachment I), asking that Virginia take steps to prepare Virginia for the sea level rise we were expecting. Specifically, we asked that the state live up to its commitment under the Chesapeake Bay 2000 Agreement to evaluate climate change, undertake LIDAR mapping in the coastal plain, provide updated natural resource inventories in the tidal regions, and then model climate change impacts upon those natural resources. Finally we pointed to the need to work with local governments to develop adaptation plans at the local level, where most land use and shoreline hardening decisions are made.

Governor Kaine soon thereafter appointed the Virginia Commission on Climate Change, on which I served along with 39 other citizens. We met during 2008 and delivered our

report in January of 2009. Virginia joins 30 other states in having a state climate commission and is among a very small number that examined adaptation strategies as part of their commission.

Virginia's Commission on Climate Change looked extensively at what it would take for Virginia to adapt to the climate change impact end points expected by 2108, estimated in the report as: a 2.3 to 5.2 foot increase in sea level, a 3 degree Centigrade increase in temperature, and an 11 percent increase in storm intensity/precipitation intensity. We then developed a novel approach to formulating a state adaptation strategy, one that might serve as a model for development of government climate change adaptation strategies.

The strategic process envisioned by the adaptation work group of the Commission involved each state agency reviewing programs and regulations under their authority and judging the impacts of projected climate change end points on those operations. The agencies would then recommend adjustments to those programs and regulations to adapt to the projected end points.

So for example, the Virginia Secretary of Transportation, wanting to know the impacts of sea level rise on transportation structures, would ask the Virginia Department of Transportation for a list of all state-owned transportation segments in tidal flood plains whose centerlines are 3 feet or less above mean higher high water. Or Virginia's Secretary of Natural Resources, wanting to insure that habitat management accommodated these end points, would ask the Department of Game and Inland Fisheries what the impact of a 3 degree Centigrade rise in temperature would be upon brook trout habitat. Or the Virginia Secretary of Public Safety would ask the Department of Emergency Management what changes in emergency preparedness might be needed with an 11 percent increase in storm intensity and 2.3 feet of sea level rise.

The agency responses would either highlight gaps and omissions in current agency authorities and operations that hindered their ability to address climate change, or the agencies would begin to adjust their programs to accommodate these changes. In the case of gaps and omissions, we would then be able to adjust agency statutory or regulatory authorities as needed. The process would be repeated as new information about end points was obtained.

What we expected as a result of this process would be a growing awareness of how climate change needs to be taken into account in the daily conduct of government operations in Virginia. We hoped that as government "led by example" and went through adaptation planning, the private sector would as well. In the end, what we envisioned emerging from this process was a full adaptation strategy for Virginia.

Unfortunately, Virginia has not taken action on the adaptation proposals made by its Commission on Climate Change. With estimates of the threat to Virginia constantly increasing, this inaction is inexcusable. Just last week, the latest federal report on climate change impacts stated that a relative sea level rise of 2.9 feet was probable for the

southern Chesapeake Bay in the coming century. This is up from the Climate Change Commission's estimate of just last year of a minimum of 2.3 feet, and up from Wetlands Watch's original starting point in 2007 that assumed "only" a two-foot relative sea level rise.

Others are taking notice, however. Recent decisions by private insurance companies to withdraw new coverage from coastal areas in Maryland and Virginia are a clear signal that businesses see an increasing risk from sea level rise. Over the last two years, a number of private insurance companies representing 55 percent of the insurance market in the mid-Atlantic have stopped writing policies on businesses and primary residences near the coast. Other companies have withdrawn new coverage on secondary residences.

These moves illustrate another negative impact from our lack of climate change planning in Virginia. Communities without sufficient information on climate change impacts and adaptation strategies are having their economic future affected by business decisions beyond their control.

The single largest barrier to putting an adaptation strategy in place in Virginia's is the lack of accurate maps of the coastal plain. At present, only a handful of localities have LIDAR maps, most of which were paid for by the local government themselves. The Virginia Commission on Climate Change set a "no regrets" priority for the mapping of the state's coastal plan with LIDAR, to provide individuals, businesses, and local governments in Virginia with a road map through the coming climate changes. This is a project that has been estimated by the Virginia Geographic Information Network to cost around $5 million. Unfortunately, there are no proposals pending to fund the generation of these maps.

We also stressed the need for inclusion of climate change impacts in numerous long range planning processes, for transportation and infrastructure at the state and regional level and in land use decisions at the local level. The hundreds of transportation and land use decisions made daily in scores of local governments throughout the Chesapeake Bay watershed combine and conspire to set the course for the health of the Bay.

Our failures to meet the goals of the Chesapeake Bay 2000 Agreement have been traced primarily to our inability to plan for and control growth and our failure to give localities the tools they need to make smart land use decisions – technical tools, legal tools, and financial tools. These local land use decisions loom even larger as we move into the future under the uncertain consequences of climate change. Every bulkhead, development, road, or other barrier allowed will cause incremental change today that, when aggregated and exacerbated by climate change over time, will result in consequential change to the Chesapeake Bay. Our actions must guarantee the resiliency of the Bay by keeping its shoreline open, thus keeping our climate change adaptation options open.

Without maps, models, wetlands inventories, and dozens of other bits of information, local governments are making decisions in the dark, encumbering the taxpayers and

potentially endangering citizens. As Wetlands Watch works throughout tidewater Virginia helping local citizens and governments cope with climate change, we encounter examples of this daily. Let me walk you from my house in Norfolk, north along the Chesapeake Bay's western shoreline to look at a few of these examples we have run across.

In a neighborhood in Norfolk just two miles from my house, federal and state taxpayers spent hundreds of thousands of dollars raising houses in the Larchmont/Edgewater neighborhoods after Hurricane Isabel under a Federal Emergency Management Agency (FEMA) grant. However, this program apparently didn't account for the impact of sea level rise on the flooding of the adjacent roads, which are now inundated frequently on full and new moon tides.

People on these streets move their cars to higher ground on surrounding streets on a lunar cycle, to avoid having to put on their boots to slosh to their cars in the morning at high tide. To maintain the usefulness of the houses we just raised, the city of Norfolk proposes to spend countless thousands of dollars to raise the adjacent roads and infrastructure out of the zone of increased flooding. The park in front of these homes, formerly upland, is now a salt pan fringed by marsh grass and the city plans to convert it into a restoration wetland; an admission that sea level rise is here to stay.

Was the decision to raise these houses made strategically? Do we know how high the roads should be raised and what the projected rate of inundation plus subsidence is for this neighborhood? What is the long-term prospect for this neighborhood and when do we try to find out? These strategic questions need to be asked prior to making this next significant taxpayer investment.

Moving north, on the other side of the James River, the Department of Defense is closing Fort Monroe and the state is determining its reuse. Virginia is studying the best use of the open space surrounding the Fort, land located on a low-lying barrier island. Proposals range from creating a new park to developing the land for residential and commercial use.

On the Virginia Commission on Climate Change, we were presented with a simulation showing this open space adjacent to Fort Monroe going underwater in 2108 with a category I storm surge. Yet state and local planners are still considering proposals to build residences and businesses on this increasingly dangerous landscape.

To the northwest a few miles is Poquoson, a city whose highest point is just seven feet above sea level. The city recently installed a new gravity-flow storm water system for around $20 million. The city engineer, who understands sea level rise, asked the contractor what it would take to make the system work with 2-3 feet of additional sea level rise. The answer was another $5 million to sleeve and pressurize the section of pipe and install a pump system. Without compelling data on climate change and financial support, the city installed the system as-is, effectively putting a $5 million taxpayer liability (in 2008 dollars) in the ground.

Across the York River from Poquoson, is Gloucester County, a low-lying locality changing from a rural to a more developed area. Residents recently complained about a road section that was now regularly flooded on a monthly tide cycle or by winds from the north. They wanted the road raised to fix the problem.

The County estimated that to raise the road 10 inches for a half mile would cost $320,000 in materials and labor, without including the expense of permits and environmental assessments. This represented 18% of the county's entire annual road maintenance budget to be spent for just one road section out of the many needing elevation in a low-lying and increasingly flood-prone locality. Without road elevations, precise digital maps, models of flooding and inundation, and other information, Gloucester County is forced to make these decisions in a vacuum, as are all other localities in Virginia.

Just north of Gloucester County is Mathews County, the self-proclaimed "pearl of the Chesapeake Bay" and deserving of the title. Mathews has much low laying land that is threatened by sea level rise and also has the longest shoreline of any county in Virginia. The County is undergoing a revision of its long-range land use plan, with an eye on sea level rise and trying to decide what to do along its coastline.

Mathews is handicapped without data on transportation and public infrastructure elevations, it has no digital maps or geographic information system data, it lacks the funding to conduct build-out analyses of those low-lying areas of the county that may be threatened by sea level rise, and so on. The state is providing few resources to guide willing local planners and citizens find their way ahead. Mathews wants to do the right thing and there is even talk of making the county a "living laboratory" for climate change adaptation, but there is no funding to help them reach that goal.

On the other side of the coin, in Mathews County, we have seen an example of federal and state efforts working at the local level with the support being provided by Chesapeake Network for Education of Municipal Officials (NEMO). Chesapeake NEMO is a federal-state partnership that helps communities implement sound, natural resource-based planning. Chesapeake NEMO is providing support for Mathews as it works through its long-range plans and the staff from the National Oceanographic and Atmospheric Administration (NOAA) and the Virginia Department of Conservation and Recreation working with Mathews County deserve credit.

As well, NOAA has funded three regional planning efforts being run through the Coastal Zone Management Program in Virginia attempting to bring stakeholder groups together to address climate change on a regional and local level. This same effort has funded programs in Maryland at the community level. However, as good as these efforts are, they are inadequate to the task we face.

These bright spots need to be expanded because the stories just related of localities being abandoned in the face of sea level rise occur throughout the Virginia coastal region. They paint a clear picture of need for a significant expansion of state and federal work in

support of local land use planning and decision-making processes in this changing environment.

Conclusion

Restoring the Chesapeake Bay is a difficult task. We've made too many shortsighted decisions - allowed too many people to do too many unsustainable things along our shoreline - to expect to get out of this situation without a lot of expense and disruption. For a while we did this out of ignorance. For a time after that we did it out of indifference or indecision.

Today, there is no longer any excuse for what we are allowing along our shorelines as we permit inappropriate and unsustainable development that is encumbering our grandchildren with a huge debt to be paid to restore the Chesapeake Bay. This debt is large enough today, without climate change figured in, and increases substantially when that calculation is made.

The failure by state and federal governments to develop climate change adaptation strategies leaves individuals, companies, and local governments to stumble blind and alone onto an increasingly dangerous terrain. At a minimum, this will produce costly consequences for taxpayers and shareholders, as decisions made without considering climate change impacts need to be corrected or reversed. At the other extreme, decisions being made today in Virginia's policy vacuum will limit our future adaptation options and are putting lives and livelihoods at risk

The absurdity of this situation is made worse by the fact that plans exist to begin the process of adapting to climate change. The federal government recently issued a report, "Coastal Sensitivity to Sea-Level Rise: A Focus on the Mid-Atlantic Region," at the back of which is a list of suggested federal actions offered by the report's advisory committee (Attachment II). The Maryland and Virginia Climate Change Commission Reports contain dozens of sound recommendations that will get us started. Wetlands Watch has started work on a "tool kit" for local governments. Other reports from the private sector, professional organizations, and the like pile up daily.

We know enough to take action. All that remains is the political will and the funding to do something with the recommendations on the table.

Thank you for the opportunity to appear before you today. I welcome any questions you may have.

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