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“Planning for a Changing Climate and its Impacts on Wildlife and Oceans:  
State and Federal Efforts and Needs”

Madam Chairwoman and members of the Subcommittee, I am David Whitehurst, Director of the Wildlife Diversity Division of the Virginia Department of Game and Inland Fisheries. Thank you for the opportunity to speak with you today about state efforts to incorporate the expected impacts of global climate change into our natural resource planning and management programs. I also welcome the opportunity to make recommendations regarding additional direction and resources that Congress could provide to assist in these efforts.

As you have already heard during previous hearings, climate change poses an unprecedented threat to the future of human communities, fish and wildlife habitat, and the natural communities we depend on for our food, our drinking water, our recreational opportunities (such as fishing, hunting, boating, and bird watching), the strength of our local economies, and our quality of life. The implications of climate change on our rich natural heritage present critically important challenges and opportunities that must be met by state and federal fish and wildlife agencies and their conservation partners using scientific and adaptive approaches, collaboration, and timely and effective communications.

The Virginia Department of Game and Inland Fisheries is the inland fish and wildlife management agency of the Commonwealth. The agency is also the boating entity in Virginia. The Department’s mission is:

- To manage Virginia's wildlife and inland fish to maintain optimum populations of all species to serve the needs of the Commonwealth;
- To provide opportunity for all to enjoy wildlife, inland fish, boating and related outdoor recreation and to work diligently to safeguard the rights of the people to hunt, fish and harvest game as provided for in the Constitution of Virginia;
- To promote safety for persons and property in connection with boating, hunting and fishing; and
- To provide educational outreach programs and materials that foster an awareness of and appreciation for Virginia's fish and wildlife resources, their habitats, and hunting, fishing, and boating opportunities.

Healthy and intact ecosystems support our wildlife conservation needs. Hunter and anglers, farmers and ranchers, hikers and bird watchers, and citizens in all walks of life, benefit from programs at all levels of government that support our ability to sustain not just human life, but

fish, wildlife, and the habitats upon which all of us depend for ecosystem services such as clean air and drinking water, recreation, and validating our natural heritage and relationship with the land.

The Virginia Department of Game and Inland Fisheries celebrated its 92<sup>nd</sup> birthday last week. State fish and wildlife agencies nationwide have an extensive history of managing natural resources, largely guided by the wisdom and foresight of great leaders of conservation—Teddy Roosevelt, Gifford Pinchot, Aldo Leopold, Rachel Carson, and Virginia’s own A. Willis Robertson, to name a few. The “North American Model of Wildlife Conservation,” which is distinct from other forms of wildlife conservation worldwide, includes, as one of its tenants, that wildlife are held as public trust resources by the states for the benefit of all people. Our conservation leaders have been instrumental in ensuring that our country has a strong legacy of protecting our fish and wildlife and the habitats upon which they depend.

In Virginia, the national parks, national forests, national wildlife refuges, state wildlife management areas, state parks and natural area preserves, and state forests represent a considerable investment in lands and waters recognized for their biological, cultural, recreational, and natural significance. The Virginia Department of Game and Inland Fisheries owns the most public land of any state government agency in the Commonwealth. Climate change threatens every one of the investments we have made to date and will have profound impacts on how we manage our lands, waters, and fish and wildlife populations. I can assure you, too, that with a \$51 million annual budget and existing needs that go unmet each year, we do not have the resources needed to respond appropriately to these new threats. Like many other state fish and wildlife agencies, our wildlife conservation programs are primarily funded by hunters and anglers. While we are all already making investments in assessing impacts of climate change and developing adaptive management strategies, critical funding shortfalls hamper our efforts.

Natural resources provide enormous contributions to our state economy. The 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation found that over 87 million Americans (38 percent of those aged 16 and older) pursued outdoor recreation in 2006 and spent \$120 billion that year on those activities. In Virginia alone, more than 2.9 million people participated in these activities and generated over \$2.1 billion in economic revenue that year. Natural systems also provide significant benefits to our local communities through the services that they provide—such as flood protection, storm buffers, groundwater storage, clean drinking water, and clean air. These ecosystem “services” can be and should be estimated in terms of the value that they provide to human communities. For example, a study conducted by the Minnesota Department of Natural Resources estimated that the state’s wetlands provide flood abatement and storage worth \$300 per acre-foot of water. The U.S. Geological Survey’s National Wetlands Research Center has estimated that Louisiana’s 2.5 million acres of coastal wetlands provide storm protection valued at between \$520 million and \$2.2 billion. In Virginia, we initiated an ecosystem services evaluation last year, led by the Virginia Department of Forestry, and that work is still under development.

In federal FY2001, Congress provided the 50 states, the District of Columbia, and the trust territories with a new source of appropriated funding for wildlife conservation—the State Wildlife Grants program administered by the U.S. Fish and Wildlife Service. This program is now the cornerstone in many states for keeping common species common and preventing

wildlife from becoming endangered. As a condition to receiving those funds, Congress asked each state and territory fish and wildlife agency to develop a roadmap that documented the status and condition of fish and wildlife populations and habitats, threats to those resources, and conservation actions that could be taken to address those threats. These documents, known as State Wildlife Action Plans, were all completed by the prescribed October 1, 2005, deadline and have provided the foundation for managing species of greatest conservation need and the habitats in which they live. A very successful federal-state partnership, led by the U.S. Fish and Wildlife Service and the Association of Fish and Wildlife Agencies, collaborated on guidelines to states and territories to facilitate the development of these Plans. I had an opportunity to participate on this team as a state representative and can attest that this partnership is one of the best I have seen in my 40 years in the profession. Because this effort resulted in strong, well-established partnerships, Wildlife Action Plans should be used as a guiding framework for integrating climate change considerations into wildlife management and planning. Targeting resources to incorporate climate change into these plans will be a cost-effective and efficient mechanism for addressing impacts of global warming on wildlife.

At the time that most of these plans were being written, though, many of us focused more on the tangible threats immediately facing us, such as habitat loss or degradation, pollution, and deleterious or invasive species, rather than the less well-documented climate change threats to resources in our respective states. The effects of climate change can more properly be viewed as exacerbators of other more direct threats as mentioned previously. The Virginia Wildlife Action Plan documents 924 species of greatest conservation need, found across Virginia and in nearly every natural habitat occurring in the state. We did recognize climate change as a source of stress to barrier island and coastal marsh habitats, high elevation spruce-fir forests that are relicts from the last Ice Age, and our coldwater headwater streams, and the many declining or at-risk species associated with them. We were not, however, able to identify appropriate ameliorating actions within our sphere of influence or those of our conservation partners in the short timeframe we had to complete the Plan.

Historical species ranges are changing and should be considered cautiously when determining long-term management objectives and implementation options. We recognize that the effects of global climate change in Virginia will result in habitats and associated wildlife species shifting northward and upward in elevation. Without considerably greater efforts, it is likely that many of our imperiled freshwater mussels, the Peaks of Otter salamander, and other species found nowhere else in the world will become extinct. Some species that are currently rare in Virginia but found elsewhere, such as the snowshoe hare, will likely persist in more northern parts of Canada and the United States, but will be extirpated from Virginia. We anticipate that some species not native to the Commonwealth, such as the American alligator and the armadillo, will expand their ranges northward into Virginia and establish populations in our state. Finally, some species, such as the brook trout and many waterfowl, may continue to persist in the state, found in significantly less habitat and in lower numbers. Reducing non-climate stressors on ecosystems (such as environmental contaminants, habitat fragmentation, and invasive species) may help to reduce impacts from changing climatic conditions.

Unfortunately, unlike funding provided through the Wildlife and Sport Fish Restoration Programs (established under the Pittman-Robertson Wildlife Restoration Act and the Dingell-Johnson Sport Fish Restoration Act, respectively) for much of our wildlife management activities, the State Wildlife Grants Program is currently an annual appropriation that must be

revisited each year. For federal FY 2008, the final apportionments to states from the Wildlife Restoration Fund is \$309,686,579 and from the Sport Fish Restoration Fund, \$398,337,729. The total appropriation in federal FY 2008 for the State Wildlife Grants Program (including funds for U.S. Fish and Wildlife Service administration of the program) is only \$61,522,997. The uncertainty of annual funding and low funding levels confound our abilities to initiate and sustain comprehensive long-term planning and management programs to respond to the effects of climate change.

### Natural Resource Planning and Management Activities

State fish and wildlife agencies across the country are recognizing the need, and are taking steps, to adapt wildlife management and planning activities to address climate change impacts on wildlife. In Virginia, we have recently initiated a number of activities to help the Commonwealth and its citizens address likely impacts of climate change.

In 2006, the Virginia General Assembly passed legislation establishing renewable portfolio standards and directing the development of a Virginia Energy Plan. In 2007, the Commonwealth also joined The Climate Registry, a nonprofit partnership developing an accurate, complete, consistent and transparent greenhouse gas emissions measurement protocol that is capable of supporting voluntary and mandatory greenhouse gas emission reporting policies for its Members and Reporters.

In 2007, Virginia Governor Tim Kaine released the state's first ever Virginia Energy Plan. This plan covers all aspects of energy production and consumption in Virginia: fuel demand and supply; infrastructure; impacts of energy use on the environment; and energy research and development capabilities. The Plan identifies four overall goals, including the reduction of greenhouse gas emissions by 30 percent by 2025, bringing emissions back to 2000 levels. This goal will be partially achieved through energy conservation and renewable energy actions identified in this Plan.

On December 21, 2007, Governor Kaine signed Executive Order 59 establishing the Governor's Commission on Climate Change. The Commission is charged with developing a Climate Change Action Plan for Virginia that identifies the additional steps that must be taken to achieve the goal of reducing greenhouse gas emissions by 30 percent by 2025. When completed, the Climate Change Action Plan will include an inventory of the amount of and contributors to Virginia's greenhouse gas emissions and projections through 2025; evaluate expected impacts of climate change on Virginia's natural resources, the health of its citizens, and the economy, including the industries of agriculture, forestry, tourism, and insurance; identify what Virginia needs to do to prepare for the likely consequences of climate change; identify the actions (beyond those identified in the Virginia Energy Plan) that need to be taken to achieve the 30% reduction goal; and identify climate change approaches being pursued by other states, regions, and the federal government. The Commission is chaired by the Virginia Secretary of Natural Resources, L. Preston Bryant, Jr., and includes representatives from all affected interests. The Virginia Climate Change Action Plan is due to Governor Kaine by December 15, 2008. Through its first five meetings, the Commission has heard testimony and public comment regarding, among many topics, the expected impacts of climate change to forests, fisheries and wildlife, and the Chesapeake Bay ecosystem; calculating and quantifying ecosystem services; expected

economic impacts of climate change on tourism; and adaptive management strategies, particularly in association with vulnerable wildlife.

Within the Virginia Department of Game and Inland Fisheries, we have established a climate change working group that is tasked with synthesizing information both for the Commission and the Department. This group has only been together for three months, and its first task was to develop a summary of the general impacts of climate change on natural communities and potential impacts on Virginia's wildlife and habitats for use in policy planning.

The Department is also working in partnership with the National Wildlife Federation and the Virginia Conservation Network to adapt our state Wildlife Action Plan to more explicitly describe the effects of climate change on all wildlife and to identify actions to mitigate or adaptively manage for those effects. We are planning two workshops in the next year—the first to be held this fall—to gather stakeholders together, determine more specifically the projected impacts of climate change on Virginia's wildlife populations and habitats, and identify specific management strategies. Such efforts will likely include minimizing the number of extinctions (which may require us to think differently about habitats, connectivity, and species distributions); facilitating the gradual migration of species (perhaps around human-created barriers); and strategically planning the acquisition and protection of future management areas that will, eventually, be suitable for target species, all the while maximizing the efficiencies and cost-effectiveness of our actions. More specific efforts may involve triage, a complicated process to determine which species can be saved with immediate action; can be saved if actions are initiated later; and cannot be saved, irrespective of actions.

When it is possible to save species, our success or failure will depend upon our ability to identify where habitats currently exist and to work with landowners, municipalities, and agencies to facilitate the migration of those habitats across Virginia. We will not have the resources to work in our traditional "species by species" approach; habitat planning and management will be more critical than ever. From a management perspective, climate change will be the new reality, and we will have to constantly evaluate and adapt our efforts if we are to be successful. We will have to monitor the current situation to determine what we have and where it occurs, initiate management efforts to conserve species and habitats as the climate changes, monitor species and habitats to determine if our management efforts are effective, adapt our efforts as conditions change, and then repeat. This cycle will occur over the course of decades. Climate change will test our ability to think about groups of species, plan for change decades in advance, and implement the adaptive management strategies needed to bring plans to fruition.

It is important to realize that climate change is just one of many issues that threaten the future of Virginia's wildlife heritage. The Virginia Wildlife Action Plan identifies over 900 species of greatest conservation need that currently reside in Virginia. The vast majority of these species are being impacted by the loss and degradation of the habitats in which they live. At the same time, conservation-related funding programs are declining. So we have many species that are already in trouble, many of our habitats are already degraded, and less money is available for conservation. Success in a world and a Commonwealth influenced by global climate change will require more cooperation among agencies at all levels of government, non-government organizations, businesses, private landowners, legislators (at the state and national level), and other countries. The experiences in Virginia are not unique, though. Throughout the country, State Wildlife Action Plans identified many species of wildlife in serious decline due to habitat

loss and fragmentation, pollution, invasive species, and other causes. In each state, scientists have also begun to turn their attention to the compounding effects of climate change on these resources.

Other states have offered information to me to help illustrate further for you the efforts of state fish and wildlife agencies to address climate change impacts on wildlife and habitats nationwide. Florida's Fish and Wildlife Conservation Commission adopted a Global Warming Resolution in September 2007 that specifically calls for the Commission to "support science and management that will effectively assess the future effects of global climate change on Florida's fish, wildlife and ecosystems...[and] to engage with other experts from government, academia, industry, and conservation organizations to develop recommendations for conserving fish and wildlife in the face of global climate change." Florida is also hosting a conference entitled "Florida's Wildlife: On the Frontline of Climate Change" in August 2008. The conference will bring stakeholders together from across the state to raise awareness about the impacts of climate change on Florida's biodiversity and to identify key research needs and actions to minimize climate change effects on fish and wildlife, which will be incorporated into the Commission's comprehensive climate change strategy.

Washington is one of the first states in the nation to develop a targeted action plan to cope with the impacts of global warming, prompted by an Executive Order from Governor Christine Gregor in 2007 as part of her Climate Change Challenge. Stakeholder-driven Preparation and Adaptation Working Groups developed a comprehensive list of recommendations to address the impacts of climate change in several important sectors, including human health, agriculture, coastal systems, forestry resources, and water resources. In addition, the Washington State Department of Fish and Wildlife provided supplemental recommendations specific to state habitats and species. These recommendations provide an important foundation for continuing work in the coming months to enhance emergency preparedness and response; incorporate climate change and its impacts into planning and decision-making processes; restore and protect natural systems and natural resources; develop and improve water supply and management; build institutional capacity and knowledge to address impacts associated with climate change; manage and share available data more effectively; and educate, inform and engage landowners, public officials, citizens and others. The Washington Department of Fish and Wildlife also is in the process of updating its wildlife action plan to address climate change.

Maryland's Commission on Climate Change also organized Adaptation and Response Working Groups. The working groups have developed a diverse set of policy options to address climate change that the Commission will present to the Governor. Policy options include strong recommendations that will benefit wildlife and fisheries. For example, one policy option calls for identifying priority areas for restoration in the context of sea-level rise and implementing strategic management actions to protect against sea-level rise. These actions will be important for protecting key Chesapeake Bay habitats that support coastal wildlife and fish species and migratory birds. Protecting and expanding coastal forests and wetlands also will help provide wildlife replenishment areas and movement corridors. Policy options also focus on resource-based industries, including commercial and recreational fishing and sportsmen activities. Policy options for commercial fisheries include developing long-term plans that are adaptive and management efforts that conserve diverse habitats to increase resiliency of the system under climate change conditions.

The Nevada Department of Wildlife is working to address climate change challenges through innovative partnerships and cross-cutting initiatives. Together with its partners, the agency is gathering information that enables it to better understand and predict future changes. By taking a multi-pronged approach that includes habitat restoration, species research and monitoring, and conservation planning efforts, the agency is working to incorporate management strategies that reduce the stress of climate change on wildlife populations. Examples of actions already underway include the restoration of healthy sagebrush habitats in northern Nevada, designed in part to stem the invasion of non-native cheatgrass into native habitats; implementation of discovery surveys in various areas of Nevada to better understand the current ranges of species at risk, which will then inform more effective management strategies; and collaboration with The Nature Conservancy and other non-governmental organizations to develop ecological models that predict the relative risk of Nevada's key wildlife habitats to the projected threats of climate change.

Nebraska's Game and Parks Commission has organized an agency-wide climate change working group to address impacts of climate change on wildlife and the implementation of the state wildlife action plan. The agency has also established relationships with outside partners, including the U.S. Geological Survey and the University of Nebraska at Lincoln, to support the development of a research agenda for a possible regional climate change research center and a degree program in adaptive resource management through the University's School of Natural Resources. Commission staff members are also engaging the state's Wildlife Action Plan Partners team in a comprehensive discussion of climate change and its impacts to wildlife populations and habitats. The agency faces some significant challenges, however, including increasing demands for biofuels and high commodity prices, which may result in a significant loss of conservation reserve lands and other grasslands to irrigated cropland. As with many other states, there is also considerable uncertainty in the conservation community as to what adaptation strategies are needed to offset the impacts of climate change.

Montana Fish, Wildlife and Parks is working with the National Wildlife Federation to plan a workshop to begin addressing the challenges that climate change will present for wildlife management and conservation efforts in the state. Initial steps in this process will focus on needed modifications in state management plans. The workshop will serve as a model for states in the Rocky Mountain and Dakota regions in collaboration with their state fish and game departments. Several states in the region, such as South Dakota, already have expressed interest in using the workshop as a model for similar efforts in their states. In addition, the South Dakota Department of Game, Fish and Parks is working currently with the South Dakota chapter of The Wildlife Society on climate change issues.

The Vermont Wildlife Action Plan ranks climate change as one of the top five problems facing fish and wildlife today. Many of the actions identified to address these impacts focus on maintaining and improving connectivity of habitats, although reducing other stressors is also recommended. The Vermont Fish and Wildlife Department has teamed up with the Vermont Department of Transportation over the past five years to maintain and improve fish and wildlife habitat connectivity. Those two agencies work with their colleagues in Maine and New Hampshire and have created a ground-breaking transportation collaborative. The third biennial transportation and wildlife conference, to be held later this year, will provide further opportunities for wildlife managers and transportation specialists to discuss regional needs and options for addressing those needs.

Various other states also are implementing multi-sector, consensus-building processes to develop adaptation strategies for wildlife. For example, the California Department of Fish and Game is embarking on a process to incorporate global warming into its activities, and the California Resources Agency is also about to launch a process to create a state-level Climate Adaptation Strategy which will include a component on natural lands, habitat, and species. The state of Wisconsin is measuring the impacts of climate change on its highly sensitive and fragile peatlands. Scientists there are studying the changes of the plants, insects, amphibians, and other wildlife using the bogs by looking at peat core samples. This assessment will help them evaluate which species are most susceptible to climate change and determine how resource managers must counter these changes.

The states and territories are also working with the Association of Fish and Wildlife Agencies to identify efficient and effective strategies for responding to climate change impacts on fish and wildlife habitats and populations. The Association—the organization that represents North America's fish and wildlife agencies—promotes sound management and conservation, and represents the collective perspectives of the State Fish and Wildlife agencies on important fish and wildlife issues. Through a relatively new Climate Change Subcommittee, the Association is providing a forum through which state fish and wildlife agencies can collaborate on the identification of key issues and actions pertaining to climate change and engage at international, national, regional, state, and local levels to successfully influence policy and implement vital management response for climate change impacts. The Association's Climate Change Subcommittee is also preparing a document summarizing more specific strategic and operational considerations for state agencies responding to climate impacts, including a recommended framework for adaptation strategies, monitoring protocols, and modeling at the local level.

#### Recommendations – Additional Direction and Resources

I want to ensure that the members of the Subcommittee recognize that state fish and wildlife agencies are currently addressing the impacts of climate change on fish and wildlife populations and habitats with extremely limited budgets. More investment is needed to protect, manage and restore fish and wildlife populations and habitats.

The Association of Fish and Wildlife Agencies worked closely with the hunting and fishing conservation community, the National Wildlife Federation, The Nature Conservancy, and the Defenders of Wildlife over the last year with Senate staffs from the offices of Senator Lieberman (CT), our own Senator Warner (VA), and Senator Whitehouse (RI) to perfect the natural resources adaptation provisions in S3036, which the Senate considered, but failed to act on, a couple of weeks ago. This title, which prescribes the development of federal and state adaptation strategies and the requirements, terms and conditions for spending carbon-auction derived revenues under direct-spending to remediate the effects of climate change on fish, wildlife, and their habitats, has broad and diverse support in the conservation and environmental communities. Association staff and representatives from these other organizations have briefed your Committee staffs on these provisions, and we all would urge that you give serious consideration to the Lieberman-Warner natural resource adaptation construct in any legislative drafting you undertake.

On behalf of my colleagues, I would like to offer some additional recommendations for direction and resources that Congress could provide to assist the states in addressing these impacts:

- Develop a national biodiversity climate change adaptation action plan (see the Australia National Action Plan). The Plan should utilize a risk assessment approach, be developed based on state input, and should guide future funding resources based on objectives developed in the plan.
- Provide uniformity to federal climate change planning efforts by using existing tools, such as State Wildlife Action Plans, or programs, such as the State Wildlife Grants or Wildlife Conservation and Restoration programs. Provide expanded funding to accomplish an update to all Wildlife Action Plans to account more fully for the impacts of climate change on species of greatest conservation need.
- Develop uniform federal interagency response to climate change that is well-coordinate with state natural resource agencies. State fish and wildlife agencies should encounter consistent policies when engaging federal agencies on climate change issues.
- Establish national climate change information centers in all major regions of the country. Existing federal research centers could be leveraged to provide this expertise.
- Identify and commit to a direct spending, dedicated funding source that will support state and territorial efforts to mitigate and adaptively manage wildlife and fish populations and habitats in response to climate change. Include funding of education and nature-based recreational activities to more comprehensively address climate change impacts.
- Ensure future federal climate change funding is not difficult to match at the state level. Many state fish and wildlife agencies already have trouble meeting the 50/50 match requirements of the State Wildlife Grants program when traditional wildlife conservation funding sources have a match requirement of 75/25. Given the magnitude of the issue, and the speed with which it must be addressed, it would be preferable if match was at 90/10 as was identified in the Lieberman-Warner Climate Security Act.
- Encourage regional, ecosystem-based cooperative programs and partnerships among adjacent states to address conservation issues affected by climate change at the landscape level through the creation of incentives in various federal funding programs.
- Support the identification and quantification of natural ecosystem services so that they are considered in climate change policies and included in the carbon marketplace.
- Develop robust climate change awareness activities. Create funding opportunities for climate change educational outreach programs for states and regions.
- Develop additional incentives that promote sustainable technologies and low-impact development.
- Continue to support and strengthen programs that implement habitat conservation on private lands (e.g., Conservation Reserve Program; Landowner Incentive Program).
- Create innovative federal programs that assist landowners in restoring cropland back to wetlands in floodplains and further “upslope” as sea levels rise due to global warming.
- During the rule-making process for the Farm Bill Conservation title, seek opportunities to make greater use of conservation programs to lessen the impacts of climate change on wildlife.

## Conclusion

Global climate change will fundamentally change the way that state fish and wildlife agencies manage fish and wildlife populations and habitats for the public trust. The potential magnitude of the impacts and the timeframe in which they will occur are greater than any other threat we have faced in the last 100 years or more. The resulting impacts on our air and water—no doubt

on our overall way of life—are staggering. I urge Congress to work together on global warming as their top priority. The states are ready and willing to work with this Subcommittee, the rest of Congress, and the federal government to plan and adaptively manage for the impacts of climate change on our natural resources. Only through such collaboration can we conserve our natural heritage for future generations. Thank you for the opportunity to testify today, and I look forward to your questions.