TESTIMONY OF DAN ASHE, DIRECTOR,
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BEFORE THE SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SUBCOMMITTEE ON GREEN JOBS AND THE NEW ECONOMY
FARMING, FISHING, FORESTRY, AND HUNTING IN THE ERA OF CHANGING CLIMATE

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Introduction

Chairman Merkley and Members of the Subcommittee, I am Dan Ashe, Director of the U.S. Fish and Wildlife Service (Service), within the Department of the Interior (Department). Thank you for the opportunity to testify on the impact of climate change on America. My testimony will discuss the value of hunting and fishing to society and the economy, the deep roots of these activities in our conservation legacy, and the concerns we have about how climate change may affect hunting and fishing resources and management.

Hunting and Fishing in America

Hunting and fishing are important to tens of millions of Americans. The pursuit of these passions, a way of life for many, has a long history and is key component of the nation's economy.

The nation's sportsmen and women, their passion for the outdoors, and their commitment to ensuring a future for fish and wildlife populations are the foundation of our current commitments to protecting and sustainably managing these resources for all Americans to enjoy. For more than a century, hunters and anglers have worked tirelessly to ensure an abundance of game and the enforcement of wildlife laws to protect wildlife populations, and they have consistently supported funding these efforts through license and user fees on the equipment used in the field. As we assess the consequences of climate change to hunting and fishing, we should always give due consideration to the sustained efforts and investments of sportsmen and women, and the Congress, to restoring and maintaining wildlife populations in this country.

The notion of wildlife as a public resource formed the cornerstone of what is now known as the North American Model of Wildlife Conservation—a system that keeps wildlife as a public and sustainable resource, scientifically managed by professionals and agencies such as the Service and our state counterparts. The guiding principles of the North American Model are simple: the

nation's fish and wildlife resources belong to all Americans and they must be managed sustainably, so that current and future generations can enjoy their abundance. Hunters and anglers are a backbone of the model's success.

The U.S. Fish and Wildlife Service's Role in Providing Hunting Opportunities

Providing hunting, fishing, and outdoor recreation opportunities to the American people is a central function of the agency. The Service provides these opportunities in a number of ways.

The Service administers the National Wildlife Refuge System, which contains 556 refuges and 38 wetland management districts found in every state and territory in the nation. The National Wildlife Refuge System Improvement Act, enacted in 1997, was the first legislation to state explicitly that compatible wildlife-dependent recreation (hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation) should not only receive priority consideration in refuge planning and management, but that it is "directly related to the mission of the National Wildlife Refuge System." This organic act for the Refuge System was supported by a broad coalition of hunting groups and environmental organizations, and received overwhelming bipartisan support in the Congress.

Tens of millions of visitors enjoy the Refuge System each year. These members of the public come to their refuges to fish, hunt, hike, or just be outdoors. In a world that is becoming more urbanized, national wildlife refuges are more valuable than ever as places where fish, wildlife—and people—can thrive.

The Refuge System provides some of the most outstanding hunting opportunities in the country; opportunities available to every American with the ability and desire to get outside and hunt. Most refuge hunting programs complement and are coordinated with hunting programs administered by states. There are 335 refuges with hunting programs and 271 with fishing programs. There were nearly 2.5 million hunting and 7 million fishing visits to refuges in FY2013. The Service is committed to strengthening and expanding hunting and fishing opportunities wherever those activities are compatible with the primary mission of the refuges on which they would occur.

The Service also supports fish and wildlife conservation and hunting and fishing through management of migratory bird hunting, administration of the Federal Migratory Bird Hunting

and Conservation Stamp (Duck Stamp), and through successful partnership efforts like the North American Waterfowl Management Plan and the Wildlife and Sportfish Restoration Program.

Economic Value of Hunting and Fishing

The nation's natural resources, including water, fish and wildlife, and forests, are among our most valuable economic assets. According to the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Survey), Americans spent $145 billion on wildlife-related recreation in 2011. This represents approximately one percent of the nation's gross domestic product. Specifically, expenditures from sportsmen and women rose totaled $89.8 billion in 2011 with $41.8 billion spent on fishing and $33.7 billion spent on hunting-related activities.

In 2011, 90.1 million Americans, or close to 38 percent of the nation's population, participated in wildlife-related recreation. Of those individuals, sportsmen and women accounted for 37.4 million in 2011 – 33.1 million Americans fished, and 13.7 million Americans hunted.

A 2013 Economic Study in a Service report entitled "Banking on Nature" documented the substantial economic activity generated by recreational visits to the National Wildlife Refuges System. In FY 2011, 46.5 million people visited refuges. Their spending generated $2.4 billion of sales in regional economies. As this spending flowed through the economy, over 35,000 people were employed and $792.7 million in employment income was generated. About 72 percent of total expenditures were generated by non-consumptive activities on refuges. Fishing accounted for 21 percent and hunting 7 percent. Refuge recreational spending generated about $342.9 million in tax revenue at the local, county, state and Federal level.

The recent surveys demonstrated that the numbers of Americans enjoying the outdoors, and the value of hunting and fishing to the economy, have increased. The effects of climate change have the potential undermine these important activities.

Climate Change Impacts to Hunting and Fishing

Climate change is among the greatest challenges to the conservation of fish, wildlife, and plants —including many species that are fished or hunted. In recent testimony before the Committee

on Environment and Public Works and the EPW Subcommittee on Oversight, the Service provided information on the effects of climate change and the ramifications to natural resources management. The Earth's average surface temperature is increasing and this has and will likely continue to erode habitat quality and sustainability for fish and wildlife species and may cause abrupt changes to entire ecosystems in some cases. According to the U.S. Global Change Research Program's just-issued National Climate Assessment,[1] significant changes in the U.S. climate over the past 50 years have occurred, including increases in average temperatures and shifts in rainfall and storm patterns. Climate change acts upon large landscapes and ecosystems and exacerbates the impact of other stressors such as habitat fragmentation or loss due to land use changes, invasive species, fish and wildlife disease, wildfire, floods, and drought.

Accelerated climate change is impacting many species right now, and is contributing to changes in the character and functionality of habitats upon which species depend to breed, migrate, and over-winter. We are learning that climate change is affecting wildlife diseases, is facilitating the spread of detrimental invasive species, and is disrupting critical relationships between certain species and their food sources (e.g., the specialized timing of migrations that historically coincides with the emergence of food sources like seeds or insects). These changes will affect the distribution and abundance of sport fish and game birds and mammals, and may result in novel assemblages of species and habitats that do not currently exist on the landscape, which in turn would impact wildlife management.

As the climate changes, habitat areas for many species will likely expand while habitat available for other species will likely shrink or otherwise be altered. Species' distribution shifts in response to climate change can lead to a number of new challenges for state, tribal and federal natural resource managers, such as the arrival of new pests, the disruption of ecological communities, and the loss of species particularly valued by people from some areas. This is true for species that are hunted and fished, and that are integral to outdoor life in America.

Because climate change is affecting wildlife, there are serious ramifications to the people and industries that depend on wildlife, including the hunting, fishing, recreational boating and wildlife viewing industries and Native American tribes who rely on these resources for cultural and subsistence purposes. Climate change will likely have negative effects on, for example: hunting and fishing guides; boating concessionaires; beneficiaries of license revenues; and industries that support hunters and anglers.

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[1] Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2.

Changing climates can alter the emergence of valuable food sources and the availability of important water resources for migrating waterfowl. Warmer water temperatures will likely reduce habitat and alter breeding/spawning opportunities for numerous fish species. Milder winters will likely increase the prevalence of parasites and pathogens that have already negatively impacted big game. These are just a few of the many impacts that climate change is having on the wildlife that forms the foundation of our hunting and fishing economy and heritage.

Impacts on Fishing

Rising temperatures, reduced flows, and reduced oxygen levels will likely affect fishes and their habitats, especially those adapted to colder waters. Popular cold-water species such as brook trout and cutthroat trout will be displaced in many areas. Such displacements mean that many trout species will be lost from lower-elevation and lower-latitude streams: publications cited in the recent National Climate Assessment projected a loss of 47 percent of habitat for all trout species in the interior western United States by the year 2080.[2] The Assessment goes on to note that in the oceans, transitions from cold-water fish communities to warm-water communities have already occurred in commercially important harvest areas.

Alterations in stream temperatures will also likely shift breeding and spawning seasons, as well as hatching times for new fish fry. Warmer temperatures may cause fry of many species to emerge sooner, resulting in reduced survival.[3]

In addition to shifts in habitat and migration/breeding patterns, warmer waters are likely to facilitate increases in disease transmission and prevalence.[4] Similar to displacements by warm-water species, warmer waters can enable parasites and pathogens to persist in areas that were previously unavailable. Along with increased disease prevalence, increased temperatures have

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[2] Wenger, S. J., D. J. Isaak, C. H. Luce, H. M. Neville, K. D. Fausch, J. B. Dunham, D. C. Dauwalter, M. K. Young, M. M. Elsner, B. E. Rieman, A. F. Hamlet, and J. E. Williams, 2011: Flow regime, temperature, and biotic interactions drive differential declines of trout species under climate change. Proceedings of the National Academy of Sciences, 108, 14175–14180, doi:10.1073/pnas.1103097108 cited in: Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2.

[3] L. G. Crozier, A. P. Hendry, P. W. Lawson, T. P. Quinn, N. J. Mantua, J. Battin, R. G. Shaw and R. B. Huey. 2008. Potential responses to climate change in organisms with complex life histories: evolution and plasticity in Pacific salmon. Evol. Appl. 1(2): 252-270.

[4] California Department of Fish and Game, Partnership for Interdisciplinary Studies of Coastal Oceans, Channel Islands National Marine Sanctuary, and Channel Islands National Park. 2008. Channel Islands Marine Protected Areas: First 5 Years of Monitoring: 2003–2008. Airamé, S. and J. Ugoretz (Eds.). 20 pp.

been shown to result in reduced immunity and increased susceptibility of fish to diseases.[5],[6] Diseases may spread more rapidly, reproduce quicker, and have more damaging effects on host populations.

Impacts on Hunting - Waterfowl

There is increasing evidence that climate change is having an impact on waterfowl populations; the habitats they use for breeding, migration stopover, and wintering; and the timing of migration. Climate change impacts to waterfowl are likely to increase in the future, and will be exacerbated by land-use change and other stressors causing further impacts to waterfowl populations.

One of the most important waterfowl breeding areas in North America is the Prairie Pothole Region on the United States/Canadian border in the northern Great Plains. The Prairie Pothole Region contains millions of shallow depressions that fill with water each spring, providing breeding habitat for millions of ducks, migratory birds, and other wildlife. Retrospective modeling by wetland experts in the US Geological Survey, South Dakota State University, and the University of Illinois have shown that 20th century climate change has already caused changes in wetland conditions by shortening their hydroperiod and reducing their productivity. Modeling of future conditions in the Prairie Pothole Region project that there will be major reductions in water volume, shortening of hydroperiods, and less-dynamic vegetation for prairie wetland complexes.[7] As a result, many of the ponds could dry up or be wet for shorter periods of time, reducing their suitability for breeding and likely contributing to an overall negative impact on duck populations.

Across the country, climate change is expected to affect the timing and distance of waterfowl migration. Warmer fall and winter temperature in northern regions may lessen the need for waterfowl to fly as far south to find open water and suitable food. Several recent studies suggest that some waterfowl species are arriving on the wintering grounds later in the season and in reduced numbers over recent decades. Some species have taken this to an extreme. The winter distribution of Pacific brant, a small, dark sea goose, has shifted northward from low-temperate areas such as Mexico to sub-Arctic areas as Alaska's climate has warmed over the last four

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[5] M Gallana, M.P. Ryser-Degiorgis, T Wahli, H. Segner. 2013. Climate change and infectious diseases of wildlife: Altered interactions between pathogens, vectors and hosts. Current Zoology. 2013; 59(3): 427 – 437.

[6] Ashley D. Ficke, Christopher A. Myrick, Lara J. Hansen. 2007. Potential impacts of global climate change on freshwater fisheries. Reviews in Fish Biology and Fisheries, Volume 17, Issue 4, pp 581-613.

[7] Brett A. Werner, W. Carter Johnson, and Glenn R. Guntenspergen. 2013. Evidence for 20th century climate warming and wetland drying in the North American Prairie Pothole Region. Ecology and Evolution 3(10): 3471–3482.

decades.[8] This overall trend could affect hunting opportunities in more southerly wintering areas. On their northward spring migration, the close match between migratory timing and the spring growth of plant foods makes geese particularly vulnerable to the impact of climate change.[9] These mismatches have been documented in Europe, and may soon be documented in the U.S.

Impacts on Hunting – Big Game

Climate change will also affect terrestrial animals. Big game species in certain areas are already being adversely affected.

For example, associated stressors related to warmer temperatures, are decimating moose populations in Minnesota and New Hampshire. At Agassiz National Wildlife Refuge in Minnesota, the moose population has decreased by 90 percent since the mid-1980s.[10] During that same timeframe, the moose population plummeted across northwest Minnesota by 98 percent.[11] Heat can affect moose directly by reducing body weights, pregnancy rates, and increased vulnerability to predators and disease. [12]

The moose population has declined by 40 percent in New Hampshire in the last decade. Many New Hampshire cows have been under the weight necessary to successfully bear calves the last few years and are producing fewer calves than they did a decade ago. Warmer winters have also caused spikes in New Hampshire tick populations, contributing to declines in the population. Ticks leave moose weakened from blood loss, and many die of anemia. Ticks also leave moose more vulnerable to exposure in the winter as their attempts to rub off the ticks leaves them with

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[8] David H. Ward, Christian P. Dau, T. Lee Tibbitts, James S. Sedinger, Betty A. Anderson and James E. Hines. 2009. Change in Abundance of Pacific Brant Wintering in Alaska: Evidence of a Climate Warming Effect? ARCTIC Vol. 62, No. 3 (September 2009): 301–311.

[9] R. H. Drent, G. Eichhorn, A. Flagstad, A. J. Van der Graaf, K. E. Litvin, and J. Stahl. 2007. Migratory connectivity in Arctic geese: spring stopovers are the weak links in meeting targets for breeding. J Ornithol (2007) 148 (Suppl 2):S501–S514.

[10] Personal Communication with Agassiz NWR biologist, May 2014.

[11] Minnesota DNR. 2011. Minnesota Moose Research and Management Plan. Minnesota Department of Natural Resources

[12] Murray, D.L., Cox, E.W., Ballard, W.B., Whitlaw, H.A., Lenarz, M.S., Custer, T.W. Barnett, T., and Fuller, T.K. 2006. Pathogens, nutritional deficiency, and climate change influences on a declining moose population. Wildlife Monographs No. 166

hairless patches. Individual moose have been documented to be infested with 150,000 ticks—five times more than normal.[13]

National Fish, Wildlife, and Plants Climate Adaptation Strategy

The President's Climate Action Plan (Plan) released in June 2013 serves as a blueprint for responsible national and international action to slow the effects of climate change using existing authorities. The Plan recognizes the importance of protecting natural resources and promoting resilience in fish and wildlife and their habitats.

The Service is committed to meet the goals of this important plan by continuing to reduce our carbon emissions, implement adaptation measures, and engage key stakeholders and constituencies, including sportsmen and women. Adaptation forms the core of the Service's response to climate change and means strategic, science-based management actions, including regulatory and policy changes that will help reduce the impacts of climate change on fish, wildlife, and their habitats.

Additionally, in March of 2013, the National Fish, Wildlife, and Plants Climate Adaptation Strategy (Strategy) was released. This Strategy presents a unified approach—reflecting shared principles and science- based practices—for reducing the negative impacts of climate change on fish, wildlife, plants, our natural resource heritage, and the communities and economies that depend on them. The Strategy was developed with input from a wide variety of sources, with multiple opportunities for public input, and was shaped by comments from more than 55,000 Americans.

The Strategy does not prescribe any mandatory or regulatory requirements, but is designed to coordinate government-wide fish and wildlife climate change adaptation efforts and to build on growing efforts beyond Federal and State agencies to understand, track, and reduce impacts of a changing climate on the nation's valuable fish, wildlife, and plants. It outlines a roadmap of key steps needed to help safeguard the nation's natural resources in the face of these challenges, and is a key component of efforts by Federal, State and Tribal governments and non-governmental entities to reduce the risks and impacts of climate change.

The Strategy also describes opportunities for numerous sectors to address these challenges and then describes how its goals and strategies may be implemented with coordination across the Federal government, States, tribes and other entities. It provides guidance about what further actions are most likely to promote natural resource adaptation to climate change, and describes

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[13] Anthony R. Musante, Peter J. Pekins & David L. Scarpitti. 2010. Characteristics and dynamics of a regional moose Alces alces population in the northeastern United States. Wildl. Biol. 16: 185-204

mechanisms that will foster collaboration for effective action among resource managers and stakeholders.

The Service is now co-leading a Joint Implementation Working Group (JIWG) with NOAA, the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), and the state of California to promote implementation of the Strategy. The White House Council on Environmental Quality is also supporting this effort. The JIWG includes representation from most of the agencies that participated in development of the Strategy (15 Federal, 5 State, and one inter-Tribal commission) and will be responsible for reporting on implementation and for future revisions of the Strategy. The Service will continue implementing the Strategy within its own programs and working with the many other agencies involved in Strategy implementation.

Conclusion

Hunting, fishing, and general outdoor recreation are part of the fabric of America. These pursuits are a major component of the nation's economy and provide tens of millions of American's with the invaluable benefit of connecting with nature.

The Service's responsibilities cover a wide range of natural resources that we are charged to conserve, protect, manage, and make available for public use through Federal statutes. Many of these resources are managed for public use, including hunting and fishing. Climate change is affecting fish and wildlife species' health, abundance, and distributions. The long term ramifications of these effects to hunting and fishing are of great concern and must be considered as the nation plans for and reacts to the effects of climate change. The Service is highly aware of the challenges presented by these effects and looks forward to working with this Subcommittee and the Congress to continue to address these issues.

We thank Chairman Merkley and the Subcommittee for holding this hearing and the opportunity to testify on this important issue, and are happy to provide response to questions.