Testimony of Dr. Molly Cross
Climate Adaptation Scientist for the Wildlife Conservation Society &
Science Director for the WCS Climate Adaptation Fund
Before the House Natural Resource Committee
Subcommittee on National Parks, Forests, and Public Lands
March 23, 2021

Good morning. My name is Molly Cross and I am the lead of the Wildlife Conservation Society (WCS) Climate Change Adaptation Program in North and South America, and the Science Director for the WCS Climate Adaptation Fund, based out of our Bozeman, Montana office. I have a Ph.D. in Environmental Science, Policy and Management from the University of California-Berkeley, where I studied the impacts of climate warming on Rocky Mountain ecosystems in Colorado. I'd like to thank Chairman Neguse, Ranking Member Fulcher, and the members of the Subcommittee for inviting me to testify before you today, regarding "Building Back Better: Examining the future of America's public lands" and the role that the U.S. Government can play in supporting solutions to the climate crisis that also protect nature and people.

Summary

The scientific consensus is clear: climate change is happening and human activities, including fossil fuel emissions and land conversion, are the reason. Because climate governs the basis for life, changes in climate will affect natural systems and species around the globe, and here at home. As the pace of climate change quickens it poses significant risks to the values supported by U.S. Federal lands and waters (marine and freshwater), such as fish, wildlife, plants, water, recreation, sustenance, and livelihoods, among others. These values could literally go up in smoke with more severe wildfires, be drowned by rising seas, or wilt during hotter droughts brought about by a changing climate.

The good news is that there are actions we can take to reduce the amount of climate change the planet and our Nation will experience, proactively prepare for climate risks, and advance the ability of nature and people to adapt to a changing world – while protecting biodiversity and human well-being. These "Natural Climate Solutions" are conservation, restoration and improved land management actions that remove carbon from the atmosphere while also safeguarding nature and providing benefits to people such as clean air and water, and protection from increasingly extreme events such as floods and wildfire. Globally, the protection of intact forests is one of the most cost-effective and valuable Natural Climate Solutions in terms of the climate mitigation and adaptation benefits and other ecosystem services that intact forests provide. In the U.S., the protection of intact forests, grasslands, and coastal ecosystems is also important, along with responsible management of natural resources that looks ahead to the impacts of a changing climate and opportunities for carbon storage and sequestration.

There are a growing number of examples of Natural Climate Solutions in action on public and private lands and waters in the U.S.; however, to meet the scope and scale of the climate crisis, the U.S. Government must accelerate science-based, participatory, and socially-equitable investments in the protection and responsible stewardship of our Federal lands and waters. Because the U.S. Government cannot fight the challenges of climate change alone, increased Federal leadership, funding, and technical support to states, Tribes, municipalities, private landowners and others are also needed to address this pressing national – and global – concern. We therefore urge the U.S. Government to invest more heavily in Natural Climate Solutions by:

- Meeting bold targets for conservation, including protecting 30% of U.S. lands and waters by 2030.
- Increasing investment in Indigenous-led conservation and climate change adaptation;
- Increasing funding and technical capacity for proactive, climate-informed management planning and action within Federal agencies and with state, Tribal and private land partners.

Now is the time for decisive action and investments in innovative, nature-based solutions to the inter-related crises of climate change, biodiversity loss, and social inequity. We need to take this opportunity to focus on how to prepare for the future – how to build back better – through climate mitigation and adaptation and building community resilience, especially for those urban and rural communities that are hardest hit by climate change's impacts. The U.S. Government must lead the way – on public lands and waters in the U.S., and beyond.

Introduction to the Wildlife Conservation Society

The Wildlife Conservation Society (WCS), founded with the help of Theodore Roosevelt in 1895, saves wildlife and wild places worldwide through science, conservation action, education, and inspiring people to value nature. Today, WCS manages the largest network of urban wildlife parks in the United States, led by our flagship, the Bronx Zoo. To achieve our mission, WCS harnesses the power of its Global Conservation Program working in nearly 60 countries and 14 priority regions across all of the world's oceans and its five wildlife parks in New York City, visited by four million people annually. We manage more than 200 million acres of protected areas around the world, employing more than 4,000 staff including 200 Ph.D. scientists and 100 veterinarians.

WCS sponsored some of the first wildlife research in Alaska, resulting in the creation of the Arctic National Wildlife Refuge; played a leadership role in the effort to prevent the extinction of bison by returning animals to protected areas in the West; and helped Congress develop and pass the Migratory Bird Treaty Act. WCS has helped to create or expand 270 protected areas worldwide, including the Grand Teton National Park in the United States -- and helps to manage more than 370 protected areas with our government and community partners, including more than 200 Indigenous Communities worldwide.

WCS is a science-based conservation organization with long-standing engagement with partners in the regions and landscapes where we work. In the U.S., WCS priority regions include: 1) the Rocky Mountains, as they link the Sierra Madres in Mexico to the Canadian Rockies, and the Great Basin to the Great Plains, 2) Arctic Beringia, encompassing an area of tundra and highly productive shallow marine shelf areas that extend from the Chukotka region of the Russian Federation, across northern Alaska in the United States, and as far east as Victoria Island in the Inuvialuit Settlement Region of Canada, and 3) the New York seascape, one of the world's most diverse and vibrant marine environments stretching over 16,000 square miles of coastal and ocean waters from Montauk, NY, to Cape May, NJ. In these regions we work closely with Federal agencies, State agencies, Tribal agencies and communities, municipalities, non-governmental organizations (NGOs), private landowners, and other stakeholders. Many of our priority landscapes in the U.S. and around the globe are at the frontlines of climate change impacts and solutions. Therefore, WCS conducts science and implements on-the-ground actions that address both climate change mitigation (reducing the build-up of greenhouse gases in the atmosphere) and adaptation (proactively preparing for and adapting to the impacts of a changing climate) at global, national, and local scales. Our goal is to advance climate change solutions in priority landscapes and share lessons to more broadly inform climate change policy, funding, and practice. See Appendix A for a brief description of WCS climate change priorities and projects in Arctic Alaska and the Rockies.

In addition to supporting place-based climate adaptation science and planning in priority regions and landscapes, WCS manages the WCS Climate Adaptation Fund[1], the largest-known funder of on-the-ground actions designed to help plants, animals, and ecosystem services adapt to a changing climate in the U.S.. Over the past decade, the Climate Adaptation Fund invested almost $22 million in over 110 adaptation projects across 41 U.S. States, 3 U.S. Territories, and 5 Tribal Territories or Nations[2]. Many of the projects supported

[1] The WCS Climate Adaptation Fund is supported by a grant to WCS from the Doris Duke Charitable Foundation.

[2] See https://www.wcsclimateadaptationfund.org/supported-projects-1 for a map and list of all projects that were awarded grants between 2011-2019.

by the Climate Adaptation Fund are taking place on Federal lands – including National Parks, National Wildlife Refuges, National Forests, and BLM lands – and even more have been conducted in close partnership with Federal agencies. Federal funding programs also are providing critical match and leveraged funding that serves to further amplify outcomes and broaden the adoption of climate adaptation strategies. The portfolio of funded projects represents a diversity of real-world stories of climate adaptation in action to support wildlife and ecosystems responses to a range of climate change impacts from rising seas, to hotter droughts and fires, changes in water availability, among others[3]. Over the past 10 years of grantmaking, we have seen a shift in the ways that conservation practitioners are embracing the realities of climate change and doing their work differently to be more effective in the face of those changes[4]. In recent years, we have seen more practitioners moving away from trying to resist the effects of a changing climate (when resistance would be futile) to playing a more active role in shaping desirable ecological transitions[5].

The Climate Crisis

The scientific consensus is clear: climate change is happening and human activities, including fossil fuel emissions and land conversion, are the reason. Because climate governs the basis for life, changes in climate will affect natural systems and species around the globe. As climate change advances and its pace quickens it poses significant risks to the values supported by U.S. Federal lands and waters (marine and freshwater), such as fish, wildlife, plants, water, recreation, sustenance, and livelihoods, among others. These values could literally go up in smoke with more severe wildfires, be drowned by rising seas, or wilt during hotter droughts brought about by a changing climate.

In October 2018, the United Nations' Intergovernmental Panel on Climate Change (IPCC) issued a special report on the accelerated pace and magnitude of human-caused climate change[6]. The report's findings are sobering: if greenhouse gas emissions continue at their current rate, the earth's atmosphere could warm by as much as 2.7 degrees Fahrenheit by 2040. This pace of change is faster than earlier forecasts by the IPCC, and likely to result in devastating impacts such as coastal flooding, drought, wildfires, food shortages, and myriad disruptions to populations and economies. These changes are already underway in the United States and are projected to have a significant impact on biodiversity and ecosystem services. The U.S. Global Change Research Program is legally mandated to produce a National Climate Assessment (NCA) – a state-of-the-science synthesis of recent changes in climate and projections for the future – every four years. The most recent NCA was completed in 2018[7], and provides details on the risks facing biodiversity and ecosystems, water resources, forests, and coastal areas. In some regions, such as the Arctic, ecological thresholds have already been crossed; even if we dramatically reduce greenhouse gas emissions, conditions that were considered "normal" over the past decades or century are unlikely to return. Although the Arctic is at the extreme end of recent climate changes, the rest of the U.S. and the planet is on a similar trajectory.

The science is also clear that the Climate Crisis is not acting in isolation – climate change exacerbates many other interrelated crises, including biodiversity loss, the threat of future pandemics of zoonotic origin, and

---

[3] Cross, M., E. Rowland, D. Long, E. Tully and K. Dunning. 2017. 14 Solutions to Problems Climate Change Poses for Conservation: Examples from the WCS Climate Adaptation Fund. Wildlife Conservation Society, New York, NY.

[4] Cross, M., E. Rowland, E. Tully, L. Oakes, D Long. 2018. Embracing Change: Adapting Conservation Approaches to Address a Changing Climate. Wildlife Conservation Society. New York, NY.

[5] Peterson St-Laurent, G., L. Oakes, M.S. Cross, and S. Hagerman (2021). R–R–T (resistance–resilience–transformation) typology reveals differential conservation approaches across ecosystems and time. *Communications Biology* 4(1): 1-9.

[6] IPCC (2018). Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., et al. (eds.)]. World Meteorological Organization, Switzerland.

[7] US Global Change Research Program (2018). Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., et al. (eds.)]. Washington, DC, USA.

social injustices. Climate change is already having a disproportionate impact on the most vulnerable human communities and exacerbating inequities. Among recent news headlines were findings from studies reporting that poor and Latino neighborhoods endure hotter temperatures in the southwest, and that areas that historically suffered discriminatory housing practices now face higher flood risks.

This mounting scientific evidence points to the pressing need for actions to limit fossil fuel emissions and remove greenhouse gases from the atmosphere.

The good news is that there are actions we can take to reduce the amount of climate change the planet and our Nation will experience, proactively prepare for climate risks, and advance the ability of nature and people to adapt to a changing world - while protecting, restoring and enhancing biodiversity and human well-being.

Natural Climate Solutions

There are a wide range of strategies for addressing climate change, from actions that aim to reduce the build-up of greenhouse gases in the atmosphere (climate mitigation) to those that help nature and people proactively prepare for and adapt to the impacts of a changing climate (climate adaptation). **Natural Climate Solutions** (also called "nature-based solutions to climate change") are conservation, restoration, and improved land management actions that remove carbon from the atmosphere while also safeguarding biodiversity and providing benefits to people such as clean air and water, and protection from climate disturbances such as floods and wildfire.

A recent study in the journal Science Advances estimated that up to 21% of the U.S.'s current annual greenhouse gas emissions can be removed from the atmosphere by restoring and responsibly managing our forests, farms, ranches, grasslands, and wetlands[8]. The protection, restoration, and responsible management of natural resources is also a key strategy for adapting to the impacts of climate change. The Global Adaptation Commission, World Economic Forum, and United Nations Decade on Ecosystem Restoration have called for greater investment in the natural environment as a cost-effective and critical part of building resilience for human communities, while helping fish, plants and animals thrive in the face of a changing climate. When carefully planned and implemented, nature-based solutions can offer both climate mitigation and adaptation benefits by reducing emissions and helping people cope with an altered environment. Although most investments in climate action have focused on mitigation to-date, support for adaptation activities is growing. ***It is essential that we increase our investment in climate adaptation strategies alongside climate mitigation actions; the latter may slow impacts and help give time for people and nature to adjust to climate changes and its impacts.***

One of the most impactful Natural Climate Solutions for both adaptation and mitigation is to protect and restore intact forests, grasslands, and coastal ecosystems, whether in the U.S. or across the planet. Globally, intact forests – forest areas free of significant anthropogenic degradation – are indispensable to any viable pathway for achieving net zero carbon by 2050 and keeping global warming below 2°C. They function as a massive ongoing carbon sink that absorbs over 25% of humanity's global emissions every year[9]. Intact forests also support important adaptation and other social and economic co-benefits[10], including:

- Enhancing ecological resilience, by sustaining regional rainfall and reducing vulnerability to fire, droughts, floods, etc.;
- Conserving the biological diversity essential to maintaining ecological functions, adaptation and resilience;

[8] Fargione, J.E., et al. (2018). Natural climate solutions for the United States. *Science Advances* 4:eaat1869.

[9] le Quéré, C., et al. (2018) Global Carbon Budget 2018. *Earth Syst. Sci. Data*, 10(4):2141–2194.

[10] Watson, J.E.M., et al. (2018). The exceptional value of intact forest ecosystems. *Nature Ecology & Evolution* 2:599–610.

- Sustaining the livelihoods and cultures of Indigenous Peoples and Local Communities. Well over 35% of the world's most intact forests are home to Indigenous Peoples[11];
- Delivering cost-effective social benefits such as functioning watersheds, food security and reduced disease transmission.

Currently, global and national commitments to mitigate climate change fail to recognize the critical role of the planet's intact forests[12]. The planet's vast terrestrial carbon sink is incorrectly assumed to be secure and too remote to face serious threats, leading to a lack of political and financial commitments. If the existing carbon stocks and ongoing sequestration capacity of intact forests (including peatlands) are not maintained, humanity may find that all safe climate mitigation pathways are out of reach. The U.S. Government has a critical role to play in acknowledging the foundational, stabilizing role that intact forests across the globe play for climate change mitigation and adaptation, and support necessary policy change, governmental action, and adequate finance for their protection.

Intact forest protection will play an important role here in the U.S., but also important will be the protection and restoration of other intact ecosystems, such as grasslands and coastal and marine ecosystems, and the responsible management of multiple-use lands towards climate mitigation, climate adaptation, biodiversity conservation, and social well-being goals. Not only do these Natural Climate Solutions offer cost-effective approaches, but they also help create jobs and can play a key role in economic recovery.

The Role of Federal Lands, Programs, and Leadership

In the United States, the U.S. Government has an outsized role to play in advancing Natural Climate Solutions. According to the Congressional Research Service, the U.S. Government owns 640 million acres, approximately 28% of all land in the U.S.[13] Opportunities abound for increasing the contribution that these lands – and U.S. freshwater systems and marine areas – are making towards climate change mitigation and adaptation.

Natural Climate Solutions are already being implemented in the U.S., on both public and private lands:

- In New Mexico, Federal and private partners are restoring wetlands in areas at high risk of burning in the Valles Caldera National Preserve, a unit of the National Park Service. By establishing zones of wet ecosystems in advance of a fire, these actions serve to reduce catastrophic changes from hotter fires by breaking up the landscape and reducing fire spread. After a fire, these wetlands are a repository for soil that erodes during heavier rain events that are projected to increase as the climate changes, providing protection to downstream communities from flooding and contaminated water supplies.
- Across the U.S., bison conservation efforts are protecting and rewilding some of the most threatened, carbon-rich ecosystems in North America: grasslands. As a keystone species and ecological engineer, bison deliver a cascade of ecological benefits for myriad species and ecosystems, as well as provide Natural Climate Solutions. Culturally, buffalo contribute to the identity of many Indigenous communities. Their restoration can therefore create a path for respect, reconciliation, justice, and equity through Indigenous and community-led conservation initiatives.
- In Arctic Alaska, conservation groups are advocating for greater protection of large protected areas such as the Arctic National Wildlife Refuge, rather than converting it to oil and gas production. Protection of these large, intact landscapes presents wildlife with the time and space to adapt to climate changes while also reducing the severity of climate changes being felt around the globe by reducing fossil fuel-related emissions.

[11] Fa, J.E., et al. (2020). Importance of Indigenous Peoples' lands for the conservation of Intact Forest Landscapes. *Frontiers in Ecology and the Environment* 18(3): 135– 140, doi:10.1002/fee.2148.

[12] Funk et al. (2019). Securing the climate benefits of stable forests. *Climate Policy* 19(7): 845-860.

[13] CRS Report R42346, updated February 2020. https://crsreports.congress.gov/product/pdf/R/R42346

- In Tennessee, the Cumberland River Compact and partners are building urban rain gardens to capture heavy downpours from climate change-driven increases in intense rain events, to keep polluted runoff out of rivers that are a drinking water source for local communities and also critical fish and wildlife habitat.
- In the Lower Rio Grande Valley of Texas, American Forests and their partners are designing reforestation projects in ways that provide carbon benefits while also helping wildlife adapt to a changing climate. They are planting drought-tolerant tree species that can withstand warmer and drier conditions, store carbon, and provide habitat, in critical riparian corridors that allow wildlife to move and track changing conditions to survive.
- In North Carolina, the Pocosin Lake National Wildlife Refuge is a freshwater bog ecosystem spanning over 1,325 acres. The Nature Conservancy and the U.S. Fish and Wildlife Service are protecting this area from climate change-driven fluctuations in precipitation patterns and increased wildfires. They installed water control structures that regulate the water level of the soil, which keeps the bogs wet and reduces the risk of wildfires, protects biodiversity and rare species that live in the pocosin, and increases carbon sequestration.

These examples and many others across the country offer inspiration and models that can be replicated; however, the scale at which Natural Climate Solutions are currently being implemented in the U.S. falls short of what is needed to address the problem. ***To meet the scope and scale of the climate crisis, the U.S. Government must accelerate science-based, participatory, and socially equitable investments in the protection and responsible stewardship of our Federal lands and waters, that anticipate future climate conditions.*** And although this expanded Federal role is essential, the U.S. Government cannot address the climate crisis on public lands alone. ***Increased Federal leadership, funding, and technical support to states, Tribes, municipalities, private landowners and others are also needed to address this pressing national--and global--concern.***

We therefore urge the U.S. Government to invest more heavily in climate mitigation and adaptation outcomes for nature and people by:

- Meeting bold targets for conservation, including protecting 30% of U.S. lands and waters by 2030;
- Increasing investment in Indigenous-led conservation and climate change adaptation;
- Increasing funding and technical capacity for proactive, climate-informed management planning and action within Federal agencies and with state, Tribal and private land partners.

Meeting bold targets for conservation: Protecting 30% of U.S. lands and waters by 2030

A recent report from the Council on Strategic Risks found that ecological disruption and environmental degradation to food, water, wildlife, forests and fisheries, increases the risks of future pandemics, conflict, political instability, loss of social cohesion, economic harm, and other security outcomes making it one of the greatest underappreciated security risks of this century[14]. The science is clear that we must conserve or protect at least 30% of the planet (both lands and waters) in the coming decade in order to take productive steps towards combating the global biodiversity and climate crises[15]. WCS therefore applauds the commitment of the Biden-Harris Administration to conserving at least 30% of U.S. lands and waters by 2030 ("30x30"), as part of the U.S. Government's efforts to tackle biodiversity loss and climate change. U.S. implementation of 30x30 provides a critical foundation for global success on biodiversity conservation, mitigating and adapting to climate change through Natural Climate Solutions, and prevention of zoonotic pandemics. It provides an opportunity for improved inter-agency coordination, as well as alignment and

[14] Council on Strategic Risk, "The Security Threat that Binds Us: The Unraveling of Ecological and Natural Security and What the United States Can Do About It," Feb. 2021. (https://councilonstrategicrisks.org/wp-content/uploads/2021/01/The-Security-Threat-That-Binds-Us_2021_2-1.pdf)

[15] Dinerstein, E., et al. (2019). A Global Deal For Nature: Guiding principles, milestones, and targets. *Science Advances* 5:eaaw2869; and other studies and reports listed at: https://www.hacfornatureandpeople.org/science-and-reports

synergy among existing and new laws, regulations, and mechanisms to enhance habitat protection. 30x30 can also provide a pathway to reconciliation of the issues of equity and justice that underlie conservation in this country by honoring and elevating the role of Indigenous Nations in any 30x30 strategy.

To realize these benefits, however, we must rely on the best available science, expand and deepen stakeholder engagement and genuine co-management efforts, and give priority to Tribal sovereignty and Indigenous-led conservation that draws on Indigenous science and Traditional Ecological Knowledge.

Identifying and supporting areas that already deliver ecosystem conservation

WCS recommends that both protected areas (IUCN categories I-VI) designated for biodiversity conservation and other 'conserved' areas ("other effective area-based conservation measures" or OECMs) should count towards 30x30 targets, if they meet technical standards and guidance for ensuring that they complement existing protected area systems and contribute to overall biodiversity outcomes. There remain opportunities to create new, expand, or reestablish durable protection and conservation measures for critically important landscapes and seascapes in the U.S.; however, the greatest opportunities to reach 30x30 are likely through recognition of, and support to, areas that already support biodiversity and ecosystem conservation and may qualify as OECMs. We therefore recommend the US Government prioritize through funding and other support, the identification of Key Biodiversity Areas (KBAs) that are most important for the persistence of biodiversity, and the conservation of potential OECMs in the following areas:

- Areas on public or private lands/waters (outside GAP 1 and 2 protection status), particularly those adjacent to existing protected areas, that are already managed for sustainable use or other ecosystem services but are not formally recognized for their contributions to biodiversity outcomes (e.g. by providing buffer zones, additional habitat for pollinators, corridors for wildlife migration, etc.);
- Tribal sovereign lands and ancestral homelands or sacred sites where the rights holders and leaders wish to have formal recognition of, and government support for, their contributions to the conservation of biodiversity;
- Underrepresented or highly threatened ecosystems – e.g., riparian, coastal wetlands, or grassland systems – to ensure a representative and coherent network that enables plants and animals to adapt to the impacts of a changing climate; and
- "Busy" areas near urban centers that are still ecologically important and contribute to a representative network of protected areas and OECMs, climate resilience, and engaging a larger constituency in place-based biodiversity conservation.

Develop and use new technologies to monitor the effectiveness of area-based measures

Monitoring the ecological, climate, and social outcomes of area-based conservation measures is critical to the successful implementation of any 30x30 commitment. Robust monitoring is also essential to identify, protect and conserve important areas for biodiversity and ecological integrity. We therefore recommend that Federal agencies and partners scale up existing efforts to assess outcomes for biodiversity and ecological integrity at the ecosystem scale.

'Build Back Better' through conservation approaches that center equity and justice

The U.S. Government has an opportunity, and an obligation, to create a path for respect, reconciliation, justice, and equity through greater support for Indigenous and community-led conservation initiatives. Increased U.S. Government support for different OECMs that contribute to biodiversity conservation is an opening for more local, community-led management approaches by Tribes and underserved or marginalized rural communities closest to the most intact lands and waters across the country. We recommend that the U.S. Government use 30x30 as an opportunity to promote these shared management approaches, particularly for federal lands and waters.

The U.S. Government's commitment to 30x30 can build on successful initiatives that already explore these models – like the Bison Conservation Initiative (BCI) – through policy and funding support; expanding shared conservation programs with Tribal, State, and private partners; building capacity to identify, recognize and implement OECMs through existing tribal and community-led local governance processes for managing private lands; and incorporating 30x30 efforts into broader reconciliation processes with Tribal Nations and marginalized communities to increase their ownership over conservation initiatives.

Re-establishing US leadership through 30x30

In addition to meeting 30x30 goals in the U.S., Congress should encourage the Biden-Harris Administration to develop a National Biodiversity Strategy, join the High Ambition Coalition for Nature and People, and support 30x30 globally. The U.S. cannot do it alone; we also need to work with the other governments and global initiatives. U.S. leadership and multilateral efforts will help catalyze other countries' commitments to 30x30, and enhance and restore the international role of the U.S. as a leader on combating both climate change and biodiversity loss.

Increasing support for Indigenous-led conservation and climate change adaptation

As the climate changes, Indigenous peoples are facing new threats to their livelihoods, cultures, and food security. For millennia, Indigenous communities have built and sustained social networks that integrate relationships with all living beings, nutritionally and culturally important wild foods, and cultural values such as honoring and caring for wildlife. These networks act as a key muscle that a community may flex when pressured to adapt by some climate-related or other exposure and contribute to resilience at the community level and beyond. In Indigenous communities, the relationships to and codes of conduct for interacting with plants, wildlife and ecosystems promote the health of local populations – both human and non-human. While Indigenous Knowledge is not extractable from its bearer or its broader context, the natural resource management and conservation community in the U.S. and around the globe may benefit from the lessons offered by Indigenous Peoples in the ways of honoring and respecting the animals, plants, lands, and waters around us.

Indigenous communities are leaders in the climate adaptation field in the U.S. With support from programs such as the Bureau of Indian Affairs (BIA) Tribal Resilience Program, Tribes across the U.S. have had access to funding, training, and technical support for the development of climate adaptation plans. Since 2011, the BIA Tribal Resilience Program has funded 703 awards with over $60.7 million in Congressionally-appropriated support[16]. Programs like this must be expanded to provide the funding support and resources needed to meet the needs of Indigenous-led climate adaptation work in the U.S.

Also critical is increased support for capacity building for Tribal managers and students. One avenue for capacity building could be to provide Indigenous students with training in marketable skills that prepare them for future careers in natural resource management and conservation. For example, the Blackfeet Nation is partnering with WCS to develop an Indigenous Scholars Hub that will bring together young Blackfeet students with decision-makers from the Blackfeet Nation Tribal Government and neighboring Federal land management agencies to co-create a research agenda that weaves together Indigenous and western environmental and cultural science. The Indigenous Scholars Hub will support the Tribe's ability to address pressing concerns, such as the impacts of climate change on the health of grasslands and rangelands on Tribal lands, and the role of bison restoration and responsibly-managed cattle grazing in building ecosystem resilience and improving soil carbon sequestration and storage.

[16] According to a BIA presentation from 2020, accessed on 19 March, 2021: https://www.bia.gov/sites/bia.gov/files/assets/bia/ots/tcrp/TRP%20Overview%202020.pdf

Increasing funding and technical capacity for proactive, climate-informed management planning and action

The most important way that climate-informed natural resource management is different from business-as-usual is the process by which the latest climate science is considered when setting goals and choosing actions. Climate-informed conservation planning helps managers and other practitioners to design goals and actions based on the best available climate science, and to re-assess decisions as the understanding of climate change and its impacts evolves. In some situations, a thorough consideration of anticipated climate change impacts can reveal the necessity of intentional, strategic, and forward-looking adjustments to what kinds of actions are being implemented, where actions are located, when actions are needed, and what goals those actions are designed to achieve.

The ability of managers to reduce climate risks and make well-informed decisions about public and private lands and natural resources in the face of a changing climate depends on having access to:

- Best-available climate science,
- Tools and technical support for climate-informed planning to link science to actions, and
- Adequate resources (e.g., funding, staffing, political will and support) to take actions to advance Natural Climate Solutions on the ground.

The U.S. Government has a direct role to play in providing these resources to Federal agencies and managers, but governmental funding, science, and technical capacity can also be directed to supporting climate mitigation and adaptation planning by state agencies, Tribal governments and communities, private landowners, and cities, towns and counties. These investments in climate-informed state, Tribal, and private land management adjacent to Federal lands will create better synergies for Natural Climate Solutions, and help avoid negative outcomes from encroachment of development, roads, industrial development, and other habitat fragmentation.

One Federal program that has successfully advanced climate-informed natural resource management of Federal and non-Federal lands and waters is the USGS National and Regional Climate Adaptation Science Centers (CASCs) that aim to "deliver science to help wildlife, ecosystems, and people adapt to a changing climate". The National CASC was established by Congress in 2008, and has since grown to a network of 8 regional CASCs that covers the entire continental U.S., Alaska, Hawai'i, the U.S. Affiliated Pacific Islands, and the U.S. Caribbean. The CASCs work directly with Federal agencies and managers, but they also support collaborative planning among Federal and non-Federal partners. As an example, in 2018 the North Central CASC awarded a grant (Federal funding) to a non-governmental organization (WCS) to help a state fish and wildlife agency (Wyoming Game & Fish Department) consider the impacts of a changing climate in their Statewide Habitat Plan. The project applied climate science that was supported by Federal research funding, and benefited from technical input from Federal scientists (USGS) and Federally-funded University researchers (University of Wyoming; University of Colorado-Boulder). The result was a forward-looking habitat management plan that sets the Wyoming Game & Fish Department on a path to making better-informed habitat protection and restoration decisions that will be more successful in the face of a changing climate.

This kind of Federal investment in climate science, tools and resources for planning, and technical capacity must be increased to meet the widespread need for climate-informed conservation decisions-making across jurisdictions.

◆ ◆ ◆

I appreciate the opportunity to share WCS's perspective and to make a case for increased Federal investment in Natural Climate Solutions by providing greater leadership, funding support, and technical capacity to Federal land and water managers, and non-Federal partners. Now is the time for decisive action and investments in creative, nature-based solutions to the inter-related crises of climate change, biodiversity loss, and social inequity. The U.S. Government must lead the way - on public lands and waters in the U.S., and beyond. I look forward to answering any questions that Members may have.

Appendix A

Wildlife Conservation Society climate change priorities and projects in priority regions in the United States:

- Arctic Alaska:
    - Conserving Pacific Walrus in a changing climate – As walrus haul out on the Arctic coast in unusually large groups as a result of declines in summer sea ice (where females and their pups traditionally spent the summer), they are vulnerable to being startled – by planes, boats, people – and the resulting stampedes can kill hundreds of animals. Alaskan Native communities are developing strategies for monitoring and protecting these walrus populations, but they need resources and support to be ready to do so when the haul outs occur, which are not always predictable but are happening more often.
    - Reducing negative impacts of changes in Arctic Ocean shipping routes and use driven by melting sea ice.
    - Understanding and supporting social cohesion and food sharing within Native Alaskan communities to support the sustainable management of changing wildlife populations.
    - Snow-dependent wildlife conservation in the Arctic - Mapping areas of persistent spring snow for species reliant on it such as polar bear, wolverine, and ringed seal.
- Rocky Mountains:
    - Restoring beaver populations and mimicking beaver activity to improve the "sponge effect" of mountain watersheds, increase shallow aquifer recharge, off-set loss of snowpack water storage, and improve riparian corridors for wildlife movements to track changing climate and habitat conditions.
    - Working lands conservation initiative – Working toward market and nature-based solutions to maintain carbon stores and wildlife habitat on private ranch lands by increasing market value to prevent conversion to other uses (e.g., cropland and rural sprawl). Identifying working lands where productivity of current land use (e.g., crop production) will decline due to climate change and develop incentives and policies to transition toward economically viable land uses that increase carbon sequestration and ecosystem services.
    - Climate-informed stream and wetland restoration in the Southern Rockies – Implementing and evaluating the effectiveness of practical, low cost and low technology stream and wetland restoration techniques to reduce fire impacts, reduce post-fire flooding and erosion damage, and improve post-fire ecosystem recovery.
    - Bison conservation – Restoring bison to improve grassland resilience, soil carbon storage, and cultural connections and reconciliation for Tribes.
    - Southern Borderlands connectivity and conservation - Applying the best available science and landscape-scale spatial planning to identify climate resilient habitats, design strategies to mitigate threats (alteration of natural fire regime, invasive species, water scarcity, fragmentation from mining and border wall construction), and restore ecological and cultural connectivity in the Sky Islands border region.
    - Jaguar conservation - Protect source populations in the U.S.-Mexico border region and restore and enhance landscape connectivity and resilience to enable this species to adapt to changes in habitat and other resources (water, availability of prey) as a result of climate change.
    - Facilitating climate-informed conservation and natural resource management planning for a range of natural resources with State and Federal agencies in the Northern Rockies.