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EXAMINING BIODIVERSITY LOSS: DRIVERS, IMPACTS, AND POTENTIAL SOLUTIONS

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BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

MAY 19, 2021

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ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

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EXAMINING BIODIVERSITY LOSS: DRIVERS, IMPACTS, AND POTENTIAL SOLUTIONS

WEDNESDAY, MAY 19, 2021

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The Committee, met, pursuant to notice, at 10:05 a.m. in room 406, Dirksen Senate Office Building, Hon. Thomas R. Carper (Chairman of the Committee) presiding.

Present: Senators Carper, Capito, Cardin, Whitehouse, Kelly, Padilla, Boozman, and Ernst.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. Good morning, everybody. I am pleased to call the Committee to order.

I am pleased that we are joined today by a distinguished panel of witnesses to examine the important issue of biodiversity loss: Dr. Leah Gerber, Ed Sullivan, Andy Treharne—hope I got that right, Andy—and John Schmidt. We welcome you all to the Environment and Public Works Committee.

I just want to begin by saying that I appreciate that you come to us from across the length and breadth of our great country. That is important because biodiversity loss is a challenge that transcends geographical boundaries and State lines.

Across our country's forests, our grasslands, our deserts, our rivers, and oceans, and all around the world, the ecosystem that supports all life is threatened by heat waves, by intense storms, by wildfires, and more. At the same time, wildlife must contend with invasive species, including pests and diseases that we hear about regularly.

The more species each ecosystem can sustain, in other words, the greater the biodiversity in each, the greater resilience those ecosystems have to the threats I have just described, and yet, around the world, biodiversity is declining faster now than any other time in human history. Let me say that again: Around the world, biodiversity is declining faster now than at any other time in human history.

Our changing climate, habitat loss, the spread of invasive species in our increasingly connected world, and pollution have all contributed to this decline.

For example, the ocean absorbs almost a third of the carbon dioxide emitted into our atmosphere every year, a third. The carbon dioxide turns into acid in the ocean, threatening species at the base

of the ocean food web. That impact on the food web is profound, affecting everything from fish to one of our most beloved species in Delaware, a little bird called the red knot.

That same carbon dioxide contributes to global warming, which is causing sea level rise. As the seas rise, they threaten the red knot's coastal habitat, making this iconic and threatened species even more vulnerable.

With limited food resources and diminishing habitat, the incredible 19,000 mile roundtrip migration that red knots make each year—think of that, 19,000 miles—they are about the size of this, Senator Capito, they are about the size of the end of my hammer, but each year they make this migration, and it has become more difficult, not easier, and it is a migration that threatens their long term survival.

The impact of biodiversity loss extends far beyond this remarkable species going extinct. It also impacts each and every one of us. How, you might ask.

Well, first of all, biodiversity is directly linked to human health. The loss of biodiversity and ecosystem resilience is making animals more susceptible to disease, a particularly troubling development since the vast majority of emerging diseases in people, including potential pandemics, originate in wildlife. We are all too familiar with the consequences of the zoonotic diseases. COVID-19 is one of them.

Noting this threat and many others, the World Economic Forum has named biodiversity loss among the top three risks to humanity in terms of impact, along with weapons of mass destruction and climate action failure.

One sector at particular risk is agriculture, which is, of course, critical for global food security and need for our very lives. Agriculture is the No. 1 industry in my home State of Delaware, as it is for many of our colleagues on this Committee. Our agriculture and food systems cannot exist without healthy soils, plant pollination, and pest control, all of which are linked to biodiversity. We simply cannot produce food without the birds, without the bees, and even the lowly earthworms and healthy soil bacteria. If we fail them, we ultimately fail ourselves.

Though the current state of biodiversity decline paints a bleak picture for the future, there is reason for hope. If we take action, we can stem biodiversity loss and prevent the harm that comes with it.

This is an issue on which our Committee has a bipartisan record of success, a record of which all of us can be proud. Last Congress, we enacted into law both the WILD Act and the ACE Act, both of which reauthorized important programs to conserve wildlife and habitat at home and abroad. We also included the first ever wildlife crossings safety section in a highway bill, which would address the problems of habitat fragmentation.

As Chairman, I hope that we can build on that record this Congress, and I am eager to work with all of our members on both sides of the aisle to do so.

We must also ensure that the Federal budget provides robust funding for wildlife protection. We know that our conservation laws work best for both wildlife and people when the agencies respon-

sible for implementing them have the resources that they need to do their jobs effectively.

What I have described is a moral and practical imperative, and like so many of the issues before our Committee, this is a challenge we all face, and one that we can resolve together. It is no overstatement to say that our livelihoods and those of our children hang in the balance.

With that, I am pleased to recognize, for her comments, our Ranking Member, Senator Shelley Capito, great State of West Virginia, the Mountain State, for her opening statement before we hear from our witnesses.

Senator Capito.

OPENING STATEMENT OF HON. SHELLEY MOORE CAPITO, U.S. SENATOR FROM THE STATE OF WEST VIRGINIA

Senator CAPITO. Thank you, Mr. Chairman, and thank you for calling today's hearing. I also want to thank our witnesses for joining us and look forward to hearing from our witnesses today.

Our Nation, as the Chairman has said, is abundant with natural beauty, and the Chairman and I agree wholeheartedly about the importance of conservation. It is essential that we preserve our public lands and our ecosystems while ensuring access to outdoor recreation.

The Committee has a history of passing bipartisan legislation aimed at conserving wildlife and wildlife habitat. Just last year, and the Chairman spoke about this, this Committee passed the America's Conservation Enhancement Act, which President Trump signed into law in October.

Included in the ACE Act was the Chesapeake Watershed Investment for Landscape Defense, Chesapeake WILD, Act, which created a new $15 million grant program within the U.S. Fish and Wildlife Service to support habitat restoration in the Bay area. As a West Virginian, and as someone from Delaware, this is important to both of us.

The Chesapeake WILD Act, the first Federal wildlife conservation grant tailored to benefiting species in the Chesapeake Bay Watershed, has bolstered our State's growing outdoor recreation industry. This important Fish and Wildlife program protects vital ecosystems while also enhancing our outdoor industry by supporting populations of birds, fish, and mammals prized by our outdoorsmen, sportsmen, and fishermen, and we all know West Virginia's $9 billion outdoor recreation industry, which supports 91,000 jobs in our State is good for the soul and good for the economy.

Our anglers and sportsmen, in turn, fund conservation through Pittman-Robertson Act programs backed by the Federal excise taxes on ammunition and fishing tackle. This creates a virtuous cycle: Improvements to our natural heritage encourage more people, including sportsmen, to get out and enjoy the great outdoors, leading to more investment in conservation.

Enhanced biodiversity from this cycle also benefits other sectors, such as agriculture, by supporting species that benefit mankind in more direct ways, such as pollinators or predators that eat pests.

Beyond our Committee, the Great American Outdoors Act, which I cosponsored, was enacted last Congress and will provide invest-

ments in our public lands and to address their maintenance backlogs. These investments will yield benefits for ecosystems and free up other tax dollars otherwise spent by the National Park Service, the Forest Service, and other Federal public agencies on addressing the Federal maintenance to address priorities, such as wildlife conservation.

West Virginia is known for being wild and wonderful, and our State is blessed with abundant natural resources, from forests to mountains to rivers and to lakes. To showcase our State's natural beauty, I worked to redesignate the New River Gorge National River to become a new National Park and Preserve.

Working with local leaders, our hunters and fishermen, economic development folks, and small business owners, we were able to craft a bill that gives the New River Gorge the recognition it deserves while preserving historic hunting and fishing rights.

I am proud to say that President Trump signed that bill into law last year, and I am also thrilled to be sharing this part of Almost Heaven with the rest of the world for generations to come. Biodiversity is intrinsic to the natural beauty of our Nation, and habitat conservation is key to healthy, biodiverse ecosystems.

Two weeks ago, the Biden administration issued the Conserving and Restoring America the Beautiful Report, which intended to outline steps toward President Biden's goal of conserving at least 30 percent of our lands and waters by 2030, commonly referred to as 30 by 30. However, the 24 page document included very few details as to how we can achieve President Biden's ambitious goal.

While a number of the core principles, including voluntary and locally led approaches to conservationism, outlined in the plan are bipartisan in nature, I do have a number of concerns. For instance, the report does not even define conservation, nor does it specify what lands should be included under that program. These questions need to be answered.

I look forward to continuing to work with the Administration in a bipartisan way on these and other issues, but my lasting and meaningful solutions to addressing biodiversity must come from legislation.

Today, I look forward to our discussion on consensus driven solutions to these challenges.

Thank you, Mr. Chairman, and I yield back my time.

Senator CARPER. Thanks very much, Senator Capito.

We have four witnesses joining us today. The first is going to be introduced to us by Senator Kelly from Arizona.

Senator Kelly, the show is yours.

Senator KELLY. Thank you, Mr. Chairman, and thank you for holding today's hearing on the biodiversity challenges we are facing in the United States and across the world.

As you noted, animal, insect, and plant species are declining at rates we have never seen before, tens to hundreds of times higher than the average background levels spanning the last 10 million years. Scientists estimate that nearly one-third of the species in the United States are close to extinction. These are commonly known species, like polar bears and bumblebees. In Arizona, we could lose wildlife like the Sonoran pronghorn antelope and the desert tortoise, to name just a couple.

Today's hearing will focus on this alarming trend, and I am grateful that the Committee tapped one of the world's leading experts to testify on this issue, Dr. Leah Gerber. Dr. Gerber is a professor of conservation science at Arizona State University School of Life Sciences. She is also the founding director of ASU's Center for Biodiversity Outcomes. Dr. Gerber is the lead author on the United Nation's report issued in 2019 that was a wake up call to the world that extinction rates are accelerating.

Mr. Chairman, I look forward to hearing Dr. Gerber's testimony, and thank you.

Senator CARPER. Thank you very much, Senator Kelly, and welcome Dr. Gerber.

You are now recognized for your statement. Go ahead.

STATEMENT OF LEAH GERBER, PH.D., FOUNDING DIRECTOR, CENTER FOR BIODIVERSITY OUTCOMES, LIFE SCIENCES CENTER; ARIZONA STATE UNIVERSITY

Ms. GERBER. Thank you, Mr. Chairman, Ranking Member Capito, and members of the Committee for the opportunity to speak with you today about the biodiversity crisis.

I am Dr. Leah Gerber, professor in the School of Life Sciences and Founding Director of the Center for Biodiversity Outcomes at Arizona State University. I was a lead author for the Intergovernmental Panel on Biodiversity and Ecosystem Services Global Assessment, which provided the most comprehensive evaluation of the status of biodiversity and nature's contribution to people in the U.S. and globally.

More species of plants and animals are threatened with extinction now than any other time in human history. Twenty-five percent of all species, including 40 percent of amphibians and 30 percent of marine mammals, are threatened with extinction.

We are not talking about just extinction; we are talking about the general decline of nature. Compared to the 1970s, there are 3 billion fewer birds in North America for people to enjoy, and coral reefs have shrunk by about half their original extent.

The consequences of the decline of nature aren't restricted to wildlife; they extend to people. Nearly 80 percent of the 18 categories of nature's contributions to people have declined. These ecosystem services provided by biodiversity include things like nutrient cycling, carbon sequestration, pollination, and agricultural productivity.

Protecting biodiversity ensures the resilience of agriculture as it intensifies to meet growing demands for food production, and food security depends on healthy pollinator populations. Diverse and abundant populations of bees are associated with higher rates of production in America's crop species.

Biodiversity is the foundation of our economy and well being, yet it is declining at unprecedented rates.

The causes of the biodiversity crisis are well known: Habitat loss, overexploitation, climate change, pollution, and invasive species. Rapid climate change, for example, influences species' ability to adapt, contributing to biodiversity loss. At present, our main challenge is not trying to figure out what is wrong, it is about deciding to take action to address the problem.

The science is clear about the biodiversity crisis, and we have options for solutions. We can start by looking to experience to figure out what works to conserve biodiversity.

Congress could consider expanding Federal investment in habitat restoration, climate adaptation, and habitat connectivity programs. Congress should also provide robust funding for our Nation's wildlife protection laws. These laws work best when the agencies responsible for implementing them have adequate resources.

My own work has shown that a return on investment approach to prioritize threatened species recovery actions can help save more species from extinction.

Innovative financing and financial markets for biodiversity are promising approaches to measure and value biodiversity. An institutional structure is needed to facilitate corporate disclosure on biodiversity impacts and dependencies and to report progress toward a sustainable development goals.

By acknowledging that biodiversity is the foundation of social and economic systems, we can begin to mainstream the value of biodiversity. Congress can help lead the way by providing direction on this solution.

Building bridges between government and non-governmental sectors will promote the growing sense of corporate responsibility that is rapidly emerging. For example, I have worked with Bayer to develop a pesticide risk assessment framework that allows sustainable agriculture while ensuring the protection of endangered species.

A national biodiversity strategy for the U.S. would focus and coordinate government response to the biodiversity crisis. While some U.S. agencies are responsible to ensure the persistence of biodiversity as part of their mission, many agencies impact biodiversity and can play a significant role in its protection.

We could also re-establish a leadership role in international conservation, from issues like wildlife trafficking to mitigating plastic pollution in our oceans.

We need an inclusive process that brings people together to solve our Nation's biodiversity challenge. A long history of discrimination has led to clear patterns of injustice and inequity in our access to nature. Committing to building a diverse work force makes the science and the scientists better prepared to address the growing challenges to biodiversity.

We are at a crossroads, and the signs are clear which direction we should take. This is the time for Senate and Congress to listen to the science, build on our Nation's conservation history, and take action for biodiversity, and ultimately, for humanity.

Thank you.

[The prepared statement of Ms. Gerber follows:]

Testimony to the Senate Committee on Environment and Public Works Examining Biodiversity Loss: Drivers, Impacts and Potential Solutions

Leah Gerber, Professor and Founding Director, School of Life Sciences and Center for Biodiversity Outcomes, Arizona State University

Thank you, Mr. Chairman, Ranking Member Capito, and members of the Committee, for the opportunity to speak with you about the biodiversity crisis. I am Dr. Leah Gerber, Professor in the School of Life Sciences and Founding Director of the Center for Biodiversity Outcomes at Arizona State University. I was a lead author for the Intergovernmental Panel on Biodiversity and Ecosystem Services Global Assessment, which provided the most comprehensive evaluation of the status of biodiversity and nature's contribution to people in the U.S. and globally.

More species of plants and animals are threatened with extinction now than at any other time in human history. Twenty-five percent of all species – including 40% of amphibians and 30% of marine mammals – are threatened with extinction. And we're not talking about just extinction, we're also talking about the general decline of nature. Compared to the 1970s, there are 3 *billion* fewer birds in North America for people to enjoy and coral reefs have shrunk by half their original extent.

The consequences of extinction and the decline of nature aren't restricted to wildlife – they extend to people. Nearly 80 percent of 18 categories for "nature's contribution to people," have declined. These "ecosystem services" provided by biodiversity include things like nutrient cycling, carbon sequestration, pollination, and agricultural productivity.

Protecting biodiversity ensures the resilience of agriculture as it intensifies to meet growing demands for food production. And food security depends on healthy pollinator populations. Indeed, diverse and abundant populations of bees are associated with higher rates of production in America's crop species. Biodiversity is the foundation for our economy and wellbeing, yet it is declining at unprecedented rates.

The causes of the biodiversity crisis are now well known. Direct drivers include land- and sea-use change, overexploitation, climate change, pollution, and invasive species. Rapid climate change, for example, influences species ability to adapt, contributing to biodiversity loss. At present, our main challenge is not trying to figure out what's wrong, it's about deciding to take action to address the problem.

The science is clear about the biodiversity crisis and we have options for solutions. We can start by looking to experience to figure out what works for biodiversity conservation.

Congress could consider expanding federal investments in habitat restoration, climate adaptation and habitat connectivity programs. Congress should also provide robust funding for

our nation's wildlife protection laws. We know these laws work best when the agencies responsible for implementing them have adequate resources.

Federal funding has the potential to spur additional investments from the conservation community, the private sector and state and local governments. My own work has shown that a return-on-investment approach to prioritize threatened species recovery actions can help save more species from extinction.

Innovative financing and financial markets for biodiversity are promising approaches to measure and value biodiversity. An institutional structure is needed to facilitate corporate disclosure on biodiversity impacts and dependencies and to report progress toward sustainable development goals.

By acknowledging that biodiversity is the foundation of social and economic systems, we can begin to mainstream the value of biodiversity into national and subnational budgets, policy planning and implementation. Congress can help lead the way by providing direction on the importance of mainstreaming biodiversity in financial markets.

Building bridges between governmental and non-governmental sectors will promote the growing sense of corporate responsibility that is rapidly emerging. For example, I have worked with Bayer to develop a risk assessment framework that allows sustainable agriculture while ensuring the protection of endangered species.

A National Biodiversity Strategy for the US would focus and coordinate government response to the biodiversity crisis. While some US agencies are responsible to ensure the persistence of biodiversity as a matter of their mission (e.g., USFWS, NMFS), many agencies impact biodiversity and can play a significant role in its protection (e.g., Army Corps of Engineers).

The US could also re-establish a leadership role in international conservation, from issues like wildlife trafficking to mitigating plastic pollution.

We need an inclusive process that brings people together to solve our nation's biodiversity challenges. A long history of discrimination has led to clear patterns of injustice and inequity in access to nature. We must recognize the systemic bias that infiltrates the experiences of underrepresented groups, and commit to building a diverse workforce. Committing to inclusion makes science/scientists better prepared to address the growing challenges to biodiversity.

We are at a crossroads, and the signs are clear which direction we should take. This is the time for the Senate and Congress to listen to the science, build on our nation's conservation history, and take action for biodiversity and, ultimately, for humanity.

Thank you.

Senate Committee on Environment and Public Works
Hearing Entitled, "Examining Biodiversity Loss: Drivers, Impacts, and Potential Solutions."
May 19, 2021
Questions for the Record for Dr. Leah Gerber

Senator Carper:

1. **The Biden administration's "America the Beautiful" initiative is a national call to action to work collaboratively to conserve and restore lands, waters and wildlife. Your testimony spoke to the importance of biodiversity conservation. Would you elaborate on the need for agencies to use an inclusive process to achieve both biodiversity conservation and a thriving economy, in line with the Biden administration's goals?**

Thank you for the opportunity to testify in May before the Environment and Public Works Committee on the biodiversity crisis, and for the chance to answer this question about the importance of inclusion in biodiversity conservation. Most fundamentally, inclusion helps ensure durable—that is, long-term, widely supported—conservation: if people or interests are excluded from the process then they will be less likely to be part of taking action to conserve biodiversity. Further, we need a focus on inclusion to help correct long-standing errors in past conservation efforts that excluded people from decisions that affected them, such as systemic racism.

The America the Beautiful initiative highlights the importance of collaboration with a broad constituency – from local communities, private and Tribal lands and waters – to tackle the climate and biodiversity crisis, address inequitable access to the outdoors, and to strengthen the economy and stimulate job growth. The report provides a framework of eight principles for implementing 30x30 in the U.S., from the role of collaboration to pursuing conservation and restoration that creates jobs, honors private property rights and uses science as a guide for decision-makers, all of which strengthen inclusion by their nature.

The report recommends six broad sets of actions that we can take now to begin to advance 30x30 and stem the decline of fish and wildlife populations and their habitats. This includes expanding the National Wildlife Refuge System, conserving wildlife corridors across landscapes, and incentivizing voluntary conservation through Farm Bill programs like Working Lands for Wildlife or conservation banking. These examples cover a swath of issues critical to biodiversity and at the same time are directly related to critical sectors and demonstrate how to be inclusive.

The report recommends creating an American Conservation and Stewardship Atlas to catalog and track lands and waters that are conserved and restored under 30x30 and an annual report that details progress toward the goal of 30x30, the first of which will be issued this year. Key details, such as the exact criteria for what counts toward 30x30, require scientific analyses, but this sets into motion the process to make that determination. An important component of this analysis is a threat assessment, summarizing the status, threats and solutions to biodiversity in the U.S. Such an assessment will require interagency and multi-stakeholder collaboration.

In sum, America the Beautiful sets out key conservation goals, and sets the tone and direction for the need for inclusion in the pursuit of the goals throughout the report.

2. As you wrote in your testimony, "we need an inclusive process that brings people together to solve our nation's biodiversity challenges." Would you please provide an example from your own career where bringing together a broad group of diverse stakeholders and community members to solve a conservation challenge resulted in a stronger, more enduring solution?

I would like to offer two examples here.

First, in 1999 I was part of a seminal study on Endangered Species Recovery Plans. This project was collaborative between the Society for Conservation Biology, the U.S. Fish and Wildlife Service (USFWS) and 19 universities across the country. Together, we reviewed 181 recovery plans - about 20% of the total number of plans at the time - to determine which features of recovery plans contribute to an improving status for species, as determined by USFWS biannual reports to Congress. The study was the most comprehensive review of endangered species recovery plans ever completed, the findings of which were published in a special issue of Ecological Applications in 2002.

As part of this effort, I led a paper on authorship and the use of biological information in recovery plans. We found that (1) groups of authors from diverse affiliations are likely to strengthen the recovery planning process, (2) recovery plans lacking nonfederal participation suffer from inadequate attention to species biology, and (3) academic affiliation is strongly associated with the use of focal-species biology in recovery plans. These results provide empirical support for the importance of engaging a broad group of diverse stakeholders and community members to solve the biodiversity challenge. In particular, results show that engaging diverse stakeholders in the recovery planning process may increase the use of biological information in recovery plans and influence the eventual success of recovery efforts.

The USFWS and National Marine Fisheries Service (NMFS) have embraced these recommendations in creating a set of guidelines for the development of recovery plans. This guidance provides information to ensure recovery plans are consistent and useful to potential partners in recovering species. The guidance also stresses the importance of involving diverse stakeholders in the recovery planning process. These agencies continue to refine and improve the recovery planning process and approaches to cross-sector collaboration in achieving recovery goals.

Second, in August 2015, I co-organized a panel titled "Expanding diversity in the next generation of ecology" at the annual Ecological Society of America conference. This event attracted dozens of underrepresented minority students who subsequently worked together to outline a strategy for promoting inclusion in ecological sciences. A student-led paper, published in *Science* magazine, *Without inclusion, diversity initiatives might not be enough,* underscores the value of engaging a broad and diverse set of stakeholders in creating enduring solutions for biodiversity conservation.

Fewer young people are pursuing conservation science degrees and working in their professions after graduation — even as platforms to increase diversity persist and expand. While the unique

challenges minority youth experience that impede academic success are well-documented, it is not clear that this knowledge is integrated effectively in diversity initiatives. Although recruiting and matriculating diverse students is a step in the right direction, the publication argues that it is not enough — steps must be taken beyond increasing diversity to advancing inclusion. While diversity refers to numbers and differences within a group, inclusion speaks to how minority students are treated and feel within an institution. This distinction is critical to increasing minority students in STEM, as it focuses on the "unintentional implicit biases" that influence institutional culture and impede success. Indeed, transitioning from diversity to inclusion requires acknowledging that structural bias and social justice impacts scientists as people, and that this has consequences for the science they do. Problems that are only framed from a single viewpoint miss valuable insights that can become key guiding questions driving research and real-world applications forward.

Our *Science* paper outlined a widely recognized strategy for promoting diversity and inclusion in biodiversity science. The convening and collaborative effort were transformative for all who attended, and inspired a diverse group of students to share insights more broadly. Committing institutional support, programs and resources to diversity and inclusion will continue to allow the ecology community to identify promising underserved high school students, recruit them, mentor them and provide professional opportunities with conservation. This, in turn, will result in more durable results that biodiversity – and society – require.

3. **In your testimony, you mentioned innovative financing opportunities and financial markets for biodiversity as promising approaches to measure and value biodiversity. I understand you have spent considerable time exploring these issues and opportunities.**
    a. **Would you please elaborate on what you mean by "innovative financing" and "financial markets for biodiversity?"**

In the context of biodiversity conservation, innovative financing typically refers to market-based mechanisms that account for the value of biodiversity. Financial markets for biodiversity broadly include managing capital and using financial incentives to support sustainable biodiversity management. Such markets may include private and public financial resources used to conserve biodiversity, investments in commercial activities that produce positive biodiversity outcomes, and the value of the transactions in biodiversity-related markets such as habitat banking. At present, 12–17% of the estimated $300–$400 billion of investment needed annually to maintain global biodiversity currently flows to conservation finance, with most originate from limited public and philanthropic sources. Yet, institutional investors and other asset managers have more than $175 trillion in assets for global economic activity. There is thus opportunity to invest private capital towards conservation, despite the marketplace for such investments being slow to develop to date. A key hurdle is that there are no established mechanisms for investors to consider the value of nature and the consequences of their activities for biodiversity.

    b. **How might Congress help support these approaches?**

Congress can help lead the way by providing direction, structures, and processes to address challenges related to the mobilization of private capital in conserving biodiversity. An institutional structure is needed to facilitate corporate disclosure on biodiversity impacts and dependencies and to report progress toward sustainable development goals.

Incentives are needed to encourage corporate disclosure on biodiversity. Congress can invest in the Natural Capital Accounting collaboration of the U.S. Government – which spans numerous agencies and business, academic, and non-profit partners – that is developing essential tools to align business and government natural capital accounting. Further, Congress can give direction and deadlines for the development of methods for adequate inclusion of biodiversity reporting for businesses to measure impacts and dependence on natural capital and associated values, and to address key data gaps on national natural capital accounting. As a precursor to a mandatory requirement to disclose company biodiversity performance, voluntary biodiversity measurement and reporting for companies that meet certain criteria should be encouraged. This should require disclosure of biodiversity related impacts, dependency of direct operations and supply chains, risks and opportunities, biodiversity footprints and overall net impact on biodiversity. Mechanisms to enable cross-government working on business measurement and reporting of biodiversity performance should also be established. And the United States should be a contributor to the upcoming Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES) *Business and Biodiversity Assessment*, which will provide a global synthesis of the science of business dependency and effects on biodiversity as well as policy recommendations.

Congress should support business awareness of the value of biodiversity, how to measure impacts, dependencies, risks and opportunities associated with biodiversity. A communication strategy is needed to promote biodiversity measurement and disclosure approaches. In such communications, the risk associated with biodiversity loss must be re-framed and clearly communicated as we develop new approaches to capturing the opportunities associated with biodiversity conservation. This is beginning to occur – for example, the World Economic Forum's 2020 Global Risks Report highlighted that biodiversity loss is now one of the three top economic risks in the coming decade – but can use further encouragement.

4. **In your testimony, you described how your own work has shown that a "return-on-investment approach" to prioritize threatened species recovery actions can help save more species from extinction.**
    a. **Would you please explain to the Committee what you mean by a "return-on-investment approach" to prioritize threatened species recovery?**

Global biodiversity loss is occurring at an unprecedented rate and halting this loss will require a significant increase in the level of conservation investment. Yet, funds for conservation are limited and priorities for investment must be set. Effective allocation to date has been hampered by the limited evidence linking investments and measurable biodiversity outcomes. A structured, logical, and transparent approach to allocating limited resources to recovery programs is the best way to pursue the recovery of the most species, and that choosing full recovery for some species does not entail deliberate extinction for others. The science of structured decision making, together with the development of decision support tools (e.g., systematic conservation planning) provides approaches that require decision makers to clearly articulate objectives and constraints, and more transparently evaluate alternative allocation strategies to find the strategy that best meets multiple objectives. A structured resource allocation process is a way for managers to allocate limited funds in a manner that ensures every dollar spent is likely to achieve as much

progress as possible. Such a process can accommodate and explicitly examine multiple objectives and their alternatives, such as minimizing the risk of extinction and maximizing the probability of recovery. Scenario-based decision support tools allow managers to simulate the outcomes of resource allocation strategies and explore how different objectives, budgets, logistical constraints, and competing societal values can affect outcomes. Such tools enable managers to compare proposed alternatives prior to committing resources.

Unlike in financial investments, for biodiversity, the pay-off is not simply monetary and there are many measures of successful outcomes, including carbon sequestered, water quality improved, species secured, habitat structure improved, and forest losses averted. A recent study provides an evidence-based model of how conservation investment quantitatively reduces the rate of biodiversity loss. The model is based on national-level expenditures on conservation, declines in Red List mammal and bird species, and human development pressures such as economic, agricultural and population growth. Using the model, it is possible to estimate where (globally and nationally) the biggest return on investment in conservation occurs, and how this may change as the national socioeconomic context changes. In this regard, the model also provides a way of predicting conservation financing needs as human development proceeds.

b. Would you please provide an example of a species for which this approach has been effective?

ASU's Center for Biodiversity Outcomes Conservation Investment Tool allows visualization of the biodiversity impact of alternative levels of investment and for different values of socioeconomic pressures. The tool allows exploration of how much investment is needed to achieve biodiversity targets under different socioeconomic growth trajectories (e.g., gross domestic product, agricultural growth). This tool is based on a model that predicts improvements in biodiversity loss of a country as a result of its investment in conservation actions, in relation to relevant human development pressures. At present, we are applying this tool to prioritize conservation investment in Peru and Colombia.

Senator CARPER. Dr. Gerber, thank you very much. ASU, right?
Ms. GERBER. Yes.
Senator CARPER. My wife is a graduate of ASU.
Ms. GERBER. Wonderful.
Senator CARPER. The other ASU, Appalachian State University.
Ms. GERBER. Oh, OK.
Senator CARPER. We were out in the Redwood City, California, on recess a week ago, visiting a bunch of technology companies out there, and we stayed at Marriott Hotel. I went down in the breakfast area to try to find a quiet place so I could do a Zoom call, a teleconference call. And all these athletes, women athletes, about 25 of them, came in from ASU and filled up the dining room, and just were full of energy and talking and everything.

My wife went over and said to them that she was a graduate of ASU. She said, "My husband is over there trying to do a Zoom call," and believe it or not, they stopped talking. They could not have been nicer, and we are just very impressed with their team discipline. So, ASU, welcome aboard.

Ms. GERBER. Thank you.

Senator CARPER. Our next witness is Ed Sullivan. Ed Sullivan, just a little bit of background, Ed Sullivan, as some of you may recall, worked as a journalist before hosting variety shows in the 1930s and 1940s. He eventually became host of the Ed Sullivan Show, the longest running TV variety program in history, which featured acts like The Supremes, like the Beatles, Jerry Lewis, Elvis Presley, among legions of others.

All right, I am kidding, but we do have a really big show today.

Kidding again, but in all seriousness, we are glad to have the real Ed Sullivan.

This is Edmund Sullivan, here with us today.

The original Ed Sullivan has passed on, but his memory lingers on Wikipedia. If you want to have a good time, check out Ed Sullivan on Wikipedia, and you can see the Beatles as kids, almost, and Elvis Presley at the age of about 20. It is just a hoot. Just great.

The real Ed Sullivan, Edmund Sullivan, and Mr. Sullivan is the Executive Officer of the Santa Clara Valley Habitat Agency. He has over 25 years of experience in habitat conservation planning, natural resource management, and land use planning.

Mr. Sullivan, we thank you for taking the time to join us this morning, and you may begin when you are ready. Take it away.

STATEMENT OF EDMUND SULLIVAN, EXECUTIVE OFFICER, SANTA CLARA VALLEY HABITAT AGENCY

Mr. SULLIVAN. Thank you, Chairman Carper, Ranking Member Capito, and members of the Committee, thank you for the opportunity to testify today. I thank you for your leadership. I hope my testimony will prove to be a catalyst into further exploration of benefits and lessons learned from large scale, multi-agency habitat conservation plans, which are effective solutions to stemming biodiversity loss while facilitating economic development.

In thinking about the future of habitat conservation planning, it is important to appreciate their legacy. Through the Endangered Species Act HCP program, endangered species conservation has

evolved considerably, and several lessons can be gleaned from this development, most notably that with foresight planning and investment, economic development and biodiversity are not mutually exclusive.

In assessing these pioneer arrangements, it is important to consider not only the efficiency of their formation and implementation processes, but also their effectiveness in advancing valuable conservation goals. Landscape scale HCPs are attempting to implement sustainable development principles of permitting economic development, while at the same time, protecting wildlife habitat and diversity, as well as sequestering carbon.

The integration of environment and development will lead to improved living standards for all, better protected and managed ecosystems, and a safer, more prosperous future.

Protected areas are the backbone of global biodiversity conservation. Land conservation at the ecosystem scale is a key driver for achieving that objective, and regional HCPs are one of the best mechanisms available capable of implementing that objective.

With the effects of climate change, regional HCPs and other similar conservation efforts are leading a paradigm shift in reserve design and function by identifying and protecting biodiversity hotspots in those areas least likely to undergo rapid climate induced changes.

Large scale HCPs are wired for tackling climate change since we are ecosystem focused, intent on building resiliency, replication into the landscape, establishing wildlife linkages, and protecting climate refugia.

Landscape scale HCPs recognize threats to biodiversity and fragmented landscapes and are positioned to help mitigate these threats by conserving large habitat patch areas linked to one another through protected wildlife corridors. HCPs have the capacity to stem biodiversity loss because it is our core mission.

We also have financial sustainability necessary to succeed, endowment funding focused on in perpetuity land management and monitoring, and we are focused on building collaborative partnerships between all levels of government, NGOs, and private landowners.

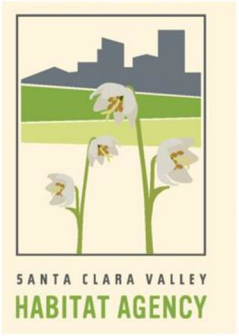
Another important point is the adaptive, management driven implementation approach that HCPs take, as well as science centered land conservation decisionmaking focused on protecting biodiversity hotspots.

I hope my testimony presents a wide range of illustrative actions for sustainability and pathways for achieving them across and between sectors. I believe it highlights the importance of adopting integrative management and cross-sectoral approaches, like regional, landscape scale HCPs that consider the trade offs necessary infrastructure development and biodiversity conservation.

Will striking these balances require substantial financial investment? Yes, but not nearly as much as losing the $125 trillion worth of ecosystem services that experts estimate nature provides to the planet every year.

Thank you.

[The prepared statement of Mr. Sullivan follows:]



TESTIMONY OF

Edmund Patrick Sullivan

Executive Officer – Santa Clara Valley Habitat Agency

Member – California Habitat Conservation Planning Coalition

REGARDING

Habitat Conservation Plans and Biodiversity Loss: A Solution to the Problem

BEFORE THE

Committee on Environment and Public Works Committee of the United States Senate

ON

Wednesday, May 19, 2021

Introduction

Chairman Carper, Ranking Member Capito, and Members of the Committee, thank you for the opportunity to appear today and speak to the theme of Examining Biodiversity Loss: Drivers, Impacts, and Potential Solutions.

My name is Edmund Sullivan, and I serve as the Executive Officer of the Santa Clara Habitat Agency (Habitat Agency) and a member of the California Habitat Conservation Planning Coalition (CHCPC). Today, it is my honor to testify on behalf of the Habitat Agency and CHCPC, which represents Habitat Conservation Plan (HCPs) stakeholders across California.

Why is Biodiversity Important?

Biodiversity underpins all life on Earth. Without species, there would be no air to breath, no food to eat, no water to drink. There would be no human society at all. The map of biodiversity hotspots overlaps extraordinarily well with the map of the natural places that most benefit people.

Biodiversity also refers to the number or abundance of different species living within a particular region. It represents the wealth of biological resources available to us. It is all about sustaining the natural area made up of a community of plants, animals, and other living things that is being reduced at a steady rate.

Biodiversity is important to most aspects of our lives. We value biodiversity for many reasons, some utilitarian, some intrinsic. This means we value biodiversity both for what it provides to humans, and for the value it has in its own right.

Biodiversity offers several ecosystem services which we all depend upon. They are as follows.

1. Keeping Biodiverse Ecosystems Intact Helps Humans Stay Healthy
    - ✓ As 2020 has shown us, there is a close link between disease outbreaks and the degradation of nature.
2. Supports a Variety of Plant Species
    - ✓ With greater biodiversity, the variety of plants increases. This leads to more opportunities, especially for farmers, since they can plant a greater variety of crops and thus use their land more effectively.
3. Ecosystem Balance
    - ✓ Recycling and storage of nutrients, combating pollution by breaking it down and its absorption, stabilizing climate, protecting water resources, forming, and

protecting soil, recovery from unpredictable events and maintaining overall eco-balance.

4. Freshwater Resources
   - ✓ Through a variety of microorganisms and other creatures, it can be assured that freshwater resources are sustained.
5. Biodiversity and Economy
   - ✓ Biodiversity is priceless. However, there have been attempts to put an economic value on biodiversity. At least 40 percent of the world's economy and 80 percent of the needs of the poor are derived from biological resources.
6. Biodiversity and Industry
   - ✓ Biological sources provide many industrial materials, including rubber, cotton, leather, food, paper, timber, water, fiber, oil, and dyes.
7. Food Resources
   - ✓ Biodiversity provides for a variety of foods for the planet. Because of the availability of different species, humans can obtain a range of materials and foods to support their well-being and health.
8. Climatic Stability
   - ✓ Biodiversity protects the planet from global warming. For example, rainforests store huge amounts of greenhouse gas CO2. In addition, forests and wetland ecosystems provide crucial buffers to extreme storms and flooding related to climate change.
9. Sustain Recreation Areas
   - ✓ Whether it is animals or humans, every species needs a place to rest. It is therefore crucial that we contain the natural variety of our planet to provide recreational areas where people can rest and escape from the stresses of life.
10. Source of Drugs
    - ✓ Nature, especially our plants, provide an immense variety of ingredients which are used for pharmaceutical processes.

How can HCPs Stem the Loss of Biodiversity?

I hope my testimony will prove to be a catalyst into further exploration of the benefits of and lessons learned from large-scale, multi-agency Habitat Conservation Plans (HCPs), which are effective solutions to biodiversity loss, while assisting economic development. In thinking about the future of habitat conservation planning, it is important to appreciate HCPs legacy. Through the Endangered Species Act's (ESA) HCP program, endangered species conservation has evolved considerably, and several lessons can be gleaned from this development – most notably, that with foresight, planning and investment, economic developing and biodiversity are not mutually exclusive.

Area-wide, multi-agency HCPs have particularly altered the landscape of habitat conservation. These plans introduced the possibility of a more comprehensive, adaptive, and collaborative approach to mitigation and conservation. In assessing these pioneering arrangements, it is important to consider not only the efficiency of their formation and implementation processes, but also their effectiveness in advancing valuable conservation goals.

Landscape scale HCPs are attempting to implement sustainable development principles of facilitating economic development while at the same time protecting wildlife habitat, biodiversity, and local food systems, and sequestering carbon. The integration of environment and development will lead to improved living standards for all, better protected and managed ecosystems, and a safer, more prosperous future.

Regional HCPs also facilitate the development of major infrastructure projects in addition to the substantial private development that is dependent on this infrastructure. Direct economic benefits of large-scale HCP include:

1. Cost savings through reduced uncertainty, time delay, and compliance costs. Regional HCPs dramatically speed up project permitting.
2. Large-scale regional HCPs accelerate the completion and operation of regional infrastructure projects and other development projects.
3. Cost savings for the USFWS – public sector efficiencies – due to a significant reduction in time required to review and negotiate "take" permits by delegating ESA permitting authority through an approved HCP to local government.

Numerous bridge and road infrastructure projects, including the widening of US-101 in Santa Clara County, benefited from the streamlined permitting provided by the Santa Clara Valley Habitat Plan. And in turn, the mitigation that resulted from these projects resulted in the protection of and the in-perpetuity management of thousands of acres of core habitat of listed threatened and endangered species.

Another example of how effective HCPs are is the Western Riverside County Multi-species HCP, which expedited a new Metrolink rail line, two new freeways, and six major freeway widening projects and resulted in conserving 33 federal and state listed species and 500,000 acres of wildlife habitat.

My final example highlighting HCPs is the Columbia Pipeline Group HCP, which covers 15,000 miles of pipeline across 14 states, and 3 Fish and Wildlife Service Regions. It addresses 90 endangered species and conservation within a 9.5 million acres area. The HCP proponents worked closely with federal and state agencies as well as numerous NGOs. The Columbia Pipeline Group HCP resulted in expedited self-implemented permitting, reduced ESA and NEPA risk, and

landscape level conservation that coordinates mitigation with the goal of protecting areas with the highest conservation biodiversity values.

Overview of Regional HCP Benefits

Landscape scale regional HCP careful management of wildlife habitat and permit certainty is the backbone of their success. The benefits to species and their habitat, all levels of government, and the community are listed below.

Species & Habitat

- Directly supports the covered species.
- Improves protection for species and their habitats at a landscape scale.
- Improves habitat quality.
- Increases species population size.
- Increases extent of habitat.
- Provides an "umbrella of protection" for many other local species.
- Increases connectivity for species between occupied areas.
- Creates a program to identify and reduce future threats and impacts to species.

Federal, State and Local Governments

- Provides for coordinated monitoring, management, and restoration planning.
- Provides a substantial commitment of resources at the onset of the program which allows for the initiation of conservation actions.
- Increases knowledge of threatened and endangered species.
- Provides clear guidelines on how and where to protect habitat and where to focus development.
- Provides framework to take advantage of future opportunities and partnerships.
- Helps promote resource conservation and education.
- Allows for the streamlined permitting of new development and infrastructure.

- Resolves many contentious land use planning disputes because all parties to the agreement understand the development and conservation game plan.

The Community

- Increases local knowledge of threatened and endangered species and related ecological resources.
- Creates opportunities for cooperative regional efforts to conserve national resources.
- Public access to some of the lands HCPs protect.
- Working lands conservation – keeping farmers and ranchers on the land.
- Enhancing ecosystem services functions including flood retention, carbon sequestration, and buffers against oceanic storm events.
- Voluntary land conservation – fee title or conservation easements purchased from willing sellers.

How Regional Landscape Scale HCPs are Protecting Biodiversity Hotspots

Protected areas are the backbone of global biodiversity conservation. Land conservation at the ecosystem scale is a key driver for achieving that objective and regional HCPs are one of the best mechanisms available capable of implementing that objective. Why do I believe large scale multi-species HCPs are well positioned to implement a policy goal focused on biodiversity conservation?

1. It is our core mission.
2. Financial sustainability.
3. Endowment financing focused on in-perpetuity funding for land management and monitoring.
4. Collaborative partnership between all levels of government, NGOs, and private landowners.
5. Adaptative management drives HCP land management and conservation decision making.
6. Science driven land conservation decision-making process focused on protecting biodiversity hotspots.

In the past, conservation primarily focused on preserving existing biodiversity patterns and acted reactively with respect to new threats. With the effects of climate change, regional HCPs and

other similar conservation efforts are leading a paradigm shift in habitat reserve design and function. A relatively straightforward and intuitive approach is to focus on identifying and protecting biodiversity in those areas least likely to undergo rapid climate-induced changes. Regional efforts are best suited for tackling climate change impacts since they are ecosystem focused, building resiliency and redundancy into the landscape, establishing wildlife linkages, and protecting climate refugia.

For example, the Santa Clara Valley Habitat Plan (SCVHP) identified biodiversity hotspots based on the best available science, critical species occurrence data, remote sensing analysis, and growth truthing when and where feasibility. This decision matrix as well as understanding critical wildlife linkages drives our land acquisition decision-making. Because of this process, my agency has purchased several properties dominated by California native endemic plants, some found only in Santa Clara County, and home to the Bay checkerspot butterfly and other species only found in California.

The United States has many biodiversity hotspots including parts of California, the Appalachian Mountains, the North American Coastal Plain, and Madrean Pine-Oak Woodlands. One of those hotspots in California is in Riverside County. One my asks today is for Senate support establishing the Western Riverside County National Wildlife Refuge (WCRCNWR) in a biodiversity hotspot found in Southern California which would protect habitat and vulnerable species, increase access to public lands for underserved communities, and provide expedited permitting for infrastructure and development. Moreover, the proposal would directly protect 146 species—33 of which are listed as threatened or endangered under the Endangered Species Act or state law. WCRCNWR would ensure finalization of the country's largest and most extensive HCP and is directly linked to biodiversity.

Threats to Biodiversity

The threats to biodiversity are many, but today I will be focusing on invasive species, climate change, and loss of habitat, and how landscape scale HCPs can help tackle these threats.

Invasive Species

Invasive species are among the leading threats to native wildlife. Approximately 42 percent of threatened or endangered species are at risk due to invasive species. Human health and economies are also at risk from invasive species. The impacts of invasive species on our natural ecosystems and economy cost billions of dollars each year. Many of our commercial, agricultural, and recreational activities depend on healthy native ecosystems.

America has a very large and increasing number of non-native species, which are spreading rapidly due to the consistent decline of native species for many of the reasons discussed above related to climate change. Non-native species are excellent opportunists, often better suited to take advantage of a newly disturbed site from an extreme event like fire or flood, and once they have developed a strong position, it is very hard for native species to effectively compete for necessary resources such as water, light, and food. Non-native species can often change the habitat in a way that it becomes ill suited for natives and therefore change the ecosystem dynamics in a way that is nearly irretrievable and can also affect the most fundamental levels of ecosystem health, such as complex food webs. Controls that worked in the native habitats do not work in their new locations, the reasons ranging from lack of predators to our native species being susceptible to the new disease.

Examples of invasive species' impacts include non-natives killing animals and plants along with disrupting ecological functions. Much of south Florida is infested by Burmese pythons. They eat virtually any animal they encounter in the Everglades, with huge impacts on the native mammal and bird populations. Unnatural wildfires result from invasive species in some locations. Non-native grasses in desert areas that were historically fire resistant are a major example. Historically, vegetation was very sparse, so that fires from lightning or other causes would not spread to catastrophically large size. A carpet of non-native grasses can result in devastating wildfires in locales such as saguaro cactus lands of Arizona, Joshua tree woodlands in the Mohave desert and the common desert creosote bush scrub. At one creosote bush scrub fire location, there was no reappearance of the scrub after 40 years. In some eastern United States areas, up to 80% of the hemlock trees have been killed by an invasive insect making these forests particularly vulnerable to non-native tree species creating type conversion to a different ecosystem in the long-term.

Freshwater aquatic ecosystems are among the most imperiled ecological communities worldwide. Invasive alien species are a major threat to freshwater ecosystems, and American bullfrogs (Lithobates (Rana) catesbeianus) are among the world's 100 most prominent aquatic invasive species. Moreover, there is a strong historical link between the introduction of the American bullfrog into the western United States and the emergence of the deadly chytrid fungus, a pathogen that has caused declines and extinctions of amphibians around the world. The bullfrogs, native to the eastern United States, likely coevolved with the deadly fungal pathogen, Batrachochytrium dendrobatidis (Bd), and brought it with them when the bullfrogs were introduced as a food source in the West and later traded throughout the world. As invasive species and disease vectors, bullfrogs continue to threaten amphibian populations that may have no defenses against Bd, including endangered species like the California red-legged frog, the mountain yellow-legged frog and the California tiger salamander.

By mitigating for environmental impacts at the landscape/ecosystem scale, it is harder for invasive species to take hold. Furthermore, HCPs have the long-term focus on eradicating non-native species threatening natural landscapes because this is a critical component of our land

management enhancement strategy. Invasives are a threat to the long-term viability of our special status species: a threat we cannot ignore. The SCVHP has taken on the invasive species challenge by removing feral pigs from our Reserve System, bullfrogs from wetlands and ponds, and invasive plants like barb goatgrass (Aegilops triuncialis) from our serpentine bunchgrass plant community.

Climate change drivers of biodiversity and species decline

One of the principal challenges to our mission as HCP practitioners is climate change and its impact on ecosystem health. It is a major threat to biodiversity, to species extinction, and a big challenge to conservation. Globally, an estimated 8 million species of animals and plants are threatened with extinction by climate change. Climate change is currently affecting 19% of species listed as threatened on the International Union for the Conservation of Nature's Red List of Threatened Species, increasing the likelihood of their extinction.

Climate change affects species range, biology, abundances, and community composition; communities that have adapted over time based upon key relationships and interdependencies amongst various species. This is where consequences of biodiversity loss become a national risk and the importance of planning for ecosystem resilience becomes imperative.

In the past, conservation primarily focused on preserving existing biodiversity patterns and acted reactively with respect to new threats. With the effects of climate change, HCPs are leading a paradigm shift in habitat reserve design and function. A relatively straightforward and intuitive approach is to focus on identifying and protecting biodiversity in those areas least likely to undergo rapid climate-induced changes. Large scale HCPs are best well suited for tackling climate change since they are ecosystem focused on building resiliency and replication into the landscape, establishing wildlife linkages, and protecting climate refugia.

Historically, species have been able to adapt to changing climates because these changes to their habitat took place slowly. The current rapid climate change is too fast for many species to adapt to new and changing conditions. Additionally, the many stressors related to climate, such as increased temperature, extended drought, increased fire intensity, extreme cold, extreme flooding, and sea level rise, potentially compound with other threats such as habitat loss and degradation, increased pollution, and human impacts at the urban/wildland interface. Together these threats and stressors decrease the functional resilience of species, populations, and ecosystems as a whole.

If our natural communities are not resilient and do not remain ecologically functional, serious impacts could be seen within the communities and our nation. For example, the black mangroves of south Louisiana are an important component of a very complex saltmarsh ecosystem. The complexity of the habitat provided by this system provides important fisheries nursery habitat supporting the world-renowned seafood, sportfishing, and tourism industries of the Gulf Coast.

What is less known, however, is that this ecosystem also offers protection from impacts of hurricanes and storm surge. These mangrove communities slow storm surge and protect the coast from land loss. In fact, mangroves build land over time through their robust below-ground root systems, sequestering carbon in the process. Local extinction of black mangrove from coastal Louisiana and other Gulf states would have serious consequences, to not only aquatic food webs supporting thousands of species, but also Gulf coast economies, infrastructure resilience to hurricanes and ultimately global carbon dioxide levels. Unfortunately, black mangrove communities along the northern Gulf Coast are at risk due to sea level rise and extreme cold events that may increase due to climate change.

Climate change results in a variety of drivers that affect biodiversity, species populations, and ecological communities across our nation. They include increasing temperatures, changes in precipitation patterns, increasing severity and frequency of extreme events, sea level rise, changing ocean currents, and salinity fluctuations. There are also interactions with other factors, such as invasive species and habitat fragmentation. Often the impacts are complex and variable from species to species and biological community to biological community.

Changes in the geographic ranges of individual species

Geographic range is the overall area where a species lives. For example, almost all occurrences of the greater sage grouse are in Nevada, Oregon, Idaho Wyoming, and Montana. The eastern flying squirrel in the U.S. ranges from Florida to Texas in the south, northwards to the Canadian border from North Dakota to Maine. Many species have much more limited geographic ranges. And, like the greater sage grouse, they may depend on a particular type of habitat. The desert tortoise is limited to certain desert areas in California, Nevada, Arizona, and Utah. The Texas toad's range is almost entirely central and west Texas. The northern pin oak is limited to a small area south and west of the Great Lakes. A very large number of native plant species are only found in California. Often, they are in very small areas, with particular needs for soil type, moisture and other factors. Species with small ranges and/or requiring niche ecological conditions are often more vulnerable to the various effects of climate change. For example, researchers have predicted that future temperature changes could threaten up to 66% of California's unique plants, including current range losses of 80% or more.

There are many examples of species ranges shifting northwards and /or to higher elevations in response to rising average temperatures and /or climate change induced changes in rain and snowfall patterns. As of 2015, 55% of the species in temperate North America had either disappeared from the southern edges of their ranges or expanded to new areas in the north. The Edith's checkerspot butterfly has disappeared from many locations in the southern portion of its range [California, Nevada, Utah]. As of 2006, the average [mean] location had moved 32 miles northwards. Alpine species such as the pika are moving uphill but will run out of habitat because they cannot go higher than the tops of mountains. This is a dramatic example of how a shift in a species range can disconnect that species from the ecosystem it requires.

Combined effects of increased temperature and changing precipitation patterns

Increased temperature has led to ecological changes including the migration of Chinook salmon (Oncorhynchus tshawytscha) to rivers from the Artic to California, while behavioral changes in species include earlier breeding times for numerous North American songbirds. Climate change is also causing significant physiological changes. Warmer temperatures during egg incubation are causing imbalanced female to male sex ratios among endangered green sea turtles (Chelonia mydas), with females accounting for 99% of newly hatched turtles on some nesting beaches. Genetic changes attributed to climate change include hybridization – interbreeding as species' habitats change.

Climate change is also causing changes in precipitation patterns. The latter will vary from region to region as local and regional weather is driven by climate conditions. For example, the Southwest is becoming drier. Over time, we will see dramatic distribution changes in biological community composition and loss of species, including the major plant species that define a region. This is occurring already. For example, between 1997 and 2006, the average elevation of the dominant plant species in the California's Santa Rosa Mountains rose by 213 feet because of changes in regional climate. The Mohave Desert's Joshua trees may become extinct due to shifting precipitation patterns and California blue oak woodlands will shift uphill over time and may eventually disappear altogether from much of Central California. Temperature and precipitation also have significant effects on overall forest health. A stressed forest ecosystem is more susceptible to disease, invasive pests, and catastrophic wildfire.

Natural processes are also being disrupted by climate change. Southern California scrub habitats regenerate after fire. But if the next severe fire occurs too soon, the natural regeneration will not occur. The result is replacement of the native vegetation with non-native grasses. Intense fires over a large area of the landscape in turn affects many ecosystem services that are important to the surrounding communities such as water supply, soil health, water quality, public recreation, carbon sequestration, air quality, etc. Forests devastated from fire are often unable to fully re-establish and instead become infested with non-native and invasive species.

Intense wildfires, major floods, extended droughts, extreme cold spells, etc. are all becoming more severe and more frequent because of rising temperature within the atmosphere and oceans. Historically, these events have occurred at frequencies and extents which nature could handle, with native vegetation regenerating after the fire or flood. However, the rapidly changing climate is pushing species and populations outside their zone of resilience, to a place where they do not have the biological fitness nor tools for adaptation available to survive. For these reasons, climate change is one of the biggest challenges to global biodiversity that we face.

Habitat fragmentation affects the ability of nature to handle climate change

It has long been understood that when animals are left without large areas of intact habitat, they are at greater risk of extinction: fragmentation leaves animals confined to ever-smaller areas, restricting movement and gene flow, and leaving species vulnerable to threats ranging from poachers to climate change. A 2017 study published in the Proceedings of the National Academy of Sciences set out to quantify this risk for more than 4,000 land-dwelling mammal species across the globe — and found that species with more fragmented habitats were at greater risk of extinction. A prime example of this challenge is for the San Juaquin kit fox a once abundant species where there are now fewer than 7,000 scattered among fragmented populations.

Habitat loss and fragmentation have long been considered a primary cause for biodiversity loss and ecosystem degradation and is a key challenge for landscape scale HCP implementation. Although some habitats are naturally patchy, human actions have profoundly fragmented landscapes across the North America, altering the quality and connectivity of habitats. Therefore, understanding the causes and consequences of habitat fragmentation is critical to preserving biodiversity and ecosystem functioning. Connectivity among elevational and other gradients, between vegetation communities, and along north-south pathways is a mainstay for successful climate adaption for plants and animals alike. The challenge is particularly severe in already depleted and fragmented landscapes, where future development or agriculture may foreclose connectivity options. Connectivity does not respect jurisdictional boundaries, and will take state, federal, local, and private partnerships with coordinated land protection strategies and acquisitions. Connectivity is one of the primary tools that species have to be resilient in the face of climate change.

In these challenges lies opportunity though. Landscape scale HCPs recognize threats to biodiversity in fragmented landscapes and are positioned to help mitigate these threats by re-establishing critical wildlife linkages and conserving large habitat patch areas linked to one another through protected wildlife corridors. HCPs have the capacity, in-perpetuity funding, and a focus on adaptive management to mitigate the effects of habitat fragmentation.

Roads unfortunately pose a significant threat to wildlife across North America. Roads serve as a direct barrier to movement, impeding the ability of wildlife to move safely to find food, water, and mates. Hundreds of millions of animals die because of wildlife-vehicle collisions on North American roads every year. As barriers to movement, roads can cause genetic isolation within populations, thereby contributing to biodiversity decline. Wildlife-related car accidents are also a danger to people, resulting in thousands of human fatalities every year.

Large-scale HCPs with our local, state, and federal partners, are identifying roads of critical concern for wildlife, conducting field research to better understand the issues at hand, and develop location-specific measures to address them. But we cannot do it alone. We also need the help of lawmakers at the state and federal level to craft policies designed to incentivize

greater investment in road crossings and other wildlife-friendly improvements, as well as to integrate these considerations into planning for new projects from the outset.

My agency, the Santa Clara Valley Habitat Agency, and others are working with Caltrans and California Highspeed Rail Authority (HSR) to build wildlife crossings into their respective project designs. Specifically, HSR will have a significant impact on wildlife movement across Santa Clara County. We are working with HSR to appropriately mitigate their project with one potential outcome being the construction of a land bridge across State Highway 152 in the Pacheco Pass area as well as construct of new or enhancement of existing undercrossings throughout the rail alignment benefiting endangered amphibians, Kit fox, mountain lion, elk, and American badger.

Another great example is the Interstate 90 wildlife crossings project through the Central Cascades. Since 2000, The Cascades Conservation Partnership and the I-90 Wildlife Bridges Coalition, led efforts to reconnect Washington's north and south Cascades by protecting and restoring habitat and establishing safe wildlife crossings under and over I-90. Two fully vegetated, 150-foot-wide overpasses are planned. Construction on the Keechelus Wildlife Overcrossing was completed in 2018, becoming Washington's first-ever wildlife bridge over a highway or freeway, and the largest wildlife overcrossing in North America. Construction has also been completed for numerous undercrossings benefiting elk, deer, salmonids, and wolverine.

My final example is Montana's U.S. Highway 93. A 56-mile stretch of U.S. Highway 93 has been redesigned to allow animal crossings over and under the existing road, facilitating the safety of both wildlife and motorists. The highway redesign came about as a means of preventing dangerous and sometimes lethal collisions between motorists and wildlife. The 56 miles of the redesigned Highway 93 now boasts 41 underpasses and overpasses. Species benefiting from these improvements include grizzly bear, elk, deer, mountain lion, moose, wolve, turtles, and amphibians.

Closing Remarks

Regional large-scale HCPs are federalism in action: local government is delegated federal and state permit implementation authority integrating federal and state permits into the local land use development review process. They are a negotiated agreement between local government, in some instances a state, and the federal government instituting permit conditions and conservation actions established for the stated purpose of project specific mitigation and covered species recovery. Regional HCPs foster a partnership between local government and the federal government, a shared vision so to speak, for conservation and economic development. Moreover, landscape scale regional HCPs have a strong track record in aiding infrastructure and other economic development, assisting federal, state, and local governments, and gaining support from the private sector and NGOs.

I hope my testimony presents a wide range of illustrative actions for sustainability and pathways for achieving them across and between sectors such as agriculture, forestry, marine systems, freshwater systems, urban areas, energy, finance, and many others. I believe it highlights the importance of, among others, adopting integrated management and cross-sectoral approaches like regional landscape scale HCPs that consider the trade-offs of food and energy production, infrastructure, freshwater and coastal management, and biodiversity conservation. Will striking these balances require substantial financial investment? Yes, but not nearly as much as losing the $125 trillion worth of ecosystem services that experts estimate nature provides to us every year.

Senate Committee on Environment and Public Works
Hearing Entitled, "Examining Biodiversity Loss: Drivers, Impacts, and Potential Solutions."
May 19, 2021
Questions for the Record for Edmund Sullivan

Senator Carper:

1. President Biden has established a national goal of conserving 30 percent of America's lands and waters by 2030. In its "America the Beautiful" plan, the Biden administration stated its commitment to eight core principles that will guide the federal government's approach to conservation, which include a commitment to collaboration, support for voluntary and locally-led conservation, honoring of private property rights, an emphasis on choosing conservation approaches that create jobs and support healthy communities, and building on existing tools and strategies. In your testimony, you spoke to the ways that Habitat Conservation Plans (HCPs), such as the one you manage in the Santa Clara Valley, conserve biodiversity while also enabling compatible economic development. You also spoke about a legislative proposal to create the Western Riverside County National Wildlife Refuge.

    a. Would you elaborate on how the Western Riverside County National Wildlife Refuge proposal, and HCPs generally, could support the Biden administration's aforementioned conservation goals and also support economic development?

Answer: Regional large-scale HCPs are federalism in action: local government is delegated federal and state permit implementation authority integrating federal and state permits into the local land use development review process. The only way regional landscape-scale HCPs can succeed is through a commitment to collaboration and working with stakeholders with diverse viewpoints. They are a negotiated agreement between local government, in some instances a state, and the federal government instituting permit conditions and conservation actions established for the stated purpose of project specific mitigation and covered species recovery. Regional HCPs foster a partnership between local government and the federal government, a shared vision so to speak, for conservation and economic development. Moreover, landscape scale regional HCPs have a strong track record in aiding infrastructure and other economic development, assisting federal, state, and local governments, and gaining support from the private sector and NGOs. Moreover, large-scale HCPs create jobs both directly through land management actions, scientific monitoring, and habitat restoration work, and indirectly by saving infrastructure and other development projects time and money through a "cut the green tape" approach to environmental permitting.

Landscape scale regional HCP careful management of wildlife habitat and permit certainty is the backbone of their success. The benefits to species and their habitat, all levels of government, and the community are listed below.

Species & Habitat

- Directly supports the covered species.
- Improves protection for species and their habitats at a landscape scale.
- Improves habitat quality.
- Increases species population size.
- Increases extent of habitat.
- Provides an "umbrella of protection" for many other local species.
- Increases connectivity for species between occupied areas.
- Creates a program to identify and reduce future threats and impacts to species.

Federal, State and Local Governments

- Provides for coordinated monitoring, management, and restoration planning.
- Provides a substantial commitment of resources at the onset of the program which allows for the initiation of conservation actions.
- Increases knowledge of threatened and endangered species.
- Provides clear guidelines on how and where to protect habitat and where to focus development.
- Provides framework to take advantage of future opportunities and partnerships.
- Helps promote resource conservation and education.
- Allows for the streamlined permitting of new development and infrastructure.
- Resolves many contentious land use planning disputes because all parties to the agreement understand the development and conservation game plan.

The Community

- Increases local knowledge of threatened and endangered species and related ecological resources.
- Creates opportunities for cooperative regional efforts to conserve national resources.
- Public access to some of the lands HCPs protect.
- Working lands conservation – keeping farmers and ranchers on the land.
- Enhancing ecosystem services functions including flood retention, carbon sequestration, and buffers against oceanic storm events.
- Voluntary land conservation – fee title or conservation easements purchased from willing sellers.

Protected areas, like the proposed Western Riverside County National Wildlife Refuge, are the backbone of global biodiversity conservation. Land conservation at the ecosystem scale is a key driver for achieving that objective and regional HCPs are one of the best mechanisms available capable of implementing that objective. Why do I believe large scale multi-species HCPs are well positioned to implement a policy goal focused on biodiversity conservation?

1. It is our core mission.
2. Financial sustainability.
3. Endowment financing focused on in-perpetuity funding for land management and monitoring.
4. Collaborative partnership between all levels of government, NGOs, and private landowners.
5. Voluntary and locally led conservation.
6. Adaptative management drives HCP land management and conservation decision making.
7. Science driven land conservation decision-making process focused on protecting biodiversity hotspots.

In the past, conservation primarily focused on preserving existing biodiversity patterns and acted reactively with respect to new threats. With the effects of climate change, regional HCPs and other similar conservation efforts are leading a paradigm shift in habitat reserve design and function. A relatively straightforward and intuitive approach is to focus on identifying and protecting biodiversity in those areas least likely to undergo rapid climate-induced changes. Regional efforts are best suited for tackling climate change impacts since they are ecosystem focused, building resiliency and redundancy into the landscape, establishing wildlife linkages, and protecting climate refugia.

These landscape scale local planning efforts are attempting to implement sustainable development principles by permitting economic development at the same time protecting wildlife habitat and biodiversity, as well as sequestering carbon are aligned with the Administration's policy goals of 30 by 30 and stemming biodiversity loss.

2. As Dr. Gerber said in her testimony, "we need an inclusive process that brings people together to solve our nation's biodiversity challenges." Would you please provide an example from your own career where bringing together a broad group of diverse stakeholders and community members to solve a conservation challenge resulted in a stronger, more enduring solution?

Answer: Early in my career as a senior environmental planner for Niagara County (upstate NY) participating in the Greater Buffalo-Niagara Regional Transportation Council, the local Metropolitan Planning Organization, transportation planning process I learned which voices in the room really matter. I advocated for projects that benefited the environment, removal of

highways that plowed through cities with little concern for local effects generally impacting minority communities, mass transit, and benefited disadvantaged communities. Fortunately, I was in the room to raise these issues, unfortunately, representatives from those disadvantage communities and tribal governments were not in the room adding their voices and prospective to the discuss. You lose creditability and you lose out on gaining local knowledge when the door is shut to diverse voices.

As Niagara County's Brownfields Program Coordinator for this USEPA funded effort, we made sure that the County's Brownfields Working Group was representative of the community including tribal representatives, environmental advocates, business leaders, landowners, and citizen representatives from both rural and urban communities. The results speak for themselves; Niagara County was designated a Brownfields Showcase Community by the USEPA. Our program would have failed if we had not pulled together as a diverse community focusing together on cleaning up brownfield sites which now have been redeveloped as community parks and new job creating businesses. Through the many diverse voices in the room, we learned where the toxic hotspots were and what was the communities' priorities lending creditability to our effort because the community was empowered by a collaborate program that listened to their stories.

Community Centered Conservation

At many times in my career, I have witnessed and participated in community centered conservation efforts. Whether it was working on habitat conservation plans in California and Wisconsin or participating in the Truckee River Watershed Council or the Dry Creek Watershed Group efforts in California or observing the Black Earth Creek Watershed Group working with farmers and anglers to protect trout habitat in this Class A trout stream in Wisconsin, or the Niagara County Brownfields Program noted above, success would have been fleeting if not for broad, diverse community support. In each instance the local community took ownership of the conservation goal because they felt empowered and were included in the process not forced to stare at a closed door on the outside looking in.

Strategies to protect biodiversity must be place-based and sensitive to context. A failure to consider the socioeconomic and political circumstances, as well as community wellbeing of those most directly reliant upon biodiversity will further undermine progress. How communities experience the benefits or costs of conservation action is influenced in large measure by the principles that guide conservation governance, and the subsequent institutional structures and processes that frame conservation actions. Conservation practitioners must reflect on core principles of community-centered conservation governance needed to yield desirable and long-term conservation outcomes—both ecological and social (i.e., equitable and just). In doing so, a conception of community-centered conservation that is relevant to guide implementation of a biodiversity protection framework can succeed.

Core principles of community-centered conservation governance include:

1. building multilevel networks and collaborative relationships needed to jointly produce conservation solutions;
2. promoting equity;
3. reframing conservation action through the lens of reconciliation and redress;
4. ensuring a rights-based approach to conservation action in which community agency, access and decision making autonomy are supported; and
5. revitalizing the customary and local institutions that provide legitimate and adaptive strategies for the stewardship of biodiversity.

Senator CARPER. Mr. Sullivan, thank you very, very much.

Senator Capito, I recognize you to introduce Andy Treharne.

My staff and I were wracking our brains, going back in time to early year, going back to the original Ed Sullivan Show when the Beatles were on. We were trying to think of a Beatles song that would actually be pertinent to the subject of today's hearing. The best we could come up with was I Am the Walrus, which is not too bad, not too bad.

Senator Capito, I re-recognize you again to introduce our next witness, Andy Treharne.

I hope I have that right, Andy.

Senator Capito.

Senator CAPITO. Thank you, Senator Carper.

I would like to take the opportunity to introduce our witness, Mr. Andy Treharne, and I am glad you could join us today. He drove up from Richmond, he said.

He joined the Congressional Sportsmen's Foundation in 2011 as the organization's lead on sportsmen's policy issues throughout the western United States, and currently serves as CSF's Senior Director of External Affairs. Prior to his role, he served as policy director for the House Republicans in the Colorado General Assembly, where he helped steer a 33 member caucus through agenda development, policy and budget analysis, and regulatory monitoring.

He's also an alumnus of Capitol Hill, having served as a legislative aide for former Senator Wayne Allard.

So a warm welcome back to the Hill, Mr. Treharne.

As someone who has dedicated his life to hunting, wildlife, and conservation issues, Mr. Treharne understands the essential role the sportsmen have in preserving our natural environment. His wealth of experience on these issues will be of good benefit to the hearing today.

We are happy to have you here, and look forward to your testimony.

Mr. Treharne.

STATEMENT OF ANDY TREHARNE, SENIOR DIRECTOR, EXTERNAL AFFAIRS, CONGRESSIONAL SPORTSMEN'S FOUNDATION

Mr. TREHARNE. Chairman Carper, Ranking Member Capito, and members of the Committee, thank you for the opportunity to testify on one of the most pressing conservation challenges facing our Nation: Biodiversity loss.

My name is Andy Treharne, and as Senator Capito said, I serve as the Senior Director of External Affairs for CSF, the Congressional Sportsmen's Foundation. Established in 1989, CSF works with the Congressional Sportsmen's Caucus, the largest, most active bipartisan caucus on Capitol Hill.

Before discussing modern day challenges and solutions for addressing biodiversity, it is important to take a moment to put things into historical perspective.

Over 80 years ago, the hunting community led the charge to establish excise taxes on firearms and ammunition directed specifically to conservation purposes.

With the subsequent enactment of similar excise taxes generated by anglers, boaters, and archery enthusiasts, revenue from sports-

men's licenses is permanently linked to conservation, laying the foundation for what is now the unique American system of conservation funding. A user pays public benefits program that is the financial backbone of conservation in our country.

Totaling nearly $1.1 billion for fiscal year 2021, plus millions of dollars annually in license and permit fees, these ongoing investments benefit the American public in a variety of ways, ranging from recreational access to increased wildlife populations to wetland conservation that filters our water and improves our soil quality.

Despite the unparalleled success of the user pays public benefit system, America continues to experience challenges for biodiversity conservation. It is critical that we take steps to invest in 21st century funding mechanisms to meet the challenges before us today. In doing so, we must also maintain the integrity of existing funding mechanisms, often generated by sportsmen and women that contribute to biodiversity conservation.

While much of the focus recently has been on declining biodiversity, our community continues to contribute positive results for fish and wildlife. For example, North American waterfowl populations have increased by 56 percent since 1970, a nod to highly successful conservation programs such as the North Americans Wetlands Conservation Act, NAWCA, and Federal and State duck stamps. We thank the Committee for their work to reauthorize NAWCA through the America's Conservation Enhancement, or ACE Act, last year.

Yet we still face significant challenges. Forest birds and grassland birds lack a funding source, such as NAWCA or duck stamps. Consequently, these bird populations have declined roughly 30 percent during the same time waterfowl populations increased significantly. However, declines in biodiversity are not limited to bird populations.

In 2000, Congress recognized this challenge and created a new sub-account within the Pittman-Robertson Act known as the Wildlife Conservation and Restoration Program, which requires States to develop federally approved State wildlife action plan, or SWAPs. However, Congress currently provides approximately only 5 percent of the funding needed to implement these plans that are essentially road maps for biodiversity. Congress has the ability to address this disparity by pursuing solutions, such as the Recovering America's Wildlife Act that provides States with the resources necessary to implement these plans that States have been crafting at Congress's request.

We also have opportunities to support biodiversity by investing in solutions that support wildlife movement. As land use changes disrupt historic landscapes and limit the movement of enough individuals within a species population, many of these species' ability to migrate to habitat conditions that are capable of meeting their resource needs becomes impaired.

We applaud the Committee for its bipartisan work last Congress and the development of the ATIA, specifically Section 1125, that would address the approximately 2 million wildlife vehicle collisions annually while enhancing habitat connectivity through existing programs.

There are similar opportunities to support aquatic resource conservation through programs like the Forest Service's Aquatic Organism Passage Program and NOAA's Habitat Restoration Grants.

Supporting programs that are built on collaborative conservation is also needed. Given that many of our most significant biodiversity and species conservation opportunities are found on privately owned lands, we believe there are opportunities to better incentivize landowners to participate in voluntary programs, such as those authorized and funded through the Farm Bill's conservation title, Joint Ventures, the Partners for Fish and Wildlife program, among others. Newer programs such as Utah's Watershed Restoration Initiative and the Southeast Deer Partnership are also generating positive results.

In summary, CSF thanks the Committee for holding a hearing on this important issue and for the opportunity to testify. Increasing efforts to address biodiversity loss is not only beneficial for fish, wildlife, and plants, but is also good for the American economy, sportsmen and women, and rural communities.

CSF encourages the continued support for existing programs that play a role in addressing these challenges, as well as support for new programs, such as the Recovering America's Wildlife Act.

Thank you.

[The prepared statement of Mr. Treharne follows:]

Testimony of

Andy Treharne
Senior Director of External Affairs
Congressional Sportsmen's Foundation

Before the

Committee on Environment and Public Works
United States Senate

Regarding

Biodiversity Loss

May 19, 2021

Chairman Carper, Ranking Member Capito, and members of the Committee, I thank you for the opportunity to testify on one of the most pressing conservation challenges facing our nation, biodiversity loss. My name is Andy Treharne, and I serve as the Senior Director of External Affairs for the Congressional Sportsmen's Foundation (CSF). Established in 1989, CSF works with the Congressional Sportsmen's Caucus (CSC), the largest, most active bipartisan caucus on Capitol Hill. The current Senate CSC Co-Chairs are Senators Martin Heinrich (NM) and Deb Fischer (NE) and Vice-Chairs are Senators Joe Manchin (WV) and Boozman (AR).

Before discussing modern day challenges and solutions for addressing biodiversity, it is important to take a moment to put things into historical perspective. The idea of conservation in America began with members of the hunting and fishing community who introduced game laws and developed programs to protect fish and wildlife resources - leading to the creation of state and federal fish and wildlife agencies. Over 80 years ago, the hunting community led the charge for the passage of the Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act), which redirected excise taxes on firearms and ammunition to a dedicated fund to be used specifically for conservation purposes. Further, revenue from sportsmen's licenses was also permanently linked to conservation, laying the foundation for what is now the unique American System of Conservation Funding, a "user pays - public benefits" program that is the financial backbone of the most successful conservation model in the world.

Through time, this System has expanded and now includes the fishing and boating communities - with the passage of the Federal Aid in Sportfish Restoration Act (also known as the Dingell-Johnson Act, and the subsequent Wallop-Breaux Amendment) as well as the archery community. The funds collected through these programs, totaling over $1.09 billion for FY 2021, plus millions of dollars annually in license and permit fees, are the lifeblood of state fish and wildlife agencies – the primary managers of our nation's fish and wildlife resources. These critical conservation dollars fund a variety of efforts, including: enhancing fish and wildlife habitat and populations, recreational access to public and private lands, shooting ranges and boating access facilities, wetlands protection and its associated water filtration and flood retention functions, and improved soil and water conservation - all which benefit the American public. Put simply, sportsmen and women are the only outdoor recreation constituency that contributes meaningful financial investments when it comes to conserving fish, wildlife, and their associated habitats.

Conservation Funding:

Despite the unparalleled success of the "user pays – public benefits" system, America continues to experience challenges for biodiversity conservation. It is critical that we take steps to invest in 21st century funding mechanisms to meet the challenges before us today. Doing so will not only benefit the natural resources on which we all rely but will further cement the United States' position as a model for the rest of the world when it comes to conservation.

While much of the focus recently has been on declining biodiversity, the 2019 State of the Birds report noted that North American migratory waterfowl populations have increased by 56% since 1970, a clear sign of the highly successful conservation programs in place such as the North American Wetlands Conservation Act (NAWCA) and Federal and State Duck Stamps. As the Committee is aware, NAWCA helps support the conservation efforts of the North American Waterfowl Management Plan by providing financial resources to carry out wetland conservation projects in the United States, Canada, and Mexico. NAWCA has completed more than 2,833 on-the-ground conservation projects while conserving more than 29.8 million acres in all 50 states, Canada, and Mexico. NAWCA requires that for every federal dollar contributed to the program, a non-federal source must equally match the federal contribution.

However, the program is often matched at a rate of $3 of non-federal money for every $1 of federal money, a sign that conservation groups, including sportsmen and women, are willing to have skin in the game, which makes this program one of the most cost-effective conservation programs our nation's fish and wildlife managers have in their toolboxes. The Congressional Sportsmen's Foundation applauds the Committee for their work last Congress to ensure NAWCA was reauthorized through FY25 as part of the America's Conservation Enhancement (ACE) Act.

Yet forest birds and grassland birds lack a funding source such as NAWCA or duck stamps. Consequently, the State of the Birds report also notes that we have experienced roughly a 30% population decline in the same time frame as waterfowl populations have increased significantly. However, declines in biodiversity are not limited to bird populations.

In 2000, Congress created a new subaccount within the Pittman-Robertson Act known as the "Wildlife Conservation and Restoration Program (WCRP)." The WCRP is an unfunded subaccount that was created to support targeted and strategic state-based conservation programs. The creation of the WCRP required states to develop a federally approved "comprehensive wildlife conservation strategy", which subsequently became known as State Wildlife Action Plans (SWAPs). Despite the significant financial and human resources states invest in the creation of SWAPs, Congress only provides approximately 5% of the funding that is needed to address the conservation actions identified by these plans.

Now in their second iteration, SWAPs serve as a road map to address each state's unique conservation needs. State fish and wildlife agencies have collectively identified more than 12,000 species of fish, wildlife, and plants that are in desperate need of attention and conservation funding. According to a 2018 collaborative report by the National Wildlife Federation, the American Fisheries Society, and the Wildlife Society, more than 150 U.S. species are already extinct and "another 500 are 'missing in action' and may also be extinct".

Fortunately, there is a solution to funding SWAPs known as the Recovering America's Wildlife Act, which will provide state fish and wildlife agencies the ability to fully implement their unfunded SWAPs. Providing much-needed funding to state fish and wildlife agencies through Recovering America's Wildlife Act would mark a historic step toward addressing biodiversity loss and ultimately reducing uncertainty for a variety of stakeholders before more costly legal and regulatory measures are necessary.

CSF continues to support state fish and wildlife agencies as the entity best equipped to make science-based wildlife management decisions given their professional training and intimate knowledge of each states' diverse ecosystems and encourages the Committee to support efforts to fund State Wildlife Action Plans to proactively address biodiversity loss.

Addressing Terrestrial and Aquatic Habitat Fragmentation:

While there has long been a general understanding and acceptance of the components that wildlife professionals consider when discussing wildlife habitat, considerations for the space and arrangement of these components are receiving increased attention from policy makers. These considerations are critical to ensure that management efforts, including ecosystem restoration efforts at the landscape-scale, successfully contribute to the conservation of declining species. As land use changes disrupt historic landscapes and limit the movement of enough individuals within a species population, many of these species' ability to migrate to habitat conditions capable of meeting their resource needs or providing access to mates necessary for maintaining genetic diversity becomes impaired. This is especially true for migratory species who, due to life history characteristics, are required to traverse great distances to meet their seasonal demands.

Whether related to travel barriers or ecological deserts that separate pockets of suitable habitat, one issue the Committee has long recognized is the importance of addressing habitat connectivity to conserve fish and wildlife. CSF applauds the Committee for its bipartisan work last Congress in the development of the America's Transportation Infrastructure Act (ATIA), and specifically Section 1125 to help fund wildlife crossings with the goal of reducing wildlife-vehicle collisions while simultaneously enhancing habitat connectivity.

It is widely believed that current estimates for wildlife-vehicle collisions – 300,000 annually – are severely underreported as the U.S. Department of Transportation estimates there are one to two million collisions annually between vehicles and large animals. In 2018, approximately 200 Americans died from collisions with wildlife, and it is estimated the costs associated with wildlife-vehicle collisions is $8 billion annually. Wildlife crossing present a strategic opportunity to reduce threats to human safety associated with wildlife-vehicle collisions while restoring and enhancing habitat connectivity.

CSF greatly appreciated the thoughtful, bipartisan negotiations to include Section 1125 in ATIA to ensure that wildlife habitat connectivity projects would be eligible for funding through existing transportation programs.

In addition to wildlife crossings, CSF also strongly supports collaborative and voluntary efforts to enhance the ecological integrity of wildlife corridors. Thanks to technological advances in fish and wildlife tracking and global positioning systems, researchers have been able to better document and understand the importance of migration patterns for fish and wildlife. With this growing understanding, we are increasingly aware that many iconic fish and wildlife species – including many important game species– have been and continue to be negatively impacted by a variety of factors. This includes changes in the quality and availability of habitat and – particularly for migratory species – obstructions and movement barriers further contribute to habitat fragmentation. For many of these species, the effects of climate change, which have included changes to water levels, growing and dormant seasons, intensified and altered weather patterns, and more, continue to exacerbate these issues by further reducing habitat availability for both terrestrial and aquatic species. CSF recognizes that emerging science reinforces previous findings that migratory fish and wildlife populations have specific requirements that assist in the successful transition from one area to another. Additionally, CSF recognizes that anthropogenic modifications have altered communities and, in some cases, led to unintended consequences that have limited the successful navigation of migration pathways.

CSF supports locally driven and supported migration corridor conservation efforts, such as those facilitated by efforts like Department of the Interior Secretarial Order No. 3362, which is designed to improve habitat quality in western big-game winter range and migration corridors. The agency actions that have occurred since issuance of this order are significant because they provide state fish and wildlife agencies with support for research needs as well as new and ongoing work to deliver on-the-ground habitat conservation services for species that fall under their respective jurisdictions. The resulting cooperation between state and federal agencies, non-governmental organizations (NGOs), industry and private landowners is now delivering measurable results that will having lasting impacts. With Congress's growing interest in developing solutions to wildlife corridor challenges, CSF encourages the Committee to build upon the success of SO 3362 by considering wildlife corridor conservation policies that acknowledge and respect the rights of private property owners and consider the needs and unique expertise of state wildlife agencies, two important factors fundamental to the success of SO 3362 thus far.

The issue of habitat fragmentation is not limited to wildlife, but also has tremendous impacts on fish and other aquatic organisms. Fragmentation of river habitats through dams and poorly designed culverts is one of the primary threats to aquatic species in the United States. Movement of fish in rivers and streams

is vital to their well-being. Fish move to reproduce, feed, and in search of habitat as seasons change. For example, eastern brook trout migrate from larger, more open waters in the winter months to smaller, heavily shaded streams that provide a thermal refuge in the warmer summer months.

The U.S. Fish and Wildlife Service (USFWS) states "Fish passage is the ability of fish or other aquatic species to move throughout an aquatic system among all habitats necessary to complete their life cycle.". CSF encourages increased funding for the U.S. Forest Service Aquatic Organism Passage Program, NOAA's Habitat Restoration Grants, and relevant to the Committee, the USFWS National Fish Passage Program. The ACE Act Congressionally authorized the National Fish Habitat Conservation Through Partnerships (NFHP) program, which has twenty established partnerships across the country working to conserve and restore fish habitat and connectivity. The Pacific Lamprey Conservation Initiative, Eastern Brook Trout Joint Ventures, Atlantic Coastal Fish Habitat Partnership and the Southeast Aquatic Resources Partnership are all examples of program partnerships that include fish passage connectivity and barrier removal as part of their overall mission.

Collaborative Conservation:

The previously mentioned recommendations and solutions have common elements that lead to collaboration: first, they acknowledge the contributions of sportsmen and women. Second, they encourage voluntary collaboration and partnerships. Third, they respect private landowners, and finally, they recognize the authority of state fish and wildlife agencies as the primary managers of fish and wildlife species.

CSF views efforts to conserve large-scale landscapes, such as the Administration's "America the Beautiful" report, as both a challenge and an opportunity. We believe such efforts are positive in that they are creating dialogue, and potential policy, that is mobilizing different segments of the conservation and environmental movements to think critically about priorities, the tools we have at our disposal, and how we prioritize where and how to use limited resources. However, we are also concerned that large-scale conservation efforts have the potential to focus on landscapes that have minimal value to increasing biodiversity to meet certain arbitrary goals as not all habitats are created equal. Given that many of our most significant biodiversity and species conservation opportunities are on privately owned lands, we believe there are opportunities to better incentivize landowners to participate in voluntary programs such as those authorized and funded through the Farm Bill's conservation title, Joint Ventures, the Partners for Fish and Wildlife program, among others.

Specific to the "America the Beautiful" report, while many questions remain unanswered, CSF appreciates the Administration's willingness to engage sportsmen and women through the Hunt Fish 30x30 coalition, and we are appreciative that several recommendations made by our community were included. CSF believes it is important to point out this is simply a broad report, but we are pleased with many of the distinctions made in the report such as the difference between "conservation" and "preservation". While this report is consistent with many of the recommendations identified by CSF, many questions remain regarding the efforts and programs that will count toward a 30% objective and establishing a baseline to determine which existing land and waters are already conserved.

CSF thanks the Committee for recognizing and supporting the value of collaborative conservation to make positive gains in the face of our nation's biodiversity conservation challenges. CSF thanks the Committee, including Chair Carper and Ranking Member Capito, for working to pass and subsequently enact the ACE Act last Congress. In addition to the NAWCA and NFHP provisions contained in the ACE

Act, the legislation included a number of critically important partnership programs to facilitate biodiversity conservation such as reauthorizing the National Fish and Wildlife Foundation as well as the Chesapeake Bay Program and the Chesapeake WILD program.

Invasive Species:

The International Union for Conservation of Nature (IUCN) defines invasive species as "animals, plants or other organisms that are introduced into places outside their natural range, negatively impacting native biodiversity, ecosystem services or human well-being." Through the increased movement of goods and services around the world, the introduction of invasive species has created significant conservation challenges in many regions. The United States has been no exception, with high profile species like silver and bighead carp, feral swine, and emerald ash borer threatening native ecosystems, food security, and the forest products industry. These are but a few of the invasive species that currently threaten the health and vitality of our nation's natural communities.

While state and federal fish and wildlife management agencies have invested considerable resources toward the eradication, or at least preventing the spread, of invasive species it is clear that additional focus is needed. Recent examples such as the U.S. Army Corps of Engineers partnership with the state of Illinois to prevent the movement of Asian carp into the Great Lakes and the 2018 Farm Bill's inclusion of $75 million over 5 years toward the Feral Swine Eradication and Control Pilot Program (FSCP) recognize the challenges we face. While these investments represent invaluable investments toward prevention and eradication efforts, meeting this challenge on a broader scale will require collaboration and partnership from government leaders, local, state and federal agencies, and private landowners. This is especially true with increased transportation of consumer products and the potential for the movement of goods to introduce species to new areas, and the still emerging effects of factors like climate change are understood.

It should be noted that not all non-native, introduced species are considered invasive. In fact, the U.S Fish and Wildlife Service highlights a report by Pimentel (2004) estimating that there are approximately 50,000 non-native species in the U.S., of which only 43,000 are considered to be invasive. For example, popular game birds such as the Ring-necked Pheasant and Chukar were originally introduced from their native ranges in Asia. Likewise, several economically and recreationally important fish species, including striped bass and rainbow trout, have been intentionally introduced throughout much of the United States. However, these species have naturalized within their new environments to become an environmentally functional and economically viable part of those communities. While these success stories should be recognized and celebrated, their presence should not be used to distract from the important conservation challenge that invasive species continue to pose for our nation's diverse ecosystems.

Climate Change:

CSF maintains that there are pragmatic solutions that can help address and mitigate that effects of climate change by committing to many of the programs and practices that the sportsmen's community has supported for decades. Some examples can be found in the aforementioned programs included in this testimony. This includes NAWCA which, through its reliance on local, regional, and even international partnerships, can serve as a model for the conservation of other critically important ecosystems, including grasslands and forest ecosystems that can contribute directly and significantly to carbon sequestration and storage efforts. Further, the value of last year's investment in NAWCA will continue to be realized as changing weather patterns cause our continent's wetland ecosystems to become all the more important for waterfowl breeding habitat, water quality, flood mitigation, soil health, and several other ecosystem functions that benefit people, fish, and wildlife.

Similarly, the impacts of a changing climate on both terrestrial and aquatic species heightens the importance of investments in habitat connectivity to address the challenges associated with fragmentation. Within terrestrial communities, particularly those in mountainous regions, increasing temperatures are forcing species to move to higher altitudes and latitudes. Without opportunities for these species to migrate to areas that better suit their needs, such as those recommended for inclusion in the pending infrastructure package, it is only a matter of time before they can no longer move up the mountain. The challenges in aquatic, particularly marine, ecosystems are much the same. Increasing water temperature, rising sea levels and the loss of coastal habitat, and hypoxic zones combine into a myriad of conservation challenges that threaten ecologically, culturally, and economically important fisheries and marine communities. Fortunately, many of the programs and partnerships mentioned herein can assist as conservationists seek to mitigate these threats.

Summary:

In summary, CSF thanks the Committee for holding a hearing on this important issue and for the opportunity to testify. As the nation's original conservationists, sportsmen and women are acutely aware and concerned about declining biodiversity. Increasing efforts to address biodiversity loss is not only beneficial for fish, wildlife, and plants, but it is also good for the American economy, especially for rural communities that have been particularly impacted by the Covid-19 pandemic. CSF encourages the continued support of existing programs as well as support for new programs such as the Recovering America's Wildlife Act. Thank you.

Senator CARPER. Thank you.

Just for the record, how do you pronounce your last name, Andy?

Mr. TREHARNE. That's a complicated question, Mr. Chairman. My parents always told me that it was "tree-harn," but every time I meet somebody from southern England or Wales, they told me it's pronounced "truh-harn," so I think my parents are probably incorrect.

Senator CARPER. All right. They usually know best, but we are delighted that you are here. Thanks so much.

I understand Senator Capito said you worked for a Senator from Colorado, Wayne Allard?

Mr. TREHARNE. Yes, Mr. Chairman.

Senator CARPER. From my recollection, he was a veterinarian and still is, right?

Mr. TREHARNE. Correct.

Senator CARPER. He would say to me, Senator Capito, that he takes care of the Lord's critters on this planet. That is what he said.

Welcome. You worked for a good guy.

Next, I think we are going to recognize Senator Capito again, and I think she is going to introduce maybe our final witness, John Schmidt. Is it John Schmidt from?

Senator CAPITO. John Schmidt.

Senator CARPER. John Schmidt from, is he from West Virginia, or which county?

Senator CAPITO. Elkins.

Senator CARPER. Elkins, my God, where my mom was born. Guess it doesn't get any better than that. We are probably related.

Senator CAPITO. Might be, might be.

I am pleased to introduce my friend, John Schmidt. We worked together for the last several decades, actually.

He currently serves on the Board of Directors of PARTNERSCAPES, an organization with agencies, non-profit organizations, and policymakers to collaborate on conservation projects through voluntary, incentive based public and private programs. He recently joined the U.S. Fish and Wildlife Partners for Fish and Wildlife Program to control invasive species and promote pollinator habitat on his own land.

John, whose background is in biology, recently finished a lengthy tenure at U.S. Fish and Wildlife, having worked for the agency for 32 years in the Elkins, West Virginia, field office. In that capacity, he worked closely with my team on conservation and permitting issues.

It is always a pleasure having West Virginians testify before the Committee.

We are both very glad that we have our visitor center up in the Canaan Valley Refuge that U.S. Fish and Wildlife helped us initiate and also cut the ribbon on. It is a beautiful spot.

John's important work with PARTNERSCAPES and the Partners for Fish and Wildlife Program shows he understands the importance of landowner input on effective conservation policies.

So, I look forward to hearing your testimony, John. Thanks for joining us.

STATEMENT OF JOHN SCHMIDT,
BOARD OF DIRECTORS, PARTNERSCAPES

Mr. SCHMIDT. It is a pleasure to speak to you, and I would like to thank Chairman Carper and you, Senator Capito, Ranking Member, and the other Senators and their staff for making this possible today.

Specifically, today, I would like to speak on the benefits of restoring the Fish and Wildlife Service's Partnership Fish and Wildlife Program and the great work it has done nationwide to keep private landowners working on their land and benefiting a multitude of native species. I have included three handouts today to provide further information.

I am privileged to represent West Virginia on the PARTNERSCAPES Board of Directors. PARTNERSCAPES is a national organization that connects private landowners with partner organizations to improve conservation efforts. The organization is led by landowners who want to conserve and sustain the land for their families and their communities, as well as the natural resources and wildlife that inhabit their respective landscapes.

What we hear time and time again is that more government programs need to be like the Partners Program. Partnerships are effective in bringing landowners and agencies together for a common purpose. When each party has skin in the game, joint projects are more successful. This is no different with our Partners projects.

Initially, in West Virginia, our Partners Program got off to a slow start, as it mainly offered technical support and funding to restore wetlands, whereas you can imagine, in the Mountain State, most of our landowners prefer their already drained wetlands to stay that way so they could grow crops.

We picked up speed, however, and projects, and acres and miles of habitat when we began offering technical assistance to build fences to help keep cattle out of streams and forests. We provided alternative water sources so the cows didn't need to get into the streams, which improved their health and weight gain. The landowners also ended up with better grazing management, and taxpayers ended up with cleaner water, higher species diversity, and so on.

The Partners Program has two primary goals, one of which is to improve endangered species habitat and populations. The other is to assist the National Wildlife Refuge with their mission. These two priorities often overlap.

Fast forward to my own experience: In this year, in 2021, my wife and I are fortunate to own some working forestland in Randolph County, not too far from Elkins. We purchased the land in 2018 and manage it for a multitude of plant and animal species. The majority of the forest supports a healthy stand of mature red oak, white oak, maple, and poplar.

Unfortunately, we have about 10 acres of young forest that the understory is dominated by a number of invasive shrub species, like Japanese barberry, autumn olive, Tartarian honeysuckle, and of course, multi-flora rose. These invasives have crowded out and prevented the recruitment of native trees and shrubs and has diminished the biodiversity on that 10 acres.

What do you do? Of course, I called my former colleagues at the U.S. Fish and Wildlife Service and the USDA to see if their programs could assist me as they have assisted countless West Virginians with eliminating the threat to forest health from these invasives.

While we were meeting onsite, the agency folks also pointed out the benefit of adding some pollinator habitat, and we are in the process of creating a one acre plot of wildflowers and other forbs to benefit pollinators such as bees and moths and things like that. This addition will also benefit a multitude of game and non-game species and improve species diversity on my land.

The Partners Program in West Virginia has restored the following: Upland acres that have been restored and enhanced, nearly 30,000 acres; wetland acres restored and enhanced, 733 acres; stream miles restored and enhanced, 138 miles, a lot of that in the Upper Potomac; stream miles reopened to fish passage, 491. That is from three dams removed on the West Fork River.

What next? To date, the West Virginia Partners construction crews have completed over 2 million feet of livestock exclusion fence. The demand remains strong and should continue for the future.

Demand for instream restoration to restore fish and aquatic passage remains high. Not only will this increase population resilience in the face of a changing climate; it will prevent stream bank erosion, which adversely affects water quality and exacerbates downstream flooding.

Several low head dams in West Virginia are utilized in conjunction with water intakes for municipal water sources. Many of these systems now need costly repair, and key components are difficult to replace.

The aging infrastructure creates an imminent risk to communities across the State. New technology exists for water intake structures that are more reliable and boost capacity without the need for expensive and dangerous dams. Removing the Hartland Dam in Clarksburg, for example, would create savings for the Water Board and its rate payers. More importantly, it would promote a healthy and diverse natural flowing ecosystem and expand local business opportunities by restoring safe access to river recreation.

Seventy-five percent of fish and wildlife species depend on private land for their survival. With 2.2 million square miles of land in private ownership, conserving and enhancing habitat for migratory birds, endangered species, and other Federal trust species, as well as the natural infrastructure, is only possible through partnerships with private landowners. The Partners Program is a model for bringing private landowners and government agencies and funding together to solve shared concerns.

Thank you.

[The prepared statement of Mr. Schmidt follows:]

Testimony of John Schmidt, PARTNERSCAPES Board Director for West Virginia before the Senate Committee on Environment and Public Works, May 19, 2021 at 10:00 AM

Dear Members and staff of the Senate Committee on Environment and Public Works,

Thank you for the opportunity to speak today regarding the benefits of partnerships for enhancing and restoring fish and wildlife biodiversity and ecosystem resiliency. Specifically, I'd like to speak on the benefits of the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife (Partners) program and the great work it has done nationwide to keep private landowner working on their land and benefiting a multitude of native species. I've included three handouts today to provided further information.

I am privileged to represent West Virginia on the PARTNERSCAPES Board of Directors. PARTNERSCAPES is a national organization that connects private landowners with partner organizations to improve conservation efforts. The organization is led by landowners who want to conserve and sustain the land for their families and communities, as well the natural resources and wildlife that inhabit their respective landscapes. What we hear time and time again is that more government programs need to be like the Partners program. Partnerships are effective in bringing landowners and agencies together for a common purpose. When each party has "skin in the game" joint projects are more successful. No different with Partners projects

Initially, the Partners program got off to a slow start in West Virginia as it mainly offered technical assistance and funding for wetland restoration and most of our farmers preferred their previously drained wetlands to stay that way so they could raise crops. As you likely know the Mountain State has a limited amount of relatively level farm land. We picked up speed, acres, and miles of habitat when we started offering technical assistance and funding to build fences and off-stream livestock water sources to preclude livestock from streams and riparian areas. These restored habitats lead to cleaner, healthier streams and fish and wildlife for the taxpayers and improved grazing management for the landowner. A real win-win!

The Partners program's two primary goals have been to recover listed species and to enhance the mission of the National Wildlife Refuge system. In the past ten years or so this very flexible program has broadened its scope to also work to preclude the need to list species.

Fast-forward to 2021 to my own experience with the program. My wife and I are fortunate to own working forestland in Randolph County, WV. We purchased the land in 2018 and manage it for a multitude of plant and animal species. The majority of the forest supports a healthy stand of mature oak, maple, and tulip poplar. Unfortunately, we have ten acres of young forest that suffers from an understory dominated by non-native invasive shrubs like autumn olive, bush honeysuckle, Japanese barberry, and multi-flora rose. These invasives have crowded out/prevented the recruitment of native saplings and lead to poor forest health and biodiversity in that ten acres.

What to do? Well of course I called my former colleagues and FWS and USDA to see if their programs could assist me in me with eliminating the threat to forest health from the invasives. While we were meeting on site the agency folks also pointed out the benefit of enhancing pollinator habitat by creating a one-acre plot of wildflowers and other forbs. This addition will also benefit a multitude of game and non-game species and improve species diversity.

Accomplishments

In the past 20 years the West Virginia Field Office Partners program has restored the following:

Upland Acres restored or enhanced-**29,733**

Wetland Acres restored or enhanced- **733**

Stream miles restored or enhanced- **138**

Stream miles reopened to fish passage- **491**

What's next:

To date, the West Virginia Partners fence construction crews has completed over 2 million feet of livestock exclusion fencing. The demand remains strong and should continue into the future.

Demand for instream restoration to restore fish and aquatic organism passage remains high. Not only will this increase population resilience in the face of a changing climate it will prevent stream bank erosion which adversely affects water quality and exacerbates flooding.

Several low head dams in West Virginia are utilized in conjunction with water intakes for Municipal water sources. Many of these systems now need costly repair and key components are difficult to replace. This aging infrastructure creates an imminent risk to communities across the state. New technology exists for water intake structures that are more reliable and boost capacity without the need for expensive and dangerous dams. Removing the Hartland Dam in Clarksburg, for example, would create savings for the Clarksburg Water Board and its rate payers, **promote a healthy and diverse natural flowing ecosystem**, and expand local business opportunities by restoring safe access for river recreation.

Seventy-five percent of fish and wildlife species depend on private land for their survival. With 2.2 million square miles of land in private ownership, conserving and enhancing habitat for migratory birds, endangered species, and other Federal Trust Species, as well as natural infrastructure, is only possible through partnerships with private landowners. The Partners program is a model for bringing private landowners and government agencies and funding together to solve our shared concerns.

Additional information

The Partners program started in 1987 primarily as a wetland restoration program. It was very successful restoring waterfowl populations but its success was limited by relatively low funding. Recognizing this, the USDA lured away some great USFWS folks to help them start their Wildlife Habitat Improvement Program (WHIP) and other wetland conservation programs. Since then the two agencies have collaborated (USDA funding and FWS-Partners expertise) to restore millions of acres of habitat nationwide.

The Economic and Conservation Benefits of the

U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program

Why Private Land Conservation?

75 percent of fish and wildlife species depend on private lands for survival.

With 2.2 million square miles of land in private ownership, conserving habitat for migratory birds, endangered species, and other Federal Trust Species, as well as natural infrastructure, is only possible through partnerships with private landowners.

For more than three decades, the Partners for Fish and Wildlife Program has promoted voluntary habitat restoration on private lands

The Partners for Fish and Wildlife Program was reauthorized with overwhelming bipartisan support on March 12, 2019 in the John D. Dingell Conservation, Management, and Recreation Act.

Accomplishments since 1987

- ✔ 50,000 projects
- ✔ 1.5 Million wetland acres
- ✔ 4.5 Million upland acres
- ✔ 12,000 Miles of stream habitat
- ✔ 45,000 private landowners
- ✔ 5,000 partner organizations
- ✔ 4:1 leveraging ratio

Critical Natural Infrastructure

47,500 wetland acres,
291,000 upland acres, and
855 stream miles
could be restored or enhanced annually across the U.S. through over 3,100 new projects and over 3,000 partnerships.

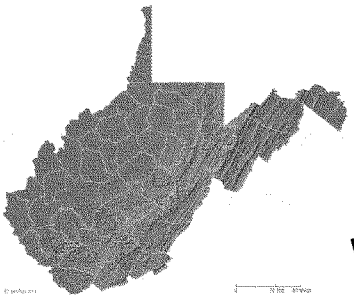
Current funding at $57 million resulted in 32,700 wetland acres, 200,200 upland acres, and 589 stream miles restored or enhanced across the United Stated through 2,100 projects and 2,060 partnerships.

Economic Returns

Every $1 the Partners for Fish and Wildlife Program invests in a project generates $8.60 in funding by project partners, creating $15.70 in economic returns.

3,500 Jobs Created

For more information contact:
Steve Jester, Executive Director, Partnerscapes
719.257.3074, steve.jester@partnerscapes.org, www.partnerscapes.org



West Virginia

USFWS-Partners for Fish and Wildlife

Upland Acres restored or enhanced-29,733

Wetland Acres restored or enhanced- 733

Stream miles restored or enhanced- 138

Stream miles reopened to fish passage- 491

(*Data from HabITS-2001-2021*)

USFWS Contribution $990,480

Partners Contribution (All) $8,477,924

Data Courtesy of Callie McMunigal, PFW State Coordinator (304)536-1361 x 7342

Restoring America's
Natural Infrastructure




Restoring America's Natural Infrastructure


Infrastructure isn't just roads and bridges- it also includes natural systems such as forests, prairies, wetlands, streams and rivers. Natural infrastructure often serves as the lifeblood for families and businesses who make a living off the land, providing our primary source of inexpensive and safe food, affordable energy, clean drinking water and accessible outdoor recreation. Investments to maintain and restore resilient land and water resources are key to protecting communities from accelerating climate impacts, providing abundant and clean water and growing the economy.


The U.S. Fish and Wildlife Service's Partners for Fish and Wildlife (PFW) Program is an innovative program which restores natural infrastructure in partnership with landowners, tribes, schools, corporations and other state and local agencies. Our 240 biologists live and work in the communities where they offer technical and financial assistance to landowners at no charge. We custom design habitat projects to meet individual landowner's needs, which range in size from a small wetland to a 100,000+ acre grazing management program. We leverage project funding and implementation through partnerships with more than 800 conservation organizations at a rate of $1 to $5.7. Each year, the program grows by approximately 2,000 new landowners enrolled, bolstered by word of mouth referrals, repeat customers and grassroots expansion throughout priority landscapes. We take pride in rising rising to the challenges of a changing climate: restoring resilient ecosystems that curtail extreme wildfires, flooding, drought and hurricanes, all while sequestering large amounts of carbon and promoting healthy soils.

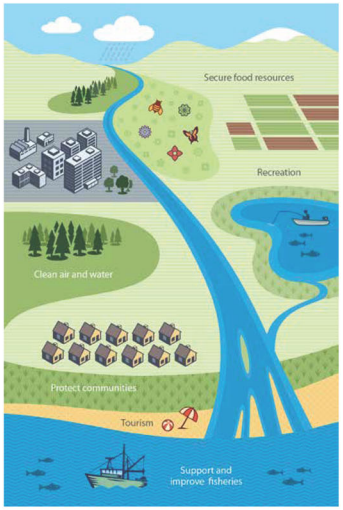

Partners for Fish and Wildlife restoration projects create jobs and stimulate local economies, putting America's people first. In 2018, a study found that PFW habitat projects created 1,835 jobs, ranging from construction workers, equipment operators, surveyors, material suppliers and more. $24.9M invested in projects resulted in $149M in economic stimulus as businesses hire and pay employees and spend money throughout local economies. With many areas having a wait list to enroll, shovel-ready natural infrastructure restoration projects can provide instant labor opportunities, putting Americans back to work in places that have been hardest hit. Projects are ready without delay: landowners, partners and agencies are ready and willing. Restoring America's natural infrastructure can get money circulating in local economies, curtail the impacts of climate change and conserve resilient landscapes across the country.





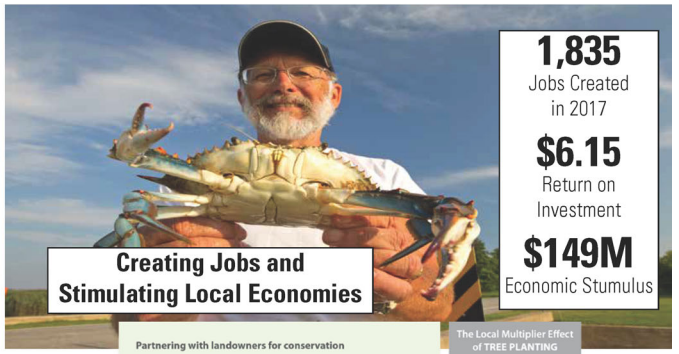






Investment in natural infrastructure projects, whether mountain forests, streams, wetlands or grasslands, provide many benefits to local communities. These infrastructure improvements to natural systems:

- Secure food and fiber resources by allowing producers to grow more food on less land, restore healthy soil ecosystems that support native plants, control pests and benefit pollinators.
- Provide for tourism and outdoor recreation industries such as fishing, hunting, shooting and boating.
- Restore wetlands that serve as the world's most efficient water filtration systems, retain water during high water events to allow for natural release and provide the best waterfowl hunting opportunities in America.
- Distribute water evenly throughout landscapes to be more resilient against drought.
- Strategically manage cattle for a healthier herd, cleaner water and better yield.
- Reduce extreme high-intensity wildfires, which are bigger, hotter and more difficult to fight.
- Support and improve commercial and recreational fisheries.



Partnering with landowners for conservation

The U.S. Fish and Wildlife Service's premier tool for working with landowners is the Partners for Fish and Wildlife (PFW) Program. The program works one-on-one, on a voluntary basis, with private landowners to improve fish and wildlife habitat. Landowners agree to maintain the improvement project for at least ten years, but otherwise retain full control of their land. Partners may also include tribes, schools, conservation groups and local, state and federal agencies.

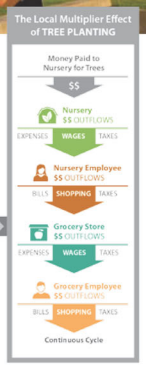
Since its beginning, the Partners for Fish and Wildlife Program has:

- **Partnered** with more than 45,000 landowners and 3,000 organizations.
- **Implemented** nearly 29,000 restoration and technical assistance projects on private lands.
- **Restored** over one million acres of wetlands, three million acres of upland and 11,000 miles of streams.

Restoration: healthy lands, healthy economies

PFW Program projects create jobs and provide income in local communities. Here's how it works:

1. PFW project funds leverage non-federal funds from other partners.
2. Project spending supports local businesses.
3. Businesses hire and pay employees.
4. Workers and businesses spend money in the local economy.
5. Spending produces local tax revenues.



Natural Infrastructure Projects:

Water

Problem:

Midwest and Western states have recently experienced increased drought and flooding events, which has disrupted crop yields, eroded fields, cut shorelines and triggered a decline in soil health. Artificial infrastructure

Opportunities:

Use water to fight water! Cooperative wetland restoration projects offer low-cost, high-yield opportunities to restore natural hydrology to working landscapes. Wetland restorations involve restoring drained wetlands important as livestock water and to a number of avian species. Restored wetlands not only provide valuable sources of water for livestock, but also can produce a huge amount of vegetation for livestock. Wetlands are also a critical part of many bird life cycles. Landowner-led restoration projects have shown that it is possible to bring back healthy, functioning wetland ecosystems even after long periods of drainage and degradation.

Native grass plantings are the planting of mixtures of warm and cool season native grass species which are important for good grazing management. Mixtures of warm and cool season grasses provide stable grazing throughout the growing season. Often times, native forbs are added to the plantings as well which also enhance grazing opportunities and add nitrogen to the soil.

Natural Infrastructure Projects:

Grazing Lands

Problem:

Overgrazing has occurred across many working landscapes, where vegetative ground cover has been exposed to intensive grazing for extended periods of time or without sufficient recovery periods. Overgrazed landscapes are susceptible to the spread of invasive species, erode, deposit valuable nutrients into waterways and become desertified.

Opportunities:

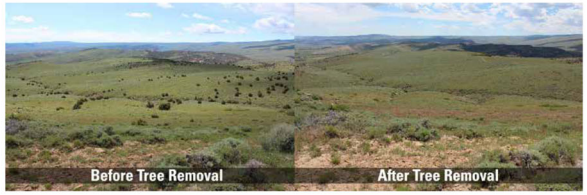
Cooperative grazing management projects offer low cost solutions to overgrazing. Habitat biologists work with landowners to fence riparian areas which prevents cattle from entering the water. The benefits are multi-fold: cows receive less exposure to water borne illness, erosion of riparian areas is prevented, and nutrient runoff into local waterways is limited. A source of water can be installed on working landscapes so that cows don't have to travel as far to drink. Finally, landowners can work with biologists to develop strategic grazing management plans, which places herds on pastures at the right time and right place for optimum yields.

Natural Infrastructure Projects:

Invasive Species Management

Problem:

Invasive species, such as Juniper tree invasions across western grasslands, has resulted in widespread negative changes to soil and grassland systems. Shifting ecology places both wildlife and humans at risk: the trees crowd into grazing land and consume significant amounts of water that might otherwise nourish the prairie or provide supplies for local towns and cities. They discharge clouds of highly allergenic pollen and harbor mosquitoes that carry West Nile virus and they usurp habitat crucial to species such as the lesser prairie-chicken and the prairie mole cricket.



Opportunities:

Cooperative invasive species removal projects have proven to be successful in slowing the spread of juniper species across the Great Plains. Beginning with mechanical harvesting, heavy equipment downs cedar trees of all sizes, thinning landscapes to a more ideal density of trees. Downed trees can then be chipped for mulch, burned on site or hauled away for other means of harvesting. Grasslands can then be supported by planting native seed mixes which include a mix of grasses and forbs to convert to native habitat.

Natural Infrastructure Projects:

Connecting Landscape Corridors

Problem:

Deer, elk and pronghorn antelope migration and winter range habitats have declined across 11 western states.

Opportunities:

On lands within these important areas, if landowners are interested and willing, conservation may occur through voluntary agreements. Projects include restoring degraded winter range and migration corridors by removing encroaching trees from sagebrush ecosystems, rehabilitating areas damaged by fire, or treating exotic/invasive vegetation to improve the quality and value of these areas to big game and other wildlife, working cooperatively with private landowners and State highway departments to achieve permissive fencing measures, including potentially modifying (via smooth wire), removing (if no longer necessary), or seasonally adapting (seasonal lay down) fencing if proven to impede movement of big game through migration corridors; and wildlife overpasses to help faciliate reconnection of big game migratory corridors.

Robust and sustainable elk, deer, and pronghorn populations contribute greatly to the economy and well-being of communities across the West. In fact, hunters and tourists travel to Western States from across our Nation and beyond to pursue and enjoy this wildlife. In doing so, they spend billions of dollars at large and small businesses that are crucial to State and local economies. We have a responsibility to be a collaborative neighbor and steward of our natural resources.

Natural Infrastructure Projects:

Cold, Clean, Connected and Complex Waterways

Problem:

Waterways are experiencing heavy loads of sediment and silt, declines in aquatic insects, simplified habitats, missing vegetation and expansion of invasive species populations such as carp.

Opportunities:

Stream health is restorable! To sustain healthy streams with abundant trout populations, we need durable restoration solutions. Collaborative watershed restoration projects utilize partnerships and process-based restoration practices to help streams and landscapes function without chronic intervention over the long term. Working in partnership with our neighbors, best practices reduce runoff from farmlands, stormwater is better managed, streambanks can be stabilized by planting native plants and in-stream habitat can be enhanced using j-hooks, woody vegetation and other stream restoration techniques.

To Learn More or to Contact Your
Local Biologist, visit us at:
www.fws.gov/partners

Senator CARPER. Mr. Schmidt, thank you very much. Give our best to Elkins.

I think I will start off by asking my first question of Dr. Gerber.

Dr. Gerber, are you still with us?

Ms. GERBER. Yes, I am.

Senator CARPER. Oh, good. Thank you.

Dr. Gerber, your testimony mentions the impacts of climate change on biodiversity decline and references an in depth article entitled Climate Change and Ecosystems: Threats, Opportunities, and Solutions. We are interested in learning more about the linkages between climate change and biodiversity loss, particularly with respect to solutions.

Can you take a shot at that question, please? Thank you.

Ms. GERBER. Sure. Thank you, Mr. Chairman, for the question. Climate change, as many of you know, has impacts on both the abundance and distribution of biodiversity. We have good evidence that climate change leads to range shifts in species. Species must adapt to the warming temperatures, and in some cases, are unable to adapt, so we are seeing a broad scale shifting of species ranges. In some cases, species are unable to adapt, and we are seeing increased risk of extinction for those species.

Some of the consequences that we have seen have to do with, for example, ocean warming and ocean acidification are great examples of some of those consequences. We also, for example, recently with the California wildfires, have seen recent frequency and intensity of these extreme events cause by climate change.

The things that climate change, in terms of posing a risk, can provide us with, taking effective action includes reducing warming, and this would include reducing emissions, food waste, promoting plant based diets, alternative energy, and reforestation, particularly in tropical areas.

We can also begin to mitigate and adapt by establishing wildlife corridors to protect networks of habitat, and in urban landscapes, to establish green spaces.

The last thing I want to mention regarding climate change is that like many of the comments that have been made throughout today's hearing, climate change not only poses a risk for natural systems, but it also impacts biodiversity fundamentally, which indirectly influences human well being, specifically our ability to provide food, pollination, medicine, flood protection, recreational opportunities, drinking water, clean air. So, there is an inextricable link between climate change and biodiversity.

Senator CARPER. All right, Dr. Gerber. Thanks very much for your response to that.

My next question is for Mr. Sullivan, and then I am going to yield to Senator Capito.

Mr. Sullivan, you shared some compelling examples today of how habitat conservation plans have improved outcomes for species and efficiency for infrastructure projects.

I am always looking for win-win situations. This appears to be a real win-win situation. Habitat conservation funding is more prevalent, as you know, than it once was, but arguably, habitat conservation plans are still an under-utilized tool. Briefly, what do you think are the primary challenges preventing more widespread

use of habitat conservation plans, and second, how might Congress be able to help address those challenges?

Mr. Sullivan.

Mr. SULLIVAN. Sure. Thank you, Chairman. I think the challenges are that they are not necessarily well known as a tool, even sometimes within the Service itself. It is embedded within the Endangered Species Act, Section 10, and many times, there is just not the promotion of them like there should be as a win-win tool, as you described.

I think there is a lack, sometimes, of funding and staffing for this program at the U.S. Fish and Wildlife Service, and I do think if there was more funding, in particular for staff within the regions, and sort of an effort by the Service to kind of market these out to stakeholders, because I do believe they are a very positive win-win solution.

There are plenty of examples that were highlighted in my testimony about highway projects and so forth and so on. We are stuck between negotiations between project proponents and the Fish and Wildlife Service and others, but got unstuck because of the Section 10 program, which is about finding a balance and a compromise.

Senator CARPER. Thanks for your response to that question.

Senator Capito.

Senator CAPITO. Thank you.

Mr. Treharne, I wanted to ask you about, I mentioned in my opening statement, President Biden's America the Beautiful Initiative, or 30 by 30, which sets a goal of conserving 30 percent of U.S. lands and water by the year 2030. I was wondering if the outdoor recreation, particularly the hunting and fishing community, was involved in the development of this report, and if not, what kind of suggestions, or what kind of caution flags would you be presenting?

Mr. TREHARNE. Thank you, Ranking Member Capito. The answer to your question really requires a little bit of history. We started to hear about 30 by 30 early in 2019 through State legislative actions. Those were particularly concerning, for some of the reasons you outlined in your opening remarks: Lack of definition, creating a lot of uncertainty for those in our community.

At that time, we started looking into the 30 by 30 Initiative, and realized that at its most basic level, there is a lot in common with the conservation work that sportsmen and women do. However, the devil is in the details.

So the Congressional Sportsmen's Foundation worked with a number of partners which now total nearly 50 NGOs that are a part of a group called the Hunt Fish 30x30 Coalition. Through that entity, we have been proactively engaging the Administration to make sure that they are aware and understand our perspective on conservation, things like the importance of private land, non-regulatory approaches, voluntary conservation, maintaining the integrity of sportsmen driven conservation dollars, revenue.

Really, we came to a decision point because with that uncertainty surrounding 30 by 30 and the lack of definition, we either could stand on the sidelines and let that happen, and let others define conservation on behalf of our community. But we decided to come to the table and create some space for hunters and anglers to talk about how we support conservation and some of the things

that we have learned over the last 80 years since we have been doing it.

Senator CAPITO. Thank you, very complete answer. I appreciate that.

Mr. Schmidt, you have mentioned a couple things in you testimony, particularly on your own private land ownership, but I know in your capacity at U.S. Fish and Wildlife, you dealt a lot with private land ownership. As you know, as West Virginians, this is very much in our DNA in terms of protecting our own land and making sure that these solutions that we find are driven by what we as private landowners can contribute and preserve.

So I guess my point in bringing that up is, in order to improve the fish and wildlife habitat, you need to have the flexibility, I think, for the landowners. So why would you think, that with your Partners for Fish and Wildlife, you said it needs to grow, would be important in addressing this flexibility issue when you are looking at biodiversity loss?

Mr. SCHMIDT. Thanks for that question, Senator Capito. The flexibility is important because every landowner has different goals, and one size doesn't fit all, as we found out when we were just doing wetland restoration.

We have modified the program nationwide to include invasive species treatment, dam removals, instream work, as well as livestock exclusion and grazing management.

Some of the best work we do is actually to put better grazing systems on the land so that the farmer makes more money, but the species diversity remains intact. As a matter of fact, it often improves when it comes to grassland species.

Landowners themselves, they want to help, and that is why they've contacted us or the USDA, but it also has to work for them and their bottom line. In some cases, they want to pass this land on to the next generation, and they want to leave it in good shape.

Senator CAPITO. I think that is a good point. I think, in some ways, where we have kind of gotten hung up a little bit on this is, a lot of times, I think our local landowners and our folks who have been in the communities for years really are the best stewards of their own properties and know the best way to move forward.

When you start pushing down mandates from Washington and other places that don't fit with the local conservation plan or envisionment for your own property, that is where it really starts to rub people the wrong way. I know we went through this with the wilderness designation several years ago in West Virginia, and really ran up against a lot of people at the same time.

We have heard a lot about ESAs. If there were a tidal wave of potential ESA listings around the country, what do you think that could mean in terms of economic development, environment, and also for the Fish and Wildlife Service itself?

Mr. SCHMIDT. Well, for economic development, it could slow things down, because currently, the staffing in a lot of our field offices is not high enough to meet the current demand, so if we had more listings, then we would need more horses to pull the wagon, OK? It is not—we are not seeing that in the budget, and the Partners Program is kind of like the, it is the restoration wing of the

Endangered Species Program, and our endangered species biologists tell us where we need to work, and then we do that.

We also work on precluding the lists that need species, so for instance, monarch butterflies. That was one that was due to be listed, had a strong potential, and we ended up doing enough work with private landowners and highway departments and such that we were able to preclude the need to list that animal.

Right now, the Service does not have the horses it needs to pull that wagon, if we have a regulatory approach. I think we need to continue to work with private landowners. I know PARTNERSCAPES is very concerned about 30 for 30 and what does it mean, for the reasons you pointed out. We are trying to let folks know that there are a lot of private landowners who have already done a lot of good work to conserve habitat, and we want to make sure that it is counted.

Senator CAPITO. Right. I appreciate it, and thank you.

Senator CARPER. Thanks, Senator Capito.

I think Senator Ben Cardin from Maryland may have joined us from Webex, my Delmarva buddy.

Senator Cardin, are you there?

Senator CARDIN. Well, thank you, Mr. Chairman.

Let me thank all of our witnesses. This has been an incredibly important hearing.

Biodiversity is critically important to the Chesapeake Bay, which I know the members of this Committee will not be surprised to hear that I will mention during this hearing. Biodiversity, we have 3,600 different species that live in the Chesapeake Bay. We have over 11,000 miles of coastline on the Chesapeake Bay, and as a result of more severe weather conditions, we have seen a challenge on runoff that has affected the quality of the Chesapeake Bay and its ability to support biodiversity. We have real challenges.

I just really want to, if I could, Dr. Gerber, focus on one of those issues, which is wetlands. We have had some conversation about this. We have lost a lot of wetlands in the Chesapeake Bay through development and through sea level increases.

We have restoration programs. I want to mention just two, and then get your reaction as to what else we should be doing.

We have reclaimed Poplar Island in the Chesapeake Bay, which was at one time, a habitable island which almost totally disappeared. We have done that through an environmental restoration, which includes the use of dredged materials to rebuild that island, and now supports biodiversity. It is a wonderful place to visit, but it also serves as an economic engine for us being able to keep our channels open in the Chesapeake Bay.

The second project I want to mention is what is happening at Blackwater. Blackwater Wildlife Refuge is one of the great refuges in this region, located on the Eastern Shore of Maryland. It has lost a lot of its wetlands over the years as a result of sea level rises and other causes, but restoration efforts have been successful where we used dredged material to rebuild wetlands, and it has worked. It just costs some money to do this; to transport the dredged material to Blackwater is a little bit more expensive than putting it someplace else.

Poplar Island environmental restorations cost more up front, but they save us money over a longer period of time.

I want to get your view of how important it is for us to restore islands such as Poplar Island or Blackwater Wildlife Refuge in an effort to have habitat that is critically important for biodiversity.

Ms. GERBER. Thank you, Senator Cardin. Wonderful work that you are leading in the Chesapeake Bay. I will add that I am by no means an expert on this region, but I will add a few comments.

I think my overarching comment is that the experience in the Chesapeake Bay demonstrates that conservation works, and when resourced, we can actually see impacts. I think it also underscores the importance and the consequences of taking a collaborative, inter-agency approach to working together to achieve these outcomes.

Third, I think it underscores the importance of funding the programs that we strategically define as important. Regarding the Chesapeake Bay in particular, as you have discussed, the Bay faces a number of challenges, including excess nutrients, sediment from non-source pollution, invasive species, climate change.

Restoration is definitely—I agree that it is a viable approach to be taken here, because it increases the diversity, the population and distribution, and diversity of endangered species. It also enhances landscape connectivity and benefits human well being because, as we have discussed previously, healthy ecosystems, clean water, air, and soil, are good for both people and wildlife.

A number of Federal restoration projects led by many Federal agencies, including NOAA, EPA, and Fish and Wildlife Service, have restored coastal areas in the Bay that have been impacted by human development, and they have seen the return of wildlife that has previously been believed to have been lost.

Some of the most recognizable restorations in and around the Bay have been those of oyster reefs. I have always been impressed with oysters, which are natural filter feeders and can clean water. The factoid that I like to talk about with oysters is that each adult filters 50 gallons of water per day, providing food and habitat for one of the region's most valuable fisheries.

So I thank you, and I support the work you are doing in the Chesapeake Bay.

Senator CARDIN. Mr. Chairman, I would invite members of the Committee to join me to visit Poplar Island and see, it is not far from here, and see first hand how we have restored biodiversity in reclaiming the Bay. The Army Corps is supporting the mid-bay, which is the next chapter of environmental restoration with dredged material. It is a real success story.

Thank you very much, Mr. Chairman, and thanks to the witnesses.

Senator CARPER. That is great news, Ben. Thank you, and Dr. Gerber, thank you for your closing comments there.

We have been joined by Senator Whitehouse and Senator Padilla. I think they are both with us on Webex.

Sheldon, I think you are next, and then Senator Padilla will be after him, after Senator Whitehouse.

Sheldon, go ahead.

Senator WHITEHOUSE. Thank you, Chairman.

Chairman Carper and I both also sit on the Finance Committee, and I just want to flag for any colleagues who may be interested that as we go through trying to reform our tax code to get rid of some of the crummy ways that it has been used to help special interests at the expense of regular taxpayers, if we can help reinforce the advantages for durable conservation easements, I am all in on that and would love to work on that in bipartisan fashion.

Mr. Treharne, your testimony talks about protecting river habitat by restoring dams and improving culverts in some of the manmade interruption of river flow. We are obviously working on this a lot in Rhode Island. We have a lot of small dams, and I have been working for years to try to figure out a solution to efficiently allow States to address the problem of particularly small dams, which in a lot of places, aren't really owned by anybody any longer.

You have to go through a process that is not that different from damming the Columbia River to remove a dam on a little local stream or river, and you have to deal with a whole lot of title and liability issues. We have got to work on a way to solve that.

I think we have a way to solve that, but we just haven't been able to get it done yet. So I would like to invite you to help us solve the problem of how to remove small and sometimes dangerous, usually obsolete dams that obstruct so many of our important rivers. Are you in for that?

Mr. TREHARNE. Absolutely, Senator. One thing that I think this Committee can take a lot of credit for is the passage of the National Fish Habitat Partnerships, which will support the National Fish Habitat Action Plan moving forward. I think those types of groups would be very interested in talking with you. I would be happy to connect you with them and see how their mission overlaps with what you are trying to do.

Senator WHITEHOUSE. Good. This is my longest lasting frustration in the Senate. Sometimes little things can take a long time to get done, so I look forward to working with you.

Dr. Gerber, you were good enough to mention oceans, and specifically, coral reefs. Could you just give us, for the record of the Committee, an overview of the biodiversity calamities that are happening, in many respects, out of our human sight in the oceans, where we are visitors and not customary inhabitants? Particularly if what is predicted for coral reefs happens, which is that ocean acidification and ocean warming, driven by fossil fuel emissions, more or less wipes them out, what that does to the pace of biodiversity collapse in the oceans.

Ms. GERBER. Thank you, Senator Whitehouse, for the opportunity to talk about reef systems, which is actually my area of expertise.

Regarding the issue of climate change and coral reefs, we see a number of impacts. One is, as you mentioned, the coral structures are unable to adapt to the increase in temperature, so what we are seeing is widespread bleaching of coral reefs.

In addition to the loss of the coral reefs themselves, we are seeing a loss of the structure that provides habitat for entire ecosystems' biodiversity.

The other thing that I think is relevant to bring up here is that in terms of impacts of climate change on marine systems, we are

also seeing impacts of climate change on the extent to which organisms move in the ocean. With warmer temperatures, we see more rapid metabolic processes, and so less movement, for example, between larval stages occurs. This has broad implications for the way we manage the ocean, because these marine organisms have adapted to having this life cycle where the larvae live in different areas than the adults, and that provides some resilience to extreme events.

So, by this reduction in movement patterns, we actually are seeing less resilience in marine systems.

Senator WHITEHOUSE. So, in a nutshell, biodiversity in the oceans is a serious problem, and it is going to get rapidly worse if coral reefs vanish as a piece of the environmental infrastructure.

Ms. GERBER. Absolutely.

Senator WHITEHOUSE. Great. Thanks for helping us remember oceans, and thank you, Chairman, very much.

Senator CARPER. Senator Whitehouse, thank you for helping us remember the oceans as well.

Senator Padilla, I believe might be next, and Senator Padilla, I think, is joining us on Webex.

Alex, are you there?

Senator PADILLA. Yes, thank you, Mr. Chair. I want to raise a couple of issues and questions with Mr. Sullivan from California.

You highlighted, Mr. Sullivan, in your testimony the proposal to create the Western Riverside County National Wildlife Refuge in Southern California, east of Los Angeles. California, as you know, is one of the most biodiverse places in the world, with thousands and thousands of species. As you noted, the proposed refuge would directly protect 147 species, 33 of which are threatened or endangered.

This area of Southern California is also in need of sustainable development. It is a densely populated area with inequitable access to nature and open spaces, particularly for working class communities and communities of color.

So I am hoping you can expand on your testimony and share with us your thoughts on how the proposed wildlife refuge can help us meet multiple policy priorities here. No. 1, helping protect biodiversity of the area, which you know has multiple environmental benefits, while also enabling responsible and sustainable development, and third, helping improve not just access to nature and wildlife, but more equitable access to the outdoors.

Mr. SULLIVAN. Yes, thank you, Senator, for the questions and the opportunity to respond. Those are great questions.

It is complicated when you are trying to balance all these different, biodiversity versus public access versus affordable housing, and a lot of the challenges that we face in California and other parts of the country. I agree with you that sustainable development is the goal, and how we plan responsibly is key.

Some of the old development models haven't worked very well. They were autocentric and focused on people sprawling out on the landscape. So how do we balance all this?

I think it starts at the local level. The locals know best on where to define where development can go. Development that is avoiding those biological hotspots, and then identifying those biological

hotspots and protecting them, which is what this proposed refuge designation is proposing.

The locals and the local scientists and the implementers of the West Riverside HCP have identified this area as important to achieving the objectives of their habitat conservation plans, so the locals have sort of worked with the Federal Government to identify this area.

I think the way the Feds can help is by approving this designation, and also for increasing funding through the ESA Section 6 program to assist HCPs across the country protect the Nation's biodiversity hotspots.

With access, parts of the refuge could be open to the public, interpretive exhibits and tours can educate visitors in the importance of biodiversity. Refuge staff and local biologists could implement and adopt a school program to get kids involved in nature. Residents and schoolchildren can help at the refuge volunteering for habitat restoration and projects and general maintenance.

So it is basically trying to empower the community to adopt the refuge and work collaboratively. The refuge doesn't necessarily have to be a place that is off limits to people and how you can kind of integrate the community with the refuge and the refuge with the community. That is sort of the intent of sustainable development anyway.

To echo some of the things that John Schmidt was saying about working with private landowners, we do that all the time here. We work with ranchers, and they are an important component of implementing a local approach to conservation. Then on the other side, working with local municipalities to encourage them to develop more sustainably. Thank you.

Senator PADILLA. Thank you.

Thank you, Mr. Chair. Much to follow up on.

Senator CARPER. Senator Padilla, great to be with you again for the second time today, and thank you. I look forward to seeing you on the floor later when we vote.

We have been joined earlier today by Senator Ernst, and she serves on a number of committees as we all do. I appreciate very much her stopping by, although she was unable to stay until we had an opening for questions, but we thank her for coming.

Senator Boozman was also here, and he is co-chair of the Senate Caucus on Recycling and an active member of this Committee. We appreciate him stopping by.

I thank Senator Kelly for joining us and introducing one of our witnesses.

I have a couple questions to go; when I get to the end of these questions, if someone else has joined us, either remotely or in person, I will yield to that Senator. That will be about 5 or 10 minutes from now.

A question, if I could, for the entire panel. The subject deals with the importance of Federal funding. Each of you, in your testimony, talks about the importance of Federal funding for conservation programs, including for the North American Wetlands Conservation Act for the Partners for Fish and Wildlife Program, and for implementation of our Nation's wildlife protection laws.

Again, a question for each of you, and the question is, would you each elaborate on the importance of Federal funding for wildlife conservation?

The second part of the question is, what do we stand to lose when we underfund these programs? Let me repeat that. Would you each elaborate on the importance of Federal funding for wildlife conservation? Second half of the question, what do we stand to lose when we underfund these programs?

Ms. Gerber, would you like to go ahead?

Go for it, Dr. Gerber.

Ms. GERBER. Thank you, Mr. Chairman, for the opportunity to comment on this important issue of funding for conservation.

Globally, we need, best estimates indicate that we need approximately $76 billion to protect biodiversity. At present, this is less than .01 percent of the annual GDP. In the U.S., the annual costs for recovering endangered species that we have estimated from reviewing of recovery plans is approximately $1.2 billion per year.

At present, approximately 20 percent, only 20 percent, is allocated to the agencies for engaging in recovery planning efforts. Just for context, this 20 percent is approximately 1 percent of the annual cost for food waste in the U.S.

I think a theme that we have discussed throughout the hearing is that biodiversity conservation programs will work if the agencies responsible for implementation are actually funded. So it is of utmost important that we begin to provide adequate funding to these agencies.

Furthermore, recognizing that there are multiple priorities with Federal funding, there are scientific approaches that allow us to make transparent and objective decisions about which species are at highest priority to protect, whether this be species that have a high chance of recovery or species that are really on the verge of extinction.

Also, I think that adopting a prioritization approach to facilitate transparent decisions, employing this return on investment approach can really enhance the outcomes that we are seeing in the U.S. regarding biodiversity conservation.

To your question about what we stand to lose, again, recognizing that there are many competing priorities that the Federal Government is faced with. I think we underscored the importance of biodiversity conservation to our economy and our well being.

Balancing these priorities, I think it is really important to think about or to recognize that when you lose a species, it is forever, so we can't go back. We can't go back. If we lose a species, that is it.

So I think we need to sort of raise the bar on and how we are currently managing endangered species so that they are adequately funding these programs, given the current crisis that we are faced with. Thank you.

Senator CARPER. Thank you, ma'am.

Just a really quick, you can just give me a yes or no answer, but your testimony and others offered today also mentioned the importance of collaboration between all levels of government and stakeholders. Would you agree, Doctor, that robust Federal funding helps our natural resource agencies be better partners?

Ms. GERBER. Absolutely, and I will give you an example of that.

I worked for about 5 years with the U.S. Fish and Wildlife Service to develop a prioritization approach to facilitate decisionmaking around which species we should implement recovery actions for, given the limited budgets. As we have discussed, these agencies are faced with backlogs of candidate species. They simply don't have the resources to take the actions or engage in any kind of strategic or prioritization exercises.

Taking this collaborative approach, of course, between the scientific and academic sectors, private sectors, and government sectors to try to identify these collaborative, inclusive processes for how we move forward with addressing this crisis are absolutely essential.

I would like to underscore my experience in this project that I just mentioned with working with Fish and Wildlife Service. We spent years working on an approach called the Recovery Explorer Tool that is now published on our Website. It is fully available. It allows for transparent decisionmaking, and the agency, the Fish and Wildlife Service, is so understaffed that they don't even have the ability to take the tool on to use it.

So despite the desire of many conservation biologists and agency scientists to work together to solve these problems, there are such scarce resources that we are not able to move the needle forward. So with additional funding, agencies would have the capacity to actually be ahead of the game in addressing this problem, as opposed to drinking out of a fire hose, which is the current situation.

Senator CARPER. All right, thank you. Thank you.

Mr. Sullivan, same series of questions. Would you elaborate on the importance of Federal funding for wildlife conservation, and second, what do we stand to lose when we underfund these programs?

Mr. SULLIVAN. Yes, thank you, Senator—Chairman.

I would echo what Dr. Gerber said, so I will address the second question first. We stand to lose a lot, and once it is gone, it is gone.

We don't even understand what the consequences of those losses are. The ecosystem is intertwined; species are very dependent upon each other. To make it even anthropocentric, position is with plants, a lot of the plants could be the future cure for cancer, so when we lose these, they are gone forever.

To your first point, yes, funding is key. I understand there is a lot of pressures on the Congress and the Administration and how to allocate resources. I feel for too long there has been a lack of investments in nature's infrastructure. I know this Committee deals both with the physical built environment as well as the natural environment, and I think there has been an underinvestment in both areas.

So from our standpoint, funding for staffing, as I said in an earlier response to a question, for Fish and Wildlife is critical. It is also funding for land acquisitions, management; a lot of times, management is underfunded. There isn't money to do invasive species management. There isn't money for the restoration programs that some of the speakers have spoken to about today.

So funding those things will help with, hopefully, stemming some of the biodiversity loss from a Section 6 perspective, which helps fund HCPs. We certainly would like more funding in that program,

which has been underfunded for decades now, for helping HCPs with land acquisitions.

There is also a lot that can be done to improve our highway systems for wildlife, and funding for wildlife crossings, both land bridges and undercrossings.

There are examples across the United States and the world. The most famous that a lot of people know about, is Highway 93 in Montana and Highway 90 going through the Cascades. There are projects here, and looking at doing improvement of wildlife connectivity over Highway 101 in California. There are certainly the examples of Banff up in Canada.

So those are areas where I think when we are funding infrastructure, it is also how do we fund infrastructure for wildlife, how do we provide a value for ecosystem services, and I appreciate the question. I am in the business of conservation, so obviously I am asking you for funding for these things, but I appreciate this opportunity to make this pitch.

Senator CARPER. Thanks, Mr. Sullivan.

Andy Treharne, would you please respond to the same two questions I have asked of our other witnesses? And here is the question: Would you please elaborate on the importance of Federal funding for wildlife conservation; and second, what do we stand to lose when we underfund these programs?

Mr. TREHARNE. Thank you, Chairman Carper. I think the importance of Federal funding is wide ranging, but I also think it deserves some context.

There are a lot of State dollars that go into conservation, as well as private sector dollars. But the reality is that the Federal Government investments in conservation and in the environment have not kept track with the growth of the Federal Government in other areas.

Function 300, which is the baseline for the environment and conservation and outdoor recreation programs and Federal budget, is, I think between 1980 and 2010, overall Federal spending grew a 130 percent.

But Function 300 grew something like 2.1 percent during that same time period. So I think that illustrates some of the challenges we are dealing with and competing priorities that other witnesses have mentioned.

In terms of consequences, I think there are a lot of consequences. One is, in addition to the ecosystem services and the potential loss of those that benefit people, I think we risk losing a human connection to nature and understanding it. I get that through hunting and fishing; others get it different ways. But it has been part of the nature of human beings for a very long time, and I am not sure we will be pleased with the results without it.

One other potential consequence, and I can provide an anecdotal example, one time I was at an event with a State Fish and Wildlife Agency Director, and I saw him looking at his phone, reading e-mails and shaking his head. I asked him what was going on, and he said we just got our Section 6 award for the State's portion of endangered species work that we are doing. He said, they just said we got awarded $1,200, and they had invested significantly more than that in the program.

In addition to the lack of resources that were provided, pursuant to his work on a Federal policy issue, Federal Trust Species, I think that type of thing also damages the partnerships that many have highlighted so well today, the fact that all of these folks can come together through these really solid programs that deliver positive results for fish and wildlife. The risk of losing that, when partners aren't contributing at the level they should, has some pretty severe consequences as well.

Senator CARPER. Mr. Treharne, thank you very much.

I am going to ask John Schmidt to respond briefly to the same two questions.

Again, I will just repeat them, Mr. Schmidt. Would you elaborate on the importance of Federal funding for wildlife conservation; and second, what do we stand to lose when we underfund these programs?

I am running out of time, but I want to hear from you, just briefly, on those two questions. The importance of Federal funding for wildlife conservation, and what do we stand to lose when we underfund these programs.

Go right ahead, Mr. Schmidt.

Mr. SCHMIDT. Thank you, Chairman Carper. I will make it short.

The economy is a wholly owned subsidiary of the environment, and part of that environment is Fish and Wildlife resources, and all the non-game species that depend on them for their food and the rest of us for our enjoyment. So that is a short answer to your No. 1.

The second part is, what we lose is opportunity. We lose opportunity to work with folks that own the vast majority of the habitat we wish to make better. So if we don't have adequate funding, we lose the opportunity to save species, to protect habitat, and to help private landowners do good things with their land, which helps our communities.

Senator CARPER. Thank you, sir.

One last question I have. I think Mr. Sullivan may have commented on that, the issue of wildlife crossings. I am going to ask Andy Treharne, if you would, to comment on this as well.

I think, in your testimony, Mr. Treharne, you mentioned the importance of habitat connectivity. You expressed support for wildlife crossing provisions that this Committee reported unanimously as part of the transportation bill we reported out in the last Congress.

I think that was the first time ever in a highway bill we included such comprehensive language to address quite a number of things as an important issue.

Mr. Treharne, briefly, would you elaborate on the importance of addressing wildlife vehicle safety and habitat connectivity, and specifically, the importance of integrating these solutions throughout a highway bill, please?

Mr. TREHARNE. Yes, thank you, Chairman Carper. The reality is that, as I said in my testimony in my opening remarks, there are about 2 million vehicle collisions with large animals across the country each year.

This is not only a human safety issue, but there is also a cost to taking those animals off the landscape, whether it is because you like to look at them or for biodiversity, or because somebody

would have otherwise purchased a hunting license and harvested one to feed their family. It is a public safety issue. With so many emerging challenges we are facing, wildlife needs to be able to move, especially migrating wildlife.

One of the pleasures I have had in my life was serving on the Habitat Stamp Committee for the State of Colorado, which directed funding to some projects. During that time, there was some wildlife crossing work going on on Highway 9. Large animals collisions were something like 35 percent of all reported crash types on that highway.

It is up in the mountains at a higher elevation. Very dangerous, and sportsmen and women chipped in a lot through their support of the State Fish and Wildlife Agency, working with CDOT to develop that project. It has had a 90 percent reduction in wildlife-vehicle collisions. Other species are using it: Mule deer, elk, turkeys, mountain lions, coyotes, river otters.

So there is a lot of opportunity to build this infrastructure and incorporate it into larger programming and existing programming, too. Things like the Federal Lands Transportation Program, Federal Lands Access Program, as I mentioned in my testimony, Section 1125 from ATIA, those are all great things that can be helpful for biodiversity as well as public safety in a highway bill.

Senator CARPER. All right. Thanks for your response to that question, Andy. Again, give our best regards if you come across Dr. Wayne Allard, also former Senator Wayne Allard, give him our best. His friends here in the Congress, Democrats and Republicans alike, send their best to him.

I really want to thank Dr. Gerber, I want to thank the real Ed Sullivan, and Andy Treharne and John Schmidt for joining us today. We may have some follow up questions for the record, but if you do receive those, I really ask that you respond to them.

It has been a good hearing. Over half of our Committee, I think, has joined us either in person or virtually, and will, I am sure, have some follow up questions. We would ask you to respond to them as soon as you can.

In my opening statement, I talked about just how high the stakes are when it comes to biodiversity loss. It bears repeating again. We have a moral, as well as an existential imperative to come together and take action on this vital issue. It is no overstatement to say that our lives and our livelihoods and those of our children and their children hang in the balance, so I am proud that we have been able to meet today to examine how we might tackle this critical problem.

I am hopeful that today's conversation is not the end, but the beginning of our work together this Congress as we build further on the Committee's reputation as an effective, bipartisan committee of workhorses. You have all heard the term show horses. We like to think of ourselves in this Committee as workhorses, and I believe we are.

Couple of closing housekeeping items. I would ask unanimous consent to enter into the record the following written testimonies, letters, and statements, as well as other supplemental materials relevant to today's hearing topic. They include a statement from Dr. Thomas Lovejoy, Dr. Lee Hannah, also a written testimony

from Dr. Gabriela Chavarria about pollinator loss, and a letter from World Wildlife Fund about how the Big Cat Public Safety Act addresses biodiversity challenges.

Is there objection?

Hearing none, so ordered.

[The referenced information follows:]

TESTIMONY

Senate Committee on Environment and Public Works

Biodiversity and Climate Change

Thomas E. Lovejoy and Lee Hannah*

To begin, it is important to recognize that climate change while involving the physical system of the atmosphere is inextricably linked to biology. All life is built of carbon. Fossil fuels are but the products of ancient photosynthesis trapped in geological formations and now releasing their energy through combustion in a geological instant. Less obvious to many is the major source of incremental atmospheric carbon from the destruction and conversion of terrestrial ecosystems. Close to half of terrestrial ecosystem carbon is in the atmosphere and no longer in living systems.

The resulting and ongoing change in climate is universally manifest in physical terms: increasing temperature, changes in precipitation, and rising sea levels. The oceans are not only warmer but more acid because of CO2 concentration affects the carbonate equilibrium. Marine environments are also They all affect individual organisms and their required conditions well-honed by evolution and natural selection over time. Increasing numbers or species are on the move trying to track their required conditions. At double pre-industrial levels of CO2 sugar maple and all the benefits of autumn foliage and maple syrup and sugar will no longer occur in New England, but rather in Canada.

Some species can move upward in altitude like the American Pika, or Edith's Checkerspot Butterfly, but that only works if upslope habitats are intact and available for colonization. Eventually those upslope opportunities run out – a process which has been likened to an elevator to extinction. Several resurveys of tropical birds have found species moving upslope or disappearing locally when they run out of upslope space. Those local extinctions will turn into global extinctions if we don't get climate change under control.

Island species, especially those on low lying islands, are impacted by sea level rise as well as upslope movement. The Key Deer only has a future if there are populations not vulnerable to the sea level rise facing the Florida Keys.

Our national parks created to conserve iconic species and awesome landscapes will find it challenging to fulfill their original purposes. Joshua Trees already growing outside of the Joshua Tree National Park led to a boundary change, so they can still be included. Death Valley is becoming unceasingly inhospitable, even to the plants and animals specially adapted to its harsh conditions. The National Park Service has recently had to release new guidance to park managers because climate change is pushing our parks into uncharted territory (https://www.nytimes.com/2021/05/18/climate/national-parks-climate-change.html). All our

protected areas are changing biologically, both domestically and abroad in incredibly important tropical forests and other unique habitats.

Animal and plant Species on the move require landscapes that enable not impede them. So, restoring natural connections between isolated natural areas will be vital. One way to improve that situation generally is to restore riparian vegetation. Vegetation along watercourses prevents soil erosion and assists water quality so there are multiple benefits from general restoration and protection of riparian zones.

We also are seeing multiple examples where a natural history feature is vulnerable to climate change. For example, musk oxen, caribou and reindeer are all raising underweight young. This is a consequence of winter foraging for female caribou now being impeded by frozen rain which has replaced fluffy snow.

As climate change advances there will be greater changes in biological systems. The most dramatic we see are tropical coral reefs. An increase in temperature not for very long causes the coral animal to eject the symbiont alga: the entire reef ecosystem collapses in what are known as coral bleaching events. These have now affected every major coral reef-harboring ocean on the planet and are becoming more and frequent.

Another example would be the coniferous forests of western North America where climate change has tipped the balance in favor of native bark beetles. Longer summers allow an additional generation of beetles and more survive the milder winters. Consequently, there are places where 70% of the trees are dead and ready to contribute to historically unprecedented fires.

It is also clear looking ahead that with increased climate change there will be more disruptive change. To avoid this, climate change must be kept to no more than 1.5 degrees compared to pre-industrial levels and preferably less. There is also an imperative to initiate widespread "nature-based solutions". Not only must we assiduously protect remaining intact nature we must proactively engage in ecosystem restoration to start returning some of the atmospheric carbon to the terrestrial ecosystems.

To deal with these impacts on nature, 3 things need to happen. First, we need to get climate change under control, including the use of Natural Climate Solutions like reducing deforestation and reforestation.

Second, we need to continue our support to US National Parks and resource management agencies to deal with climate change. Park managers dealing with 100-year old infrastructure may not have time to think forward about climate change. We can't manage changing fire regimes if we can't put out the fires we have now

And finally, the US needs to push the Green Climate Fund (GCF) to help National Parks and nature adapt to climate change. Currently the GCF funds only human adaptation, and that is important work. But we need to also help nature through this crisis we've created – whether its helping a tropical park manage species shifting upslope or indigenous communities to manage fish they've never seen in their waters before, the GCF needs a green bottom line to go with the bottom line of human lives improved that it has already successfully established.

By getting climate change under control, helping parks and resources managers here at home and taking an active role in helping nature adapt to climate change internationally, the US can be an important leader in shaping this emerging public policy issue for better outcomes for people and other life on Earth.

*Thomas E. Lovejoy (George Mason University) and Lee Hannah (University of California, Santa Barbara have collaborated on biodiversity and climate change for more than two decades, most recently the 2019 book, Biodiversity and Climate Change: Transforming the Biosphere, pp i- xvi, 1-388, Yale University press

Written Testimony of Dr. Gabriela Chavarria

On behalf of the hearing on May 19, 2021 on "Examining Biodiversity Loss: Drivers, Impacts and Potential Solutions."

Chairman Carper, Ranking Member Moore Capito, and Members of the Committee. Thank you for inviting me to submit written testimony in support of the May 19, 2021, hearing on "Examining Biodiversity Loss: Drivers, Impacts and Potential Solutions."

My name is Gabriela Chavarria. I was an undergraduate at the National University of Mexico majoring in Biology, and I then earned my Master's degree and Ph.D. at Harvard University studying evolutionary biology of bumble bees. I am a board member of and a Science Advisor to Defenders of Wildlife and I live in Denver, Colorado.

I would like to include this written testimony to add information on the biodiversity loss of pollinators and their important role in pollination. Pollination is an ecosystem function that is fundamental to plant reproduction, agricultural production, and the perpetuation of terrestrial biodiversity (1,2). An estimated 87.5% (approximately 308,000 species) of the world's flowering plants are pollinated by insects and other animals, and more than three quarters of the major types of global food crops derive at least some benefit from animal pollination. The process is estimated to advantage one third of the volume of food produced globally (1, 2).

According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES): 'The complexities of plant–pollinator interactions, even in modern agricultural ecosystems, are poorly understood because usually more than one pollinator species is involved, and they vary between seasons and locality. There are over 20,000 species of bees worldwide; they are the dominant pollinators in most ecosystems and nearly all bees are pollinators. Flies are the second most frequent visitors to most flowers with approximately 120,000 species. In addition, some butterflies, moths, wasps, beetles, thrips, birds and bats and vertebrates also pollinate plants, including crops.' Although the most common pollinators are insects, this is not exclusively so: around 1,500 species of mammals and birds have been reported to transfer pollen between flowers. The total number of different pollinator species may number as many as 200,000, which serve to fertilize around 308,000 species of flowering plants (1,2).

Bees are vital to U.S. agriculture, pollinating foods that make up roughly a third of our diet, including the most nutritious portions, such as fruits and leafy greens. But commercial beekeepers continue to report escalating losses of 42 percent or more of their bees, jeopardizing $30 billion in annual revenue and our health.

In North America, a significant decline in commercially managed honeybee colonies during the winter and spring of 2006-2007 led to the losses of about one third of honeybees. This was the first widespread report of a type of event called Colony Collapse Disorder (CCD). CCD has affected honeybees in 35 states of the United States. Some beekeepers report losses in their colonies as high as 80 to 100 percent. If left unchecked, CCD has the potential to cause a $15 billion direct loss of crop production and $75 billion in

indirect losses (3). About 1/3 of the North American diet comes from food – fruits, vegetables, seeds, and nuts – that rely on animal pollinators, which include beetles, butterflies, flies, bats, hummingbirds, and bumble bees (4). Honey bees are essential crops pollinators in the United States: they are indispensable farmhands, pollinating some 95 kinds of fruits and vegetables (5). In 2000, the value of American crops pollinated by bees was estimated to be US$ 14.6 billion (6). Native and honey bees pollinate so many crops that if the decline is not stopped, it could impact many crops dependent on animal pollination and cause both increased prices and shortages of many food crops including almonds, avocados, cranberries, apples, and soybeans (7).

The latest current data on honey bee trends were compiled in 2006 (Appendix II). The most reliable data are for domesticated honey bees, which indicate that a 25% decline of colonies occurred in central Europe (8) between 1985 and 2005, while in North America, during the years 1947–2005, 59% of managed honey bee colonies had succumbed (9,10). Nevertheless, as the result of a substantial expansion of the number of hives, mainly in Argentina and China, global honey bee stocks grew by nearly 50% (11). In contrast, other parts of the world, especially Europe and the USA, have suffered large colony losses, which were attributed to CCD (12).

It's not just domesticated honeybees at risk. A study (13) of bees in north-eastern USA (based on > 30,000 museum records representing 438 species, and spanning a 140-year period), published in *Proceedings of the National Academy of Sciences*, showed that 56% of species had exhibited significant changes in relative abundance over time, yet only 3 out of 187 native species of bee had declined steeply, all being of the genus *Bombus*. Declining relative abundance was associated with a small dietary and phenological (time of activity during the year) breadth and a large body size. Nonetheless, an increase in the relative abundance of species with lower latitudinal range boundaries was identified, which may be due to effects of climate change (13). Why outside of the genus *Bombus* only modest declines in native bee species occurred irrespective of pronounced changes in land use and significant elevations in human population density remains unknown. There is a need for well-documented cases of specific pollinator declines, as much uncertainty remains regarding pollinator-pollination declines (12).

The available science suggests that the most worthwhile conservation efforts would be focused on maintaining native bee abundance and diversity and hence the ecosystem services they provide (13). However, it is difficult to know whether a wholesale decline in insect pollinator species (including non-bee species) is occurring across the world, due to an insufficient geographically widespread and long-term data. In a recent study (14), made in Germany indicates that a decline in the biomass of flying insects had occurred by 76% in less than three decades, as sampled in nature reserves across the country (14). Goulson and Nicholls published an article (15) in which they described the well-documented declines in bee numbers as being 'the canary in the coalmine', arguing that 'their declines are probably indicative of widespread reductions in insect diversity and abundance, driven by a range of anthropogenic pressures'.

The fate of our pollinators is tied closely to the current trend in farming: towards larger farms, where more intensive practices are used, with a major use of agrochemicals and monoculture cropping, to feed a rapidly increasing population of humans. Because of these factors, the drivers of pollinator declines in flying insects appear set to continue. Insects provide a whole host of vital ecosystem services, such as

being a food source for a range of larger creatures, controlling pests, and acting as decomposers, in addition to their role as pollinators. As world-renowned American biologist, researcher, theorist, naturalist and author, E.O. Wilson observed, 'If insects were to disappear, the environment would collapse into chaos' (16). Bees, as the best documented species, can be seen to be suffering from the consequences of chronic exposure to a range of stressors (17,15,18), which include: a loss of abundance and diversity of flowers, and a decline in suitable habitat for them to nest; long-term exposure to agrochemicals, including pesticides such as neonicotinoids; and infection by parasites and pathogens, many inadvertently spread by the actions of humans. Also, it is likely that climate change may further impact pollinators, for example bumble bees, which are cool-climate specialists. Moreover, the synergies of various kinds of stress factors should be noted: for example, exposure to pesticides is known to diminish detoxification mechanisms and immune responses, hence lowering the resistance of bees to parasitic infections. It is further conspicuous that for those wild non-bee insects – principally moths and butterflies – where data are available, the picture is also one of significant population losses (19). It will require many more detailed, more geographically encompassing, more species-inclusive, and longer-term studies, but the available evidence points to a clear continuing decline. Economic assessments of agricultural productivity should account for the "cost" of sustaining wild and managed pollinator populations (20).

Conclusion

Pollination by insects is vitally important for much of global and U.S. crop production, and to provide pollination services more widely throughout the planetary ecosystems. And this isn't a concern in far-away places: it is happening now, right here in the U.S., likely in your very state. As such, the prospect of an imminent 'pollination crisis' due to pollinator decline is extremely concerning to me as a scientist, is extremely concerning to the public, and should be extremely concerning to you. It is essential to recognize that pollination is not a free service, and that investment and stewardship are required to protect and sustain it. As Albert Einstein put it bluntly, "No bees, no food for mankind. The bee is the basis for life on this earth."

The U.S. should establish a National Biodiversity Strategy to address the five drivers of biodiversity loss, secure and restore ecosystem services, promote social equity and justice, and reestablish the nation as a global leader in biodiversity conservation. This approach would mobilize a stronger, more coordinated national response and create a blueprint for effectively tackling the challenge, and all pollinators should be incorporated in it.

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Appendix I

Federal and Non-federal groups working on pollinators:

Federal

Department of Defense Pollinators - DENIX (osd.mil)

Department of Energy Pollinator Protection Initiative | Department of Energy

Department of Transportation Pollinators | Ecosystem and Vegetation System Management | Environmental Review Toolkit | FHWA (dot.gov)

Department of the Interior

National Park Service Additional Pollinator Resources - Pollinators (U.S. National Park Service) (nps.gov)

U.S. Bureau of Land Management Pollinators | Bureau of Land Management (blm.gov)

U.S. Fish and Wildlife Service Pollinators Home Page - U.S. Fish and Wildlife Service (fws.gov)

U.S. Geological Survey Native Bee Inventory and Monitoring Lab (usgs.gov)

U.S. Department of Agriculture Pollinators | USDA

U.S. Environmental Protection Agency Protecting Bees and Other Pollinators from Pesticides | US EPA

Non-Federal

Pollinator Conservation Association http://www.pollinatorconservationassociation.org/

Pollinator Partnership Homepage | Pollinator.org

Xerces Society for Invertebrate Conservation The Xerces Society for Invertebrate Conservation

Appendix II

2006 data trends for honey bees from KLUSER, Stéphane, PEDUZZI, Pascal & United Nations Environment Programme, 2007 https://archive-ouverte.unige.ch/unige:32258

Starting in late 2006, commercial migratory beekeepers along the East Coast of the United States began reporting sharp declines in their honey bee colonies. Because of the severity and unusual circumstances of these colony declines, scientists named this phenomenon colony collapse disorder (CCD). Reports indicate that beekeepers in most states have been affected. Overall, the number of managed honey bee colonies dropped an estimated 35.8% and 31.8% in the winters of 2007/2008 and 2006/2007, respectively. Preliminary loss estimates for the 2008/2009 winter are reported at 28.6%. To date, the precise reasons for colony losses are not yet known. Honey bees are the most economically valuable pollinators of agricultural crops worldwide. Scientists at universities and the U.S. Department of Agriculture (USDA) frequently assert that bee pollination is involved in about one-third of the U.S. diet, and contributes to the production of a wide range of fruits, vegetables, tree nuts, forage crops, some field crops, and other specialty crops. The monetary value of honey bees as commercial pollinators in the United States is estimated at about $15-$20 billion annually. Honey bee colony losses are not uncommon. However, losses in recent years differ from past situations in that colony losses are occurring mostly because bees are failing to return to the hive (which is largely uncharacteristic of bee behavior); bee colony losses have been rapid; colony losses are occurring in large numbers; and the reason(s) for these losses remains largely unknown. Based on the available research over the past few years on the numerous possible causes of CCD, USDA concluded in its 2007-2008 progress report (released in June 2009)(Colony Collapse Disorder (usda.gov)) that “it now seems clear that no single factor alone is responsible for the malady.”

Funding for honey bee and CCD research at USDA’s Agricultural Research Service (ARS) increased following both the enactment of the 2008 farm bill (P.L. 110-246) and the FY2009 and FY2010 appropriations process (P.L. 111-8 and P.L. 111-80, respectively). These legislative actions contained additional provisions that would, among other things, provide additional funding for research and conservation programs addressing honey bees and pollinators. Total ARS funding for honey bee and CCD research averaged more than $7.7 million each in FY2007 and FY2008, increasing to $8.3 million in FY2009 and $9.8 million for FY2010.

Importance of honey bee Pollination honey bees (*Apis mellifera*) are the most economically valuable pollinators of agricultural crops worldwide and are the only bee species kept commercially in the United States (1). In the United States, bee pollination of agricultural crops is said to account for about one-third of the U.S. diet, and to contribute to the production of a wide range of high-value fruits, vegetables, tree nuts, forage crops, some field crops, and other specialty crops (2). The monetary value of honey bees as commercial pollinators in the United States is estimated at about $15 billion annually (2). Some studies report the estimated value of honey bee pollination at as much as $20 billion annually. This estimated value is measured according to the additional value of production attributable to honey bees, in terms of the value of the increased yield and quality achieved from honey bee pollination, including the indirect benefits of bee pollination required for seed production of some crops. About one-third of the estimated value of commercial honey bee pollination is in alfalfa production, mostly for

alfalfa hay. Another nearly 10% of the value of honey bee pollination is for apples, followed by 6%-7% of the value each for almonds, citrus, cotton, and soybeans. Overall, pollinator-dependent crops are reported to make up an estimated 23% of total U.S. agricultural production in 2006, up from an estimated 14% in the 1960s (3).

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The Honorable Thomas R. Carper
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May 28, 2021

Re: The Big Cat Public Safety Act (S. 1210) Supports the Conservation of Wild Tigers

Dear Chairman Carper and Ranking Member Capito,

On behalf of World Wildlife Fund (WWF) and our over 1 million members in the United States, I thank you and your Committee for holding the recent hearing on "*Examining Biodiversity Loss: Drivers, Impacts, and Potential Solutions*". I also want to encourage the Committee and Congress to consider taking a significant step to respond to the global biodiversity crisis and the impact it is having on some of our planet's most imperiled species by advancing the Big Cat Public Safety Act (BCPSA) - S. 1210.

The global loss of nature and biodiversity is one of the greatest global threats we face, negatively affecting not only species and ecosystems but also our societies, economies, and national security. The rate of species loss is now unprecedented in human history, and it continues to quicken due to a number of factors that are driven by human development practices and over-exploitation of our planet and its resources. The science tells us we must make concerted efforts to reverse these trends over the next decade in order to protect and begin to restore our planet's biodiversity, which we will need to do if we are going to ensure a secure and prosperous future for future generations.

Among the wildlife species that have seen some of the steepest population declines over the past century is also one of the most iconic – the tiger. Across Asia, tigers have faced unrelenting pressures from poaching, retaliatory killings, and habitat loss. Increasingly forced to compete for space with dense and often growing human populations, the species now occupies only five percent of its historical range. While still far below their population of roughly 100,000 a century ago, thanks to concerted conservation efforts, the number of tigers in the wild is now stable or increasing in India, Bhutan, Nepal, Russia, and China. The overall global population of wild tigers is now estimated at roughly 3,900 – up from an

estimated 3,200 a decade ago. Nevertheless, the species remains in crisis in other areas, including Southeast Asia, with their numbers continuing to decrease, and much remains to be done if we are to secure a future for tigers in the wild.

Captive Tigers: A Global Conservation Issue

To save wild tigers, it is critical to tackle the problem of captive tigers and the role they play in driving the overall demand for tigers and their parts. This is why WWF urges the Committee to advance the BCPSA, not only to address animal welfare and public safety issues, but also to help ensure the continued recovery of tiger populations in their wild habitats in Asia.

WWF first began to raise the alarm around the U.S. captive tiger issue in 2006/2007 with the publication of *Paper Tigers? The Role of the U.S. Captive Tiger Population in the Trade in Tiger Parts*. We have been working to advance policy solutions ever since. Many of our partner organizations supporting BCPSA focus on the significant animal welfare and public safety issues involved in the keeping of captive big cats, which the bill would certainly address. WWF also highlights the conservation threat posed by a large, poorly regulated captive tiger population that could filter into the international illegal trade in tiger parts and products. This trade remains the most immediate threat to the survival of tigers in the wild.

Asia's Tiger Farms

Illegal killing of tigers to obtain their body parts – mostly bones and skins – continues to threaten their survival in the wild. Complicating that threat are the more than 7,000-8,000 tigers estimated to be housed in Asian tiger farms, mostly in China, Laos, Vietnam and Thailand. These farms act as sources of illegal trade in captive tigers and their parts and products, which confuses and complicates enforcement efforts, providing cover for illegal trade in wild tigers and their parts and products. In addition, the existence of these farms and speculation around any potential future legal trade in farmed tiger parts confuses consumers and complicates and undermines efforts to reduce demand for these products.

That speculation almost became reality in 2018 when China published a regulation that would have overturned a 25-year ban on commercial trade in tiger bone and rhino horn. At the time of that 1993 ban, tiger bone and rhino horn were removed from the official pharmacopeia of Traditional Chinese Medicine. The new regulation would have allowed trade from farmed rhinos and tigers to hospitals for use as medicine. The 1993 ban has been critical in helping to prevent the extinction of tigers by curbing demand in what was historically the world's largest consumer market. The resumption of that market would have set tiger conservation efforts in China, and across the globe, back by decades. Fortunately, with swift and strong international push back, China put a temporary hold on the regulation. However, with tiger farms still in operation, the threat they pose continues to be very real.

There is ample evidence of tiger farms feeding the illegal, international trade in tigers and their parts and products. TRAFFIC's 2016 report, *Reduced to Skin and Bones Re-examined*,[2] demonstrates the severity of the ongoing threat from poaching and illegal trade, with seizures

of the parts and products from an average of at least 110 tigers killed and traded each year since 2000. The true number is surely higher, given that these figures come from reported seizures and much of the trade goes undetected. TRAFFIC's report also found that an estimated 30 percent of tigers seized between 2012 and 2015 were reported to come from captive facilities (farms, zoos and tourist attractions), highlighting the growing role of these facilities in contributing to the illegal tiger trade.

U.S. Captive Tigers: Leading By the Power of Our Example

Numbering an estimated 5,000 tigers, the U.S. captive tiger population is likely second only to that of China's tiger farms (estimated to be over 6,000) and far exceeds the approximately 3,900 individuals that are believed to exist in the wild today. While the U.S. has long been a leader in global wildlife conservation, it has not done enough to ensure its own captive tiger population is not contributing to illegal trade or fueling demand for tiger parts. U.S. leadership to address this issue, including through passage of the BCPSA, would set a strong standard and bolster efforts to crack down on the explosion in the number of captive tigers, particularly in Southeast Asia, where wild tiger populations face some of the greatest threats to their survival.

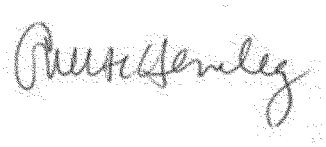
The U.S. started a global wave earlier this decade when, in response to the poaching crisis in Africa, the U.S. government tightened regulations on domestic trade in elephant ivory. Many countries followed suit, most notably China. The U.S. should step up in the same way now for tigers. By passing the BCPSA into law and more strictly regulating big cats in the U.S., the U.S. government can increase its diplomatic leverage and its chances of convincing other countries to do the same, including where the conservation risks to wild tigers are greatest. Conversely, if the U.S. continues to fail to act to address the captive tiger problem in its own backyard, then it may prove impossible to secure commitments from countries such as China or Vietnam to take those same steps. This has proven true in the past, with other governments pointing to America's own captive tiger problem to demonstrate a lack of credibility when the U.S. has advocated for other countries to close their tiger farms. Passage of the BCPSA would therefore backstop the ability of the U.S. to make progress in these bilateral discussions and to secure greater protections for wild tiger populations in Asian range states.

First drafted over a decade ago, the BCPSA has evolved to incorporate the inputs of a wide range of stakeholders, including conservation organizations such as WWF. The legislation now before Congress would effectively address the serious implications of the United States' large captive tiger population and has broad and bipartisan support. WWF believes that the bill as introduced reflects well the inputs and interests of numerous sectors and provides a fair, reasonable, and rational approach to this persistent problem. It would get us a significant step closer to a more secure future for wild tigers.

WWF strongly encourages the Committee to take up S. 1210, the Big Cat Public Safety Act, and to report it out favorably for consideration by the full Senate. We hope to see its final passage into law during the 117th Congress.

Thank you for your ongoing leadership on efforts to protect and restore biodiversity, both in the United States and globally.

Sincerely,



Ginette Hemley
Sr. Vice President, Wildlife Conservation
World Wildlife Fund

WASHINGTON, DC

MAY 6, 2021

Statement from **Jamie Rappaport Clark,** president and CEO, Defenders of Wildlife on the Biden administration's "Conserving and Restoring America the Beautiful" report, that emphasizes the ways the federal government and states can voluntarily advance the goal of conserving at least 30% of U.S. lands and waters by 2030.

"We applaud today's action by the Biden administration to advance the conservation of at least 30% of our lands and waters by 2030," said Jamie Rappaport Clark, president and CEO, Defenders of Wildlife. "As a result of escalating threats, including climate change and habitat destruction, 1 million species around the world may face extinction. Science tells us that we need to change course to save species – and ourselves – and that achieving the 30x30 goal is a key part of the solution. The recommendations from the administration recognize that we must engage all interested constituencies to create enduring solutions for climate and biodiversity. We are excited to support this growing local, national and global effort."

Defenders of Wildlife is dedicated to the protection of all native animals and plants in their natural communities. With nearly 2.2 million members and activists, Defenders of Wildlife is a leading advocate for innovative solutions to safeguard our wildlife heritage for generations to come. For more information, visit defenders.org/newsroom and follow us on Twitter @Defenders.

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Senator CARPER. Senators will be allowed to submit questions to our witnesses for the record through close of business on June the 2nd. We will compile those questions and will send them on to our witnesses. We ask our witnesses to reply by June the 16th.

My script here says that, I am supposed to, at this point, to say the hearing is adjourned, but I am not quite ready to do that.

A very clever staff, probably with some input from our Republican friends, has, at my request, looked to see if there is anything in song that relates to today's hearing. I mentioned, to the real Ed Sullivan, who is one of our witnesses today, Edmund Sullivan, I asked my staff to take a look at one of the folks who, one of the groups that was on the Ed Sullivan Show when I was in college, I think.

The Beatles, there's a species to themselves, with some interest to all of us. Ladybug is the State bug from Delaware, by the way, but I asked my staff to take a look and see anything in the Beatles' repertoire that reflects biodiversity.

As it turns out, remarkably, there are more than a few songs. I mentioned one of them, I Am the Walrus, another is Blackbird, Blackbird, Singing in the Dead of Night, Norwegian Wood, Isn't It Good, And Your Bird Can Sing, Bluejay Way, Rocky Raccoon, Mother Nature, Son, Everybody's Got Something to Hide Except for Me and My Monkey, Octopus's Garden, and the playlist goes on. For some of us, in my generation, that is a playlist of my life.

With respect to life, if we don't look after it, if we don't focus on biodiversity and root causes of the threat to biodiversity, our lives are—I don't mean to be overly dramatic—but our lives and the lives of the people we care about are threatened.

We can do something about it. I am encouraged in this Committee, we are committed to doing that.

With that, I think this hearing is adjourned.

My thanks to everyone who has participated. I want to thank our Republican colleagues who are here on my right, and the Democratic staff, the majority staff, directly behind me, and everybody that has worked on this hearing today.

For those of you as witnesses who joined us in person and from afar, thank you very much.

Good luck, God bless, see you soon.

And with that, this hearing is adjourned.

[Whereupon, at 11:42 a.m., the hearing was adjourned.]

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