Adapting to Climate Change
A National Landscape Conservation Strategy

"In the 19th century, we devoted our best minds to exploring nature. In the 20th century, we devoted ourselves to controlling and harnessing it. In the 21st century, we must devote ourselves to restoring it."
---Steven Ambrose

"We invest in conservation because it is an expression of our faith in the future."
---Jim Levitt

Statement of Problem. The American people are fortunate to have hundreds of millions of acres of private, state and federal lands managed and conserved for fish and wildlife—but even these vast expanses are in jeopardy from climate change, fragmentation, invasive species, human development, increasing public use, and other threats. Recent international scientific assessments have sounded the alarm on the global biodiversity crisis, warning that up to one million species may be threatened with extinction worldwide,[1] and highlighting the rapidly accelerating threat that climate change poses to ecosystems worldwide.[2,3] These reports reinforce multiple warnings from U.S. agencies about the varied and severe climate impacts to species and habitats that are already upon us and are projected to worsen.[4,5]

America's fish and wildlife are contending with—and losing against—these mounting threats. New research presents alarming evidence that bird populations in the U.S. and Canada have declined by 29 percent, or almost 3 billion birds, in the past 50 years.[6] Another study found that a 3.0ºC increase in global temperature could put two-thirds of North American bird species at risk of extinction.[7] State fish and wildlife agencies have identified more than 13,000 Species of Greatest Conservation Need

---

[1] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Report of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on the work of its seventh session, Addendum: "Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services," Key Message A. (May 29, 2019); available at https://www.ipbes.net/system/tdf/ipbes_7_10_add-1-_advance_0.pdf?file=1&type=node&id=35245

[2] Intergovernmental Panel on Climate Change. Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security and greenhouse gas fluxes in terrestrial ecosystems. Summary for Policymakers. (August 7, 2019); available at https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

[3] Intergovernmental Panel on Climate Change. The Ocean and Cryosphere in a Changing Climate. Summary for Policymakers (September 22, 2019); available at https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

[4] U.S. Global Change Research Program. Fourth National Climate Assessment, Volume II: Impacts, Risks and Adaptation in the United States (*see, especially* chapters 5 through 9); available at https://nca2018.globalchange.gov/

[5] National Fish, Wildlife and Plants Climate Adaptation Partnership. 2012. National Fish, Wildlife and Plants Climate Adaptation Strategy; available at https://www.wildlifeadaptationstrategy.gov (website is currently unavailable due to an encryption error).

[6] Rosenburg, KV, AM Dokter, et al. 2019. Decline of the North American avifauna. Science 366 (6461): 120-124.

[7] Wilsey, C, BL Bateman, et al. 2019. Survival by Degrees: 389 Bird Species on the Brink. National Audubon Society. New York, NY; available at https://www.audubon.org/sites/default/files/climatereport-2019-english-lowres.pdf

nationwide.[8] Similarly, American Forests estimates that more than 17,000 species of animals and plants in the U.S. are at risk of extinction.[9] Roughly 10 percent of imperiled species are federally protected under the Endangered Species Act, which lists 1,662 U.S. species as endangered or threatened.[10] However, even for those listed species, the federal agencies charged with their recovery have incorporated actions relating to climate change into only 18 percent of management documents for endangered animals.[11]

Given the ongoing habitat loss, fragmentation and degradation, effects from overutilization and invasive species, and the additive threat of climate change, it is clear that the U.S. faces a major conservation challenge in the 21st century: preserving enough resilient, natural and connected habitat to support functioning watersheds and ecosystems, biodiversity, and species movement in response to climate change and other factors. Our coalition understands the urgent need to reduce greenhouse gas emissions in order to mitigate future climate warming. We recognize the numerous existing legislative proposals and input to the Select Committee to affect these needed reductions. However, we also urge Congress to recognize the critical need to take bold action to protect our country's natural heritage from climate threats that are already upon us.

Proposed Solution. The U.S. needs to develop, implement, and regularly update a National Landscape Conservation Strategy to adapt to climate change, building on existing climate science, strategies and conservation initiatives. Maintaining the capacity of America's lands to provide for robust and diverse populations of fish and wildlife and dependent recreational economies in the face of climate change and other threats will require an unprecedented engagement in *science*, *planning*, and *management and protection* of habitats nationwide. Simply expanding existing conservation programs is not likely to produce effective ecological resilience to climate change and could waste conservation resources. Instead, a comprehensive and coordinated national strategy is needed to identify the key areas that will need to be conserved, to protect important habitat now, and in the future, and to protect landscape-scale connectivity through the purchase of conservation easements, habitat creation, enhancement, and restoration and changes in land management. Such a strategy will need to establish conservation priorities and coordinate the work of numerous federal and state agencies, and even NGOs. To implement this strategy, the U.S. needs a massive investment in conserving and enhancing tens of millions of acres, emphasizing conservation of large expanses of high-quality habitat, connected across landscapes, political jurisdictions and management regimes. Fortunately, many of the elements of this strategy are already in place, though they have been underfunded or ignored at the federal policy level over the past three years. This proposed solution is consistent with biodiversity protection goals released by the United Nations in early 2020.[12]

Science: Successful conservation will depend on improved analysis of key threats to species and habitats, including a spatially explicit understanding of the gaps in our current conservation estate.

---

[8] State Wildlife Action Plans (database); available at https://www1.usgs.gov/csas/swap/

[9] Sprague, E, J Hynicka and J Lerner. 2017. Wildlands for Wildlife. American Forests Magazine (Summer). https://www.americanforests.org/magazine/article/wildlands-for-wildlife/

[10] US Fish & Wildlife Service Listed Species Summary. Accessed December 3, 2019. https://ecos.fws.gov/ecp0/reports/box-score-report

[11] Delach, A, A Caldas, et al. 2019. Agency plans are inadequate to conserve US endangered species under climate change. Nature Climate Change 9: 999-1004; available at https://www.nature.com/articles/s41558-019-0620-8

[12] United Nations Environment Program, Convention on Biological Diversity. Zero Draft of the Post-2020 Global Biodiversity Framework. Jan 6, 2020. https://www.cbd.int/doc/c/efb0/1f84/a892b98d2982a829962b6371/wg2020-02-03-en.pdf

Conservation maps and plans already exist for some regions of the country. For other areas, and for many species, future threats and habitat needs are not yet well understood. A comprehensive strategy to adapt to habitat fragmentation and climate change should begin with assessment of species and ecosystem vulnerability, considering measures of exposure, sensitivity, and adaptive capacity, to better understand threats to natural systems. Habitat distribution modeling can help to identify future ranges and gaps in connectivity, as well as potential climate refugia, which are areas likely to experience lower rates of change due to topography, orientation or other factors. These assessments can then inform planning and management by governments and conservation partners to help wildlife adapt to the myriad threats of climate change. The need for a strong scientific basis in climate change adaptation was recognized in the 2012 National Fish, Wildlife and Plants Climate Adaptation Strategy within *Goal 4: Support adaptive management in a changing climate through integrated conservation and monitoring and use of decision support tools;* and in *Goal 5: Increase knowledge and information on impacts and responses of fish, wildlife and plants to a changing climate*. [13]

Entities like the U.S. Global Change Research Program,[14] the National Science Foundation's Long-term Ecological Research Network,[15] Climate Adaptation Science Centers,[16] Landscape Conservation Cooperatives,[17] Regional Integrated Science and Assessment teams,[18] U.S. Department of Agriculture Climate Hubs,[19] and U.S. Forest Service Research Stations[20] are developing and delivering actionable science to help understand and combat the various threats to natural resources around the country.

Legislative Needs:
Congress should ensure that these entities have the authority, funding and support they need to continue and expand on this critical work.

Planning: The Obama administration prioritized managing lands and waters for climate preparedness and resilience, overseeing the development and implementation of the National Fish, Wildlife and Plants Climate Adaptation Strategy,[21] the Freshwater Action Plan,[22] and the National Ocean Policy Implementation Plan,[23] and climate adaptation modules for Strategic Sustainability Performance Plans[24] for all federal agencies. These plans have been left to languish under the Trump administration. Congress should reinvigorate and encourage agencies to recommit to such plans and ensure they are appropriately updated. The U.S. Fish and Wildlife Service and National Marine Fisheries Service, charged

---

[13] *Op cit.,* National Fish, Wildlife and Plants Climate Adaptation Partnership. Pages 67-73.
[14] See http://globalchange.gov
[15] See https://lternet.edu
[16] *See* https://www.usgs.gov/land-resources/climate-adaptation-science-centers
[17] *See* https://lccnetwork.org/
[18] *See* https://cpo.noaa.gov/Meet-the-Divisions/Climate-and-Societal-Interactions/RISA
[19] *See* https://www.climatehubs.usda.gov/
[20] *See* https://www.fs.fed.us/research/locations/
[21] *Op cit.,* National Fish, Wildlife and Plants Climate Adaptation Partnership.
[22] Interagency Climate Adaptation Task Force. 2011. National Action Plan: Priorities for Managing Freshwater Resources in A Changing Climate; available at https://www.epa.gov/sites/production/files/2016-12/documents/2011_national_action_plan_1.pdf
[23] National Ocean Council. 2013. National Ocean Policy Implementation Plan; archived at https://obamawhitehouse.archives.gov/sites/default/files/national_ocean_policy_implementation_plan.pdf
[24] Obama White House Archives. 2017. Federal Agency Strategic Sustainability Plans; archived at https://obamawhitehouse.archives.gov/administration/eop/ceq/sustainability/plans

with protecting our most imperiled species under the Endangered Species Act, must also do a more thorough job of incorporating climate change effects in planning for species recovery. Additionally, Congress should provide more support for including climate change in state and tribal planning processes; many states have already taken the initiative to do this in their regularly updated State Wildlife Action Plans. We recommend that Congress codify, and provide funding and additional authority, as needed, to update and implement climate-smart State Wildlife Action Plans. Ensuring a commitment to strong and updated planning processes is in line with *Strategy 2.1* of the 2012 National Fish, Wildlife and Plants Climate Adaptation Strategy: *Update current or develop new species, habitat, and land and water management plans, programs and practices to consider climate change and support adaption*.[25]

In addition to these science and planning collaboratives, scientific and conservation organizations, working with federal and state agencies and other partners, have modelled and assessed habitat conditions and developed plans to support species and ecosystems to adapt to climate change nationwide. For example, The Nature Conservancy, through its Resilient and Connected Landscapes[26] project, is identifying areas that must be conserved to protect the functionality of ecosystems in a warming world. There are numerous other regional models for large landscape conservation that can inform a National Landscape Conservation Strategy, such as the collaborative 3000-mile Spine of the Continent conservation initiative along the Rocky Mountains; [27] American Forests' "Wildlands for Wildlife" initiative;[28] and Harvard University Forest's Wildlands and Woodlands vision[29] that calls for 70 percent of New England to be under forest cover by 2060. Our Nation's challenge will be to fully realize these initiatives and to duplicate them in other ecoregions, such as the Appalachians, Sagebrush Sea, Prairie Potholes and grasslands, and coastal plains, to create a true National Landscape Conservation Strategy that will conserve and restore the most important habitats today and in coming decades as climate change acts on the landscape and shuffles ecosystems.

Legislative needs:
Congress should pass The SAFE Act, which reinvigorates and codifies the National Fish, Wildlife, and Plants Climate Adaptation Strategy, and also improves the federal government's ability to assist state, territorial, local, and tribal governments as they prepare for and respond to climate change effects, with new authorities and resources.[30]

Management and Land Protection: Conserving wildlife in the face of climate change and other threats will require a new paradigm in management and a substantial new investment in protecting and connecting lands and waters, based on the science and planning elements described above. This ambitious strategy must include all land ownerships, employ existing programs and mechanisms and

---

[25] *Op cit.,* National Fish, Wildlife and Plants Climate Adaptation Partnership. Page 61.
[26] Anderson, MG, A Barnett, et al. 2016. Resilient and Connected Landscapes for Terrestrial Conservation. The Nature Conservancy; report and data available at https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx
[27] Hannibal, ME. 2012. SPINE OF THE CONTINENT: THE MOST AMBITIOUS WILDLIFE CONSERVATION PROJECT EVER UNDERTAKEN. Lyons Press. Guilford, CT.
[28] *Op. cit*. Sprague et al. 2017.
[29] Foster, D, KF Lambert, et al. 2017. Wildlands and Woodlands, Farmlands and Communities: Broadening the Vision for New England. Harvard Forest, Harvard University; available at https://www.wildlandsandwoodlands.org/vision/ww-vision-reports
[30] https://www.congress.gov/bill/116th-congress/senate-bill/1482

seek new authorization and funding to achieve our national conservation goals. Our strategy will implement and facilitate a broad array of conservation measures, including improved management of federal and state lands; working with private landowners to manage and conserve connected habitats; carefully siting human infrastructure to avoid areas of ecological importance; mitigating impacts from new development; restoring and enhancing degraded and fragmented habitat; preserving and enhancing habitat connectivity; and restoring natural hydrological systems to retain water in mountain watersheds. Our strategy will be guided by spatially explicit and climate-informed understanding of threats, opportunities, and important habitats. It should establish clear directives and goals for habitat conservation and landscape-scale connectivity, including protection of wildlife migration corridors that are applicable across multiple taxa, are informed by an understanding of current and future microclimate biophysical factors, physical linkages and known and anticipated wildlife movements, utilize tools for assessing landscape permeability, and offer alternate pathways of movement into a future state. Perhaps most importantly, it will require the enthusiastic involvement of many important conservation and landowner organizations, as well as private landowners themselves. And of course, it will require securing financial resources necessary to implement the strategy and realize our conservation vision.

If fully developed and implemented, the management and land protection provisions of this National Landscape Conservation Strategy would help accomplish several of the most important goals of the 2012 National Fish, Wildlife and Plants Climate Adaptation Strategy:

Goal 1: Conserve habitat to support healthy fish, wildlife and plant populations and ecosystems functions in a changing climate; Strategy 1.1: Identify areas for an ecologically-connected network of terrestrial, freshwater, coastal and marine conservation areas that are likely to be resilient to climate change and to support a broad range of fish, wildlife and plants under changed conditions.

Legislative needs:
1) Additional funding and authorities to entities like the Climate Adaptation Science Centers, Landscape Conservation Cooperatives, Regional Integrated Science and Assessment teams, U.S. Department of Agriculture Climate Hubs, and U.S. Forest Service Research Stations, and state organizations such as Natural Heritage Programs to help identify areas that can contribute to an ecologically-connected network of terrestrial, freshwater, coastal, and marine conservation areas that will be resilient to climate change and support a broad range of fish, wildlife and plants under changed conditions.

2) Direction to federal agencies and incentives for states and territories to incorporate input and advice from the academic experts and the general public, including from non-governmental organizations and their climate resilience planning and mapping efforts, such as the Wildlands and Woodlands New England Forest Conservation Strategy and The Nature Conservancy's Resilient and Connected Landscapes maps, in identifying, mapping and prioritizing these areas.

2012 Strategy's Goal 1, Strategy 1.2: Secure appropriate conservation status on areas identified . . .to complete an ecologically-connected network of public and private conservation areas that will be resilient to climate change and support a broad range of species under changed conditions.

Legislative needs:

Increased funding for land acquisition and easements, with prioritization for lands and waters that have been identified via Strategy 1.1, through the following mechanisms (not an exhaustive list):

- Increased Farm Bill conservation program funding for private lands conservation, forest restoration and coastal resilience as provided in the Climate Stewardship Act[31]
- Public lands acquisition through the Land and Water Conservation Fund;
- Extension and expansion of the North American Wetlands Conservation Act[32] to improve habitat in wetlands and adjacent grasslands
- Robust federal funding to state and tribal fish and wildlife agencies to support conservation of threatened and endangered species and Species of Greatest Conservation Need

2012 Strategy 1.3 Restore habitat features where necessary and practicable to maintain ecosystem function and resiliency to climate change.

Legislative needs:
1) Increased federal appropriations for ecologically appropriate reforestation and restoration of other habitat types, including grasslands, arid lands, and coastal and inland wetlands, on federal public lands.

2) National investment, through new and existing programs, such as Farm Bill conservation programs in restoration of terrestrial and aquatic habitats on private lands, as provided in the Climate Stewardship Act.[33]

2012 Strategy 1.4 Conserve, restore, and as appropriate and practicable, ecological connections among conservation areas to facilitate fish, wildlife and plant migration, range shits and other transitions caused by climate change.

Legislative needs:
Statutory direction and incentives authorized in the Wildlife Conservation Corridors Act[34] to conserve and restore habitat connectivity and wildlife corridors on landownerships nationwide.

Additional funding and authorities would help advance two other key goals of the National Strategy, *2012 Strategy Goal 2: Manage species and habitats to protect ecosystem functions and provide sustainable cultural, subsistence recreational and commercial uses in a changing climate;* and *Goal 7: Reduce non-climate stressors to help fish, wildlife, plants and ecosystems adapt to a changing climate.*

Legislative needs:
1) Increased funding and direction for federal fish and wildlife agencies and the wildlife and habitat conservation programs within the federal land management agencies to ensure that they are managing species and habitats to facilitate adaptation to a changing climate;

---

[31] https://www.congress.gov/bill/116th-congress/senate-bill/2452
[32] https://www.congress.gov/bill/116th-congress/house-bill/925
[33] https://www.congress.gov/bill/116th-congress/senate-bill/2452
[34] https://www.congress.gov/bill/116th-congress/house-bill/2795

2) Robust federal funding and direction to state, territorial and tribal fish and wildlife agencies to support conservation of threatened and endangered species and Species of Greatest Conservation Need;

3) Direction to federal land management agencies to identify areas that should be free of development, including from new energy projects and associated infrastructure, to reduce habitat loss and fragmentation.

4) Retain robust and climate-informed NEPA planning requirements and process that effectively evaluate and avoid, minimize and mitigate for potential impacts from development proposals, including the cumulative impacts of climate change, in order to reduce conflicts between conservation lands and development and land use.

5) Strengthen authorities and increase funding to manage the damaging effects of pollution, invasive species, pests and pathogens, and to minimize the impacts of overharvest and incidental take on species.

Finally, we hope that Congress continue to engage with stakeholders in the sporting community, land conservation community, wildlife conservation and environmental organizations, and federal, state and tribal fish and wildlife agencies to develop and implement a National Landscape Conservation Strategy to adapt to climate change.