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Working to protect and restore Western Watersheds and Wildlife

February xx, 2023

President Joseph R. Biden
The White House
1600 Pennsylvania Ave NW
Washington, DC 20500

Dear President Biden:

We, the undersigned, appreciate your recognition of the urgency of the climate crisis and the existential threat it poses to human civilization, to native wildlife and fisheries, and to ecosystems by signing into law our country's greatest climate legislation to date, the *Inflation Reduction Act*. Building on the momentum this legislation has ignited, **we urge you to issue an Executive Order that closes all federally-managed public lands (public lands) in the United States to beaver trapping and hunting** as an emergency climate change and biodiversity loss response measure ([maps](#)).

Protecting beavers from this human-caused mortality would immediately implement a nature-based climate solution identified in the November 2022 report to The National Climate Task Force titled, [Opportunities To Accelerate Nature-Based Solutions: A Roadmap For Climate Progress, Thriving Nature, Equity, & Prosperity](#). In response to protection, beavers and their dams would begin expanding in numbers, setting in motion processes that would lead to the restoration of hundreds of thousands of miles of degraded streams and the creation of millions of hectares of new, nature-based **carbon capture and storage** (CCS) zones in the form of stream-corridor wetlands. These changes would in turn support the goals found in existing Executive Orders such as: 13990, [Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis](#) (January 25, 2021); 14008, [Tackling the Climate Crisis at Home and Abroad](#) (January 27, 2021); and 14072, [Executive Order on Strengthening the Nation's Forests, Communities, and Local Economies](#) (April 22, 2022). These new CCS zones would also add to the CCS contributions currently being made from existing coastal wetlands and mature and old growth forests.

The value of new wetlands cannot be overstated.¹ The Intergovernmental Panel on Climate Change and the International Energy Agency identified carbon capture and storage (CCS) as likely to play a vital role in efforts to address climate change.² In response, the Inflation Reduction Act provided critical updates to the 45Q tax credit for industries to incentivize the use of CCS technologies. Protecting beavers, therefore, directly compliments the Act because the newly-created wetlands become net carbon sinks once a minimum of 55% vegetation cover is achieved as above and below ground biomass expands, a change that usually occurs within two to five years.³ The effectiveness of wetland soils in carbon sequestration is reflected in the values listed below:

¹Zhu et al (2022). Conservation of carbon resources and values on public lands: A case study from the National Wildlife Refuge System. *PLoS One* 17 (1). 17 p.; Nahlik and Fennessy (2016). Carbon Storage in US wetlands. *Nature Communications*, 9p.

²Clean Air Task Force (2022). <https://www.catf.us/resource/carbon-capture-provisions-in-the-inflation-reduction-act-of-2022/>

³Valach et al (2021). Productive wetlands restored for carbon sequestration quickly become net CO2 sinks with site-level factors driving uptake variability. *PLoS ONE* 16(3)

- Store 3-10 times more carbon than the same volume of soil in a virgin forest, 6-14 times more than a secondary forest, and 7-35 times more than a grassland due to deep and extensive root networks.⁴ The amount of stored carbon varies depending on the site conditions.
- Store carbon for longer residence times (> 1,000 years) than upland forest soils (100s of years).⁵ This is an important contribution given the long-term challenge of climate change.
- Store 195 to 478 metric tons of carbon per hectare of soil (715 to 1,753 metric tons CO₂) depending on their type and location.⁶

In addition to new nature-based CCS, widespread, cost-effective, and rapid beaver-driven restoration of wetlands and stream ecosystems would provide additional valuable benefits such as those listed below. These benefits directly address other national challenges highlighted in the November 2022 *Opportunities to Accelerate Nature-Based Solutions* (p. 13, Table 1).

- **Temporarily store large volumes of surface and groundwater.** This storage would help 1) maintain stream baseflows once supplied by deep but now dwindling and less predictable snowpacks, 2) reduce flood magnitudes downstream by altering the volume and timing of floodwaters, and 3) increase water security for municipal and agricultural users by dampening extremes in flows [\(video\)](#).
- **Improve water quality.** Improvement would be the result of wetlands and ponds 1) trapping sediment and nutrients eroding from uplands, and 2) decreasing stream temperatures through increased groundwater inputs and deeper water depths. Reductions in temperatures and nutrient inputs would help decrease potential for algae blooms.
- **Increase the size and abundance of natural firebreaks.** These firebreaks 1) become refuges for wildlife and livestock during wildfire events, 2) provide post-fire habitat, 3) trap post-fire sediment eroding from hillslopes, helping to protect water quality and fisheries, and 4) alter fire patterns and severity in the surrounding area [\(video\)](#).
- **Improve and expand wildlife habitat.** Protecting beavers leads to greater diversity, abundance, and distribution of wetlands and riparian woody and herbaceous vegetation such as willows, dogwood, sedges, and rushes needed by beavers and other riparian-dependent species.
- **Improve and expand fish habitat.** Beavers and their natural infrastructure create colder stream temperatures, clearer waters, greater channel complexity, beaver ponds, greater vegetation and insect life – all of which are critical for salmon and other cold-water dependent species.

⁴Wohl (2013). Landscape-scale carbon storage associated with beaver dams. *Geophysical Research Letters*, Vol. 40, 1-6; Buringh (1984). Organic Carbon in Soils of the World (chapter 3) in *The Role of Terrestrial Vegetation in the Global Carbon Cycle: Measurement by Remote Sensing*. pp. 91-109.

⁵Valach et al (2021).

⁶Nahlik and Fennessy (2016).; <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#>:

The value of these benefits, also known as “ecosystem services”, is in the billions of dollars.⁷ This value is generated by the combination of benefits gained and costs no longer incurred as damaged streams and riparian ecosystems recover. As pointed out in numerous studies of ecosystem responses to beaver activity ([references](#)) and on the front page of [The New York Times](#), these benefits are experienced directly by a wide variety of individuals and communities. However, to receive these benefits and eliminate costs, beaver populations, their dams, and their distributions need to rapidly expand. Expansion requires increased survival rates. Protecting beavers by closing public lands to beaver trapping and hunting will improve their survival rates and is, in fact, the only mortality factor we can control.

SUMMARY OF KEY POINTS

The climate and biodiversity crises require actions that lead to rapid and large-scale tangible results. Protecting beavers on public lands will provide such results because it does the following:

- **Compliments** the *Inflation Reduction Act* and numerous Executive Orders by implementing a known nature-based climate solution (protecting beavers) that provides a host of benefits including bringing rapidly online another nature-based climate solution in the form of millions of hectares of new carbon capturing and storing wetlands.
- **Delivers** visual and measurable results rapidly ([video](#)) and provides cost-effective and widespread stream ecosystem restoration at the regional scale. The benefits gained will be in the billions of dollars.
- **Builds** on the hope generated by the recent passage of the *Inflation Reduction Act* for the millions of Americans struggling to cope with “eco-anxiety.” It does this by working with a charismatic species that is family-oriented, playful and hard-working ([video](#)), and capable of rapidly restoring health and diversity to degraded stream systems as they go about their daily lives. This kind of energy is infectious and a powerful antidote to despair and depression.
- **Inspires** public engagement in restoration. The ability to participate in restoring stream ecosystems will increase creativity and energy to find other opportunities to help solve our most pressing challenge – how to not only survive, but thrive during this time of great change.

WHY AN EXECUTIVE ORDER IS REQUIRED TO IMPLEMENT THIS NATURE-BASED CLIMATE SOLUTION

Our request for an executive order is the result of the following issues:

1. The accelerating, intertwined climate change and biodiversity loss crises, which beavers can help address.

⁷Zhu et al (2022); ECONorthwest (2011). The economic value of beaver ecosystems services: Escalante River Basin, Utah. 64p. (report); Thompson et al. (2021). Ecosystem services provided by beavers *Castor spp.* *Mammal Review*, 51(1), 25–39; The Conservation Fund (2013). Houston-Galveston – Green Infrastructure and Ecosystem Services Assessment, 16 p.; Industrial Economics Inc. (2011). Economic valuation of wetland ecosystem services in Delaware: Final report. Delaware Department of Natural Resources and Environmental Control, Division of Water Resources, Dover, DE. 133p.; Niemi et al (2020). Economic Benefits of Beaver-Created and Maintained Habitat and Resulting Ecosystem Services. Appendix F in “*Petition to Initiate Rulemaking to Amend OAR 635-050-0070 to Permanently Close Commercial and Recreational Beaver Trapping and Hunting on Federally-Managed Public Lands and the Waters that Flows Through These Lands*”, brought before the Oregon Fish and Wildlife Commission on September 24, 2020.

2. The futility of spending money and time on public lands creating beaver habitat, restoring stream-floodplain connectivity, and relocating beavers into these areas to further restoration and habitat building only to allow beavers to be killed via trapping and hunting.
3. The impact that historic and current trapping had, and continues to have, on beaver populations, the habitat they create and maintain, and the biodiversity that the habitat sustains.
4. The unwillingness of state wildlife agencies to protect beavers and allow them to help address climate change impacts and biodiversity loss as they modify their environments.

Only issues 3 and 4 are discussed below given the awareness of the crises, and the obvious contradiction between building habitat and relocating beavers only to allow them to be killed.

Impact of Historic and Current Beaver Trapping on Stream Ecosystems

Prior to the arrival of Europeans in North America, beavers, scientifically known as *Castor canadensis*, were found in nearly all aquatic habitats and estimated at 60-400 million individuals.⁸ They created and maintained vast networks of rich wetland habitat and complex rivers that generated much of the early wealth of what would become the United States.

Beginning in the 1600s, beavers began to be systematically trapped out of streams in response to demands of the international fur trade. If not for the fact that the beaver hat went out of style in the mid-1800s⁹ beavers may have gone extinct. As for the vast wetlands and complex river systems they created and maintained, and the abundant biodiversity their habitat sustained, these decreased as dams failed and were not repaired, channels incised, widened and were simplified, and water tables dropped. Riparian vegetation shifted to dryland species as other land uses took hold and gigatons of greenhouse gases, such as carbon dioxide, were emitted into the atmosphere.

The result of these historic changes is that stream ecosystems, and the human and wild communities that depend on them, are more vulnerable to climate variability.¹⁰ This vulnerability is rapidly increasing as climate change accelerates and the risk of system failure grows. Current beaver trapping and hunting contributes to this increased vulnerability by removing beavers during their breeding and pregnancy season when they are most secure from wild predators (winter). Removal of beavers means dams are no longer maintained, leading to dam failure and loss of habitat. It also means that populations remain suppressed, preventing the dispersal needed to build new dams and create new complex habitat such as wetlands. While some degraded streams will need a human assist because of specific site conditions, many streams simply lack beavers.

Inability of State Wildlife Agencies to be Proactive in Climate Change Preparations

Beavers are key to rapid and landscape-scale restoration of stream ecosystems and wetland development. Yet state wildlife agencies refuse to provide protections. Currently, only California and New Mexico have trapping bans that protect beavers, and these are recent. California closed its entire state to

⁸Naiman et al. (1988). Alteration of North American Streams by Beaver. *BioSciences*, Vol. 38, No. 11, pp. 753- 762, citing Seton (1929).

⁹Backhouse, F. (2015). Once They Were Hats: In Search of the Mighty Beaver.

¹⁰Fouty (2018). Euro-American beaver trapping and its long-term impact on drainage network form and function, water abundance, delivery, and system stability [Chapter 7] In: Johnson et al (tech. eds.), *Riparian research and management: Past, present, future: Volume 1. Gen. Tech. Rep. RMRS-GTR-377. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.* p. 102-133

all trapping in 2019 and New Mexico closed its public lands to all trapping in 2022. These closures took 15 to 20 years to accomplish, and eventually required legislative action.

In Oregon, known as the “the beaver state,” efforts to protect beavers have been underway for the last 14 years without success. The most recent efforts to close public lands to beaver trapping and hunting involved proposals brought before the Oregon Fish and Wildlife Commission (2020, 2022) and the Oregon state legislature (2021). These efforts failed even as Oregon experienced severe droughts and wildfires that left towns burned to the ground, charred remains of livestock and wildlife, and fish belly up as sediment and ash filled the streams. The efforts failed even though Oregon has had two prior state-wide beaver trapping closures (1899-1917 and 1932-1952),¹¹ and less than 200 people in the state currently trap and hunt beavers on Oregon’s public lands.¹²

Oregon’s two prior state-wide legislative closures were enacted in response to water and soil resource concerns. The first closure (1899-1917) followed on the heels of the 1893 closures in drought-prone Baker and Malheur Counties to improve stream flows.¹³ Beaver-generated benefits were considered so important that Oregon kept its national forests closed even when other parts of the state were reopened to trapping. In contrast to this prior proactive approach, beaver trapping and hunting is currently allowed on public lands even though 50% or more of the state has experienced moderate to exceptional drought in eight of the last ten years (2013-2022).¹⁴

[State regulations](#) vary. Beaver trapping and hunting seasons range from a couple of months to year-round. Most states have no limits to the number of beavers that can be killed, and reporting requirements are minimal. The failure of the state wildlife agencies to protect beavers is puzzling until one realizes that their goal is to meet the desires of hunters and trappers who contribute to their funding via licenses and equipment purchases. As a result, state wildlife agencies ignore the wealth of information about the societal, economic, and environmental benefits derived from beaver-created and maintained habitat. They ignore the serious consequences of climate change and biodiversity loss to communities and the essential contributions beavers can make towards improving conditions. And they ignore studies showing that the cessation of trapping, or its absence after beaver reintroductions, result in increased beaver numbers, distribution, habitat, and benefits ([references](#)).

The narrow focus of the state wildlife agencies has serious consequences. Failure to protect beavers is helping keep hundreds of thousands of miles of streams locked into degraded conditions. It is also contributing to the billions of dollars in lost benefits and in the emotional and financial costs incurred as floods, droughts, and wildfires destroy towns, livelihoods, and fish and wildlife, and as distinct salmon populations become listed as threatened, endangered, or go extinct ([video](#)). On the West Coast alone, NOAA has listed 28 population groups of salmon and steelhead as threatened or endangered under the Endangered Species Act.¹⁵ Clearly, the broader human and wild community can no longer afford the luxury of this narrow state wildlife focus. A new national approach to this ecosystem engineer is needed.

¹¹Kebbe, C.E. (1960). Oregon’s beaver story. *Oregon State Game Commission Bulletin*. February 1960. No. 2, Vol. 15: pp. 3-6.

¹²Oregon Department of Fish and Wildlife (2022). Oregon Furbearer Information Summary and Regulation Proposals: 2022–2023 and 2023–2024. Table 1 (p.10) and Appendix 11 (p. 26)

¹³Kebbe, C.E. (1960); Gilliam, L.L. (1942). History of beaver planting in Oregon with recommendations for planting in the future. Bachelor of Science thesis. School of Forestry, Oregon State University. 31p.

¹⁴<https://droughtmonitor.unl.edu/Maps/MapArchive.aspx>

¹⁵ <https://www.fisheries.noaa.gov/species/pacific-salmon-and-steelhead#esa-protected-species>

THE RESTORATIVE POWER OF THIS EXECUTIVE ORDER

An executive order is unique in its ability to create a uniform policy and provide clear and decisive leadership. Using the federal government’s constitutional and statutory authority to manage the land, fish, and wildlife under its care, as granted by Congress and upheld in various Supreme Court decisions ([authority](#)),¹⁶ an executive order protecting beavers would achieve the following:

- Send a clear message that our nation is serious about implementing nature-based climate solutions to address climate change and biodiversity loss.
- Allow benefits to be maximized and made rapidly available to broad and diverse human and wild communities.
- Initiate stream restoration processes that will bring CCS zones and other benefits online in some locations in as little as two to five years, such as improved water quality, quantity, and channel complexity needed by salmon, steelhead, and a host of other human and wild communities.
- Demonstrate that this administration will take bold action that directly addresses community priorities, and rising anxiety levels felt especially by our youth, related to the climate change crisis¹⁷ as they watch their future become increasingly untenable.
- Create opportunities for private landowners to learn about the water and habitat benefits related to beaver activity and the effectiveness of coexistence strategies *without risk*. This opportunity allows them to decide if they will welcome beavers in the streams that flow through their lands in order to gain the benefits and, in turn, contribute to the well-being of their community.

Actively promoting nature-based solutions on public lands creates hope. It allows Americans and agencies to participate in and accelerate recovery of water-rich ecosystems and carbon capture and storage zones at the landscape scale. Opportunities include improving habitat and, where needed, installing low-tech, process-based restoration structures such as beaver dam analogs. These structures are valuable when streams are so degraded that dams frequently fail¹⁸ as they alter a stream’s hydrology and power such that beaver dams can persist and benefits expand ([video](#)).¹⁹ However, artificial structures are supporting players in promoting landscape-scale recovery. These structures need maintenance, are inflexible, and costly if done at the scale required to help reduce climate change impacts. In contrast, robust beaver populations maintain and expand the natural infrastructure and habitat they create at little to no cost, adapt their dams to changing conditions, and repair them when needed.

MAXIMIZING BENEFITS FOR AND MINIMIZING IMPACTS ON COMMUNITIES

¹⁶Nie, et al. (2017). Fish and Wildlife Management on Federal Lands: Debunking State Supremacy. *Environmental Law*, 47, no. 4.

¹⁷Hickman et al. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. *Lancet Planet Health*, Vol. 5, Issue 12; Responsive Management (2016). Oregon Residents’ opinions on and values related to Oregon Department of Fish and Wildlife. See pages 8, 66-67, and 70-71 of 200; The Conservation Fund (2013). Houston-Galveston – Green Infrastructure and Ecosystem Services Assessment. See pages 8-11 of 16.

¹⁸Demmer and Beschta (2008). Recent History (1988-2004) of Beaver Dams along Bridge Creek in Central Oregon. *NW Science*, Vol. 82. No. 4

¹⁹Bouwes et al (2016). Ecosystem experiment reveals benefits of natural and simulated beaver dams to a threatened population of steelhead (*Oncorhynchus mykiss*). *Scientific Reports*: 6:28581

An effective executive order designed to develop abundant and widely-distributed nature-based carbon capture and storage zones (wetlands), capture other valuable benefits, and capitalize on interconnected nature-based climate solutions (beavers, wetlands, healthy stream ecosystems) must include the following elements:

- **Stop** the hunting and trapping of beavers on public lands with a few [exceptions](#).
- **Direct** federal land management agencies to prioritize beaver-wetland creation and maintenance in all land-management decisions, and to employ and maintain coexistence strategies on public lands to address any beaver-human infrastructure conflicts.²⁰ These strategies are more durable and cost-effective than repeated killing of beavers,²¹ and leave the benefits they provide intact.
- **Allocate** funds to the following federal agencies to undertake activities related to expanding beaver numbers and dams on public lands.
 - Federal Land Management Agencies (Bureau of Land Management, Forest Service, Department of Defense, National Park Service, Fish and Wildlife Service)
 - Restore stream ecosystems in ways that facilitate the expansion and persistence of beavers, their dams, and the habitat they create.
 - Employ and maintain appropriate coexistence strategies on public lands to address any beaver-infrastructure conflicts.
 - Monitor and report on changing conditions in habitat diversity, distribution and area, and if appropriate, wildlife such as migratory birds.
 - Create and post educational signage notifying the public of the moratorium on beaver trapping and hunting on federal public land and benefits gained.
 - Partner with local nonprofits such as watershed councils and conservation groups and help fund their beaver-related stream restoration and co-existence efforts.
 - Natural Resources Conservation Service (NRCS):
 - Share with interested landowners the benefits beavers could bring to their property.
 - Help with costs and expertise of implementing and maintaining coexistence strategies.
 - Partner with local nonprofits such as watershed councils and conservation groups and help fund their beaver-related stream restoration and coexistence efforts.
 - US Geological Survey:
 - Create and maintain a national database to track hectares of beaver-created wetlands coming online and changes in mean carbon stock and rates of carbon sequestration.
 - Install stream gauges to track changes in flood peaks and baseflows in response to improved stream conditions related to beaver-created wetlands and ponds and increased channel complexity and floodplain connectivity.

²⁰Coexistence strategies websites: [1](#), [2](#), [3](#), [4](#), [5](#)

²¹Boyles and Savitzky (2008). An Analysis of the Efficacy and Comparative Costs of Using Flow Devices to Resolve Conflicts with North American Beavers Along Roadways in the Coastal Plain of Virginia. *Proceedings – Vertebrate Pest Conference*; Hood et al. (2017). Mitigating infrastructure loss from beaver flooding: A cost-benefit analysis. *Human Dimensions of Wildlife*; Callahan et al. (2019). Billerica Municipal Beaver Management Program 2000 - 2019 Analysis. *Assoc. of MA Wetland Scientists*, 7 p.

- Install and monitor groundwater wells in the areas of beaver-created wetlands to assess changes in groundwater storage and water table rises.
- NOAA Fisheries:
 - Fund research into beaver expansion and distributions as it relates to salmon recovery.
 - Monitor and report on conditions of distinct populations of salmon, their numbers, and their geographic distributions and connection to beaver habitat.
- Civilian Climate Corps:
 - Provide youth and young adults with paid professional opportunities that:
 - Restore stream ecosystems in ways that facilitate the expansion and persistence of beavers, their dams, and the habitat they create.
 - Assist federal agencies in collecting and analyzing monitoring data.
 - Implement and help maintain beaver-human coexistence strategies.

CONCLUSION

Mr. President, our window to minimize the worsening effects of climate change and biodiversity loss is closing. As our life support systems continue to degrade, restoration becomes more difficult and costly, and likelihood of success diminishes. Water and water-rich habitats are and will remain essential resources, and we need the assistance of beavers to restore their quality and availability if we are to help maintain the health and well-being of our human and wild communities.

We urge you to take this step and issue an Executive Order protecting this vital ecosystem engineer. Nature-based climate solutions make good societal, economic and environmental sense. As Americans work with beavers, we will begin seeing changes in a couple of years if not sooner. These changes will come at little to no cost, and bring enormous benefits to all of us.

Thank you for your consideration. Western Watersheds Project looks forward to answering any questions or concerns that members of your administration might have.

Sincerely,



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cc:

Deb Haaland, Secretary of the Interior
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Ali Zaidi, Assistant to the President and National Climate Advisor to lead the Climate Policy Office
John Podesta, Senior Advisor to the President for Clean Energy Innovation and Implementation
Dr. Jane Lubchenco, Deputy Director for Climate and Environment, White House Office of Science and Technology Policy
Stephene Harding, Senior Director for Lands, Council for Environmental Quality
Rep. Raúl M. Grijalva, Chair, House Natural Resources Committee
Sen. Tom Carper, Chair, Senate Environment and Public Works Committee
Sen. Joe Manchin, Chair, Senate Energy and Natural Resources Committee
Rep. Suzan DelBene, Sponsor of the *Dams (Developing Alternative Mitigation Systems) for Beavers Act*

Sign-on Disclaimer: *University and agency affiliations provided for informational purposes only to indicate the credentials of the cosigners and do not necessarily reflect the official policy or position of the agency or university.*

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