THE FRESHWATER TRUST®

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July 14, 2023

The Honorable Ron Wyden
Chairman
Senate Energy & Natural Resources Committee
Water and Power Subcommittee

The Honorable Jim Risch
Ranking Member
Senate Energy & Natural Resources Committee
Water and Power Subcommittee

RE: Support for S. 2169, the "Watershed Results Act"

Dear Chairman Wyden and Ranking Member Risch:

Thank you for the opportunity to submit testimony on the reintroduced Watershed Results Act (WRA). The Freshwater Trust (TFT) strongly urges support for the concepts outlined in S. 2169; however, we believe the current measure warrants important modifications and enhancements at markup that we discuss below.

First, some background. TFT is a "practical solutions" organization. Over the last 40 years, TFT has used data-driven insight to unlock more than $1 billion for large-scale programs that deliver high-impact, cost-efficient conservation projects in a way that works for farmers, cities, agencies, and rivers. We take pride in these wins but accomplishing critical work at scale should not be so hard.

In the face of urgent and compounding drought, flood, and wildfire pressures, TFT believes we must rapidly deliver large-scale "natural infrastructure" project dollars to build resilience for communities and ecosystems. Implementing enough work to matter will likely require tens or hundreds of millions of dollars of coordinated, focused investment in each major watershed. This challenge is big enough already, but the degree of difficulty is magnified by the outdated approach the government uses to support these kinds of projects, barriers to landowner participation, and by the insufficient use of data to drive otherwise uncoordinated investment to the projects that get the "best bang for the buck."

While the U.S. is now making once-in-a-generation infrastructure investments in water, just adding cash will not yield materially different results unless we also address financial, technological, and practical barriers that stand in the way of big, fast results.

As currently structured, and based on past performance history, conservation funding agencies cannot secure the results that are needed with the dollars they receive from Congress. While funding

amounts start out large, they are subdivided among multiple programs that then disburse them project-by-project. While all these funders are well-intentioned, each is focused on a sliver of the problem, which makes it difficult for them to work together or achieve landscape-level outcomes. Without consistent data-driven metrics to guide investment, it is nearly impossible to know how much investment is needed, where it should go, and what progress is being made against needs.

With that background in mind, and though we think some amendments can strengthen the bill further, TFT strongly supports the WRA because the key elements of S. 2169 reflect a direct, market-informed response to overcoming these practical funding challenges. Specifically, by centering "analytics," the WRA acknowledges that data-driven insight can help identify how much investment is needed and where, while also highlighting which projects can secure the best return on investment. S. 2169 then uses that insight to help organize multiple, otherwise siloed, federal, state, local and private funders, and ensure that coordinated investment is directed to the highest-impact, most cost-effective projects. And with much simpler contracting and transaction approaches (buying the quantified "outcomes" from projects), the legislation seeks to decomplexify the byzantine public funding world for landowners, farmers, and local groups, which is consistently flagged as a major barrier to participation. Importantly, by testing this at a pilot scale, the WRA will provide a roadmap for improving the system without requiring major commitments of resources.

As on-the-ground practitioners working with partners to demonstrate tangible, measurable results we strongly believe that S. 2169—with recommended key changes—will drive better, faster, less costly results at a critical time, while maximizing each taxpayer dollar invested, and provide a much better outcome compared to future post-disaster spending.

Importantly, the pilot approach outlined in S. 2169 will also lead to significant benefits for Bureau of Reclamation (Reclamation) projects and programs. As Reclamation increasingly manages through severe drought and precipitation deluges, having a bigger, more integrated portfolio of watershed projects implemented across the landscape will add more resiliency to the overall water system. These tools will provide Reclamation with a greater set of options and assist in ensuring that the agricultural, environmental, and community stakeholders who rely on these projects can better navigate volatility without setting up as many win-lose conflicts.

Overall, the approach embodied by the WRA will increase jobs and business activity in underserved rural areas and provide additional financial funding options for farmers as they attempt to grow more food with less water. In a world short on winning bipartisan solutions, a modified S. 2169 offers the potential for a unique path forward.

To assist the Subcommittee in reviewing and improving the legislation, attached to our testimony please find the following documents: 1) detailed case study of how the WRA could help unlock huge benefits in the Mid-Snake River watershed (ID/OR); 2) specific suggestions for how to improve the bill based on extensive briefings aimed at securing bipartisan support for the bill; and 3) a summary of how the WRA approach can reduce America's disaster costs.

Appendices:

TFT commends and thanks Chairman Wyden for reintroducing this game-changing bill and urges the Subcommittee to move S. 2169 to markup where we hope members will consider TFT's recommendations for further improving the bill.

Thank you again for affording us the opportunity to submit the testimony for the Subcommittee's consideration.

Sincerely,

Joe S. Whitworth
President & CEO
The Freshwater Trust

HOW THE WRA CAN UNLOCK RESULTS: A SNAKE RIVER CASE STUDY

The big problem. Runoff into the Mid-Snake watershed in Western Idaho and Eastern Oregon contains sediment that includes inorganic mercury and excess phosphorus. Excess phosphorus in the Mid-Snake fuels algal blooms and aquatic plant growth, which depletes the water of oxygen and creates the conditions necessary to convert the inorganic mercury into dangerous methylmercury. Methylmercury can accumulate in the food chain, leading to neurological disorders, developmental delays, and cardiovascular disease. This situation affects communities throughout the Snake, including tribes who cannot currently consume culturally important fish due to high pollution levels.

A 2019 legal settlement requires Oregon Department of Environmental Quality (ODEQ) to develop a mercury Total Maximum Daily Load (TMDL) for the Mid-Snake. TMDL allocations will be converted into limits for large, regulated sources (e.g., energy producers and industrial and wastewater treatment facilities). While a positive step, TMDLs do not lead to direct control of runoff from "nonpoint" sources like agricultural fields that contain inorganic mercury depositions and phosphorus from fertilizer. Recent studies by US Geological Survey (USGS) indicate that a large proportion of the methylmercury that comes out of the Hells Canyon Complex (HCC) of hydroelectric dams comes from upstream watershed sources.[1] To meaningfully address Mid-Snake methylmercury production will require a large-scale funding and implementation plan focused on stopping runoff from nonpoint sources. While possible at some scale without the WRA, the WRA would supercharge, streamline, and enhance the results.

Addressing toxics through runoff reductions. Significant toxics reductions from nonpoint sources can be achieved by implementing agricultural best management practices (Ag BMPs) that reduce runoff containing inorganic mercury and phosphorus. Ag BMPs reduce both the load of available mercury and disrupt the methylation processes fueled by excess phosphorus loading into rivers. One of the most effective and common BMPs for this purpose is the conversion from gravity flow flood irrigation to pressurized sprinkler or drip irrigation (irrigation upgrade). The need for these improvements is huge: US Department of Agriculture's (USDA) latest Irrigation and Water Management Survey (2018) shows that 837,000 acres (59% of farms) remain flood irrigated in Idaho. The barrier to practice adoption is not lack of interest: irrigation upgrades are something many producers and water user districts in the basin want more of. The barriers to change are siloed funding sources, complex match/cost-share requirements, and mismatches in the timing of funding available from multiple sources—all components of traditional funding cycles that make it difficult for

[1] Figures S10 and S11. Baldwin, A., Eagles-Smith, C., Willacker, J., Poulin, B., Krabbenhoft, D., Naymik, J., Tate, M.T., Bates, D., Gastelecutto, N., Hoovestol, C., Larsen, C., Yoder, A.M., Chandler, J., & Myers. R. (2022). In-Reservoir Physical Processes Modulate Aqueous and Biological Methylmercury Export from a Seasonally Anoxic Reservoir. *Environ. Sci. Technol.* 56(19), 13751–13760. https://pubs.acs.org/doi/10.1021/acs.est.2c03958

producers and implementation and outreach partners (such as irrigation districts and soil and water conservation districts) to make changes at the scale desired and needed.

Insight to identify priority irrigation upgrades. For over a decade, The Freshwater Trust (TFT) has been helping stakeholders understand and define actionable solutions to address water quality issues in the Snake River. TFT worked with Idaho Power Company (IPC) and agencies to design, permit, and launch a $350 million temperature and sediment compliance program for the HCC, the Snake River Stewardship Program (SRSP, pg. 403 of link). The SRSP was driven by the type of detailed "analytics" called for in the WRA. In preparation for IPC's anticipated mercury compliance obligations, TFT has continued to develop the analytics needed to identify and prioritize irrigation upgrades in the Mid-Snake. TFT has identified ~311,000 acres of agricultural land currently using flood irrigation in the Mid-Snake (see analytics summary video) that could be upgraded. Preliminary investigations show that upgrading all these fields could secure all available annual mercury-laden sediment load reductions, and similar reductions of phosphorus runoff into the Mid-Snake annually, for a total price tag of $540 million.

However, a targeted investment approach guided by analytics can secure a large share of those reductions at a much smaller price tag. The analytics highlight the specific projects that can produce reductions cost-effectively, as well as the many that do not. Using these analytics to guide strategic investment, TFT estimates that $150 million targeted to priority irrigation upgrades (28% of the overall $540 million price tag) can secure 66% of annual sediment reductions. These analytics make it simple to work in close strategic collaboration with on-the-ground partners across geographies and jurisdictions to bring funding together in pursuit of an efficient watershed-wide effort. But even with this insight, it remains very difficult to organize siloed funding to projects at scale. Again, the WRA offers an elegant model to turn this insight into reality.

Current barriers to coordinated funding. Although there are multiple programs that offer funding for farmers to implement irrigation upgrades, accessing these funds is complicated and time-consuming. To complete a single project often requires applicants and the implementation and outreach partners who support them to stitch together funds from multiple grant and loan sources, with varying timelines and match requirements. This is because in the current system, each funder is pursuing different outcomes. For example, EPA has a program focused on reducing toxics, USDA's Natural Resources Conservation Service (NRCS) seeks to support farmers and ranchers addressing a range of natural resource concerns, Idaho DEQ has phosphorus TMDLs that require wastewater and electric utilities to secure quantified reductions of phosphorus load, and Congress wants new Inflation Reduction Act dollars to fund agricultural practices that reduce greenhouse gas (GHG) emissions.

Irrigation upgrades produce quantifiable toxic, phosphorus, and GHG reductions that benefit agricultural producers and so should be appealing to all those funders. But in practice, each program is difficult to access on its own, let alone deploy to projects in coordinated fashion. Each funder has different methods of quantifying outcomes they care about, which leads to complicated and time-consuming funding applications. Strict match requirements make it difficult to blend funding from different sources even though the outcomes they seek can be achieved faster and at a greater scale

with targeted and coordinated action. This complexity means stakeholders are stuck trying to solve watershed-scale problems project-by-project and funder-by-funder. Addressing methylmercury at a meaningful scale in the Mid-Snake requires a more coordinated approach that makes it easy for funders, implementation and outreach partners, and agricultural producers to participate.

The right partners and tools to take advantage of a big opportunity. The Mid-Snake is a great example of a place where the WRA could unlock hugely beneficial outcomes. First, the analytics that provide visibility into the multi-objective benefits and relative cost of individual projects already exist. Second, many of the funders and on-the-ground partners want to see this work happen. Third, the Inflation Reduction Act (IRA) and the Bipartisan Infrastructure Law (BIL) created historic funding levels for the types of Ag BMPs needed to address methylmercury in the Mid-Snake. Finally, new phosphorus TMDLs and mercury 401 certifications will require utilities to make significant investments soon, which could drive more funding to these toxics-reducing, on-farm actions. This geography has a once-in-a-generation opportunity to leverage funding together at the right scale, and then quickly deploy it to high-impact projects in a simple way that works for agricultural producers. The WRA would make this kind of approach much easier to accomplish.

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SPECIFIC MODIFICATIONS TO S. 2169

We propose the following modifications to enhance and improve S. 2169:

1. **Eliminate mandatory spending but retain aggregable level of authorizations:** While TFT believes mandatory spending would make it easier to deliver results in pilots, recent federal infusions through the BIL and IRA provide more funding options to work with in pilots. However, TFT understands the financial constraints the US Treasury is currently facing so we recommend eliminating mandatory spending, but still retaining appropriation authorizations to support pilot operations and assist in kickstarting coordinated project investment.

2. **Eliminate the Outcomes Fund**: If mandatory spending is eliminated, TFT also recommends eliminating the Fund. Without mandatory spending to "capitalize" the Fund, it may become a burdensome item for the Secretary. Additionally, given the likely need to aggregate funding from multiple federal sources, doing so in a federal vehicle under one agency could prove difficult. TFT suggests an alternative, more flexible, market-enabled "aggregation" approach in the next bullet.

3. **Replace the Outcomes Fund and the multi-agency Management Team bureaucracy with a new third-party "Watershed outcomes partner" role to help the Secretary execute on outcomes-based elements in pilots and more flexibly build a leveraged "stack" of funds**: For several reasons, we believe a public-private approach to accomplish the funding coordination and leverage aims outlined in the WRA would work best. First, the bill calls for the Secretary to accomplish several functions that are outside the agency's core expertise and experience base (e.g., completing analytics, supporting the development of project performance standards, pursuing additional funding leverage, recruiting, and verifying quantifiable project outcomes, and providing financial and outcome accounting services). Second, we have heard concern expressed that the added bureaucracy associated with the Management Team and consultation functions would likely impede rapid, efficient implementation of the market-driven efficiency and speed expected in the pilots. Third, while DOI might have challenges aggregating funding from multiple sources, a third party supervised by DOI could more readily and easily undertake this function. For these reasons, TFT suggests including this new role, with a requirement for the Secretary to use the role in each pilot to accomplish key functions, and eliminating the Management Team and consultation functions.

4. **Replace the current match waiver with a "federal-federal" matching allowance up to a federal cap so pilots can leverage programs together to secure bigger, faster results:** The goal of the pilot is to get as much concentrated investment "on the ground" as quickly as possible,

and the opportunity to do this effectively is especially ripe in FY 23-26 during the prime years of BIL and IRA funding. For the many types of distributed watershed projects, federal funds are by far the biggest available source of money, and there is not often a local rate base or some other ready source of matching funds available. TFT suggests a scaled-back matching approach that combines the attributes of the Waters Infrastructure Finance and Innovation Act (WIFIA) and Department of Defense Readiness and Environmental Protection Integration (REPI) program. Specifically, WIFIA sets an overall total federal assistance cap of 80% (33 USC 3908(9)(A)). And the DOD REPI program allows REPI funds to be used to fulfill other federal program match requirements (10 USC 2684a(h)). TFT recommends application of the REPI "fed-fed" matching allowance, but with an 80% federal assistance cap like WIFIA.

Unlike with a match waiver, individual program matching requirements would not go away, there would just be more pathways to achieve them, which would allow many of these otherwise fragmented sources to be brought together into a single funding stack to buy outcomes.

5. **Consolidate revised funding and contracting flexibilities into Section 4**: TFT continues to support the use of pay-for-performance contracts to procure as outlined in Section 4(a). In lieu of the existing cost-share waiver in Section 4(d), TFT suggests adding the revised match flexibility described in #4 of this list. And per the suggestion in #1-2 of this list, TFT suggests eliminating Sections 4(c) (Outcomes Fund), which includes the current mandatory funding. In addition to these changes, TFT suggests consolidating other funding and contracting flexibilities under Section 4. Specifically, TFT suggests authorizing the Secretary to accept non-federal contributions for pilot watersheds and allowing the Secretary to direct any authorized appropriations to support project prepayments. For many agricultural producers, the upfront expense of implementing conservation projects is difficult to manage within their business operations. Prepayments help smooth out cashflow and could be deducted from final performance-based payments to producers.

6. **Streamline the watershed pilot plan**: Consistent with the suggested edits in #2-3 above, TFT suggests a tighter articulation of core strategy elements in Section 3(c). TFT believes the core elements can be more succinctly stated as: A) complete the analytics, B) use the analytics to help set outcomes prices for the watershed, C) develop project performance standards that allow for consistent design and quantification of outcomes (which will expedite outcomes-based transactions), and D) develop a leveraged and funding implementation strategy that can cost-effectively carry out enough projects to achieve meaningful watershed-scale results.

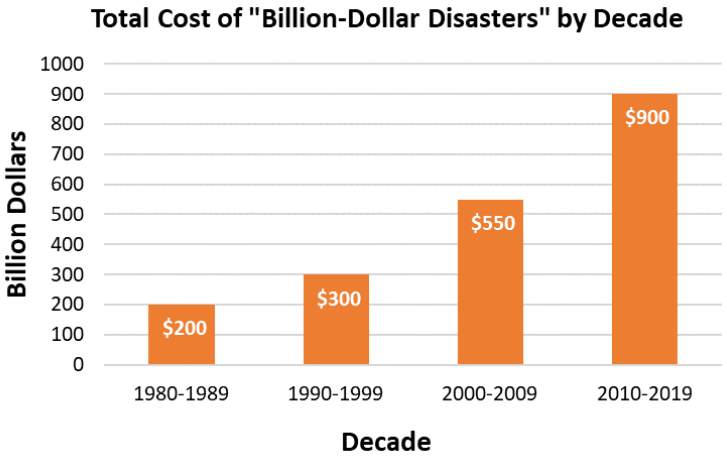
7. **Add restrictions on use of analytics-related data to bolster confidence with agricultural partners**: TFT suggests adding sideboards to the use of/access to data created to implement pilots to ensure the analytics will not be used for enforcement or FOIA purposes.

HOW THE WRA'S INVESTMENT APPROACH CAN HELP AMERICA SPEND MUCH LESS ON DISASTER RECOVERY

Coordinated, prioritized watershed investment will result in lower disaster bills in the future, with benefits far outstripping costs. Moving forward, this reality should be factored into the economic evaluation of legislation that includes spending for natural infrastructure. While avoided future costs are not traditional spending offsets, watershed resilience investments promoted by the WRA will help the government spend a lot less over time, and so should be considered in the same way. This is especially important given how much America's post-disaster spending is increasing.

Post-disaster spending is already high and will significantly increase, putting growing financial strain and risk on the federal budget: Since 1980, the U.S. has sustained 310 climate and weather disasters, with a total cost of more than $2.155 trillion.[2] Around half of this total occurred from just 2012-2021.[3] As illustrated in Figure 1, that trend is worsening, with costs almost doubling each decade. More than one-third of all disaster spending since 1980 ($764.9 billion) has occurred in the last five years.[4] This marked increase in disaster spending—$148.4 billion per year on average over the last five years—is likely to continue its exponential growth as the U.S. adjusts to significantly more frequent and severe storms, floods, fires, and drought.

Figure 1. Total cost of billion-dollar disasters in the U.S. over time (CPI-adjusted). Adapted from NOAA NCEI (2021).[5]



[2] NOAA NCEI, U.S. BILLION-DOLLAR WEATHER AND CLIMATE DISASTERS (last accessed Mar. 14, 2022), https://www.ncdc.noaa.gov/billions.

[3] NOAA NCEI, 2021 U.S. BILLION-DOLLAR WEATHER AND CLIMATE DISASTERS IN HISTORICAL CONTEXT (Jan. 24, 2022), https://www.climate.gov/news-features/blogs/beyond-data/2021-us-billion-dollar-weather-and-climate-disasters-historical.

[4] NOAA NCEI, CLIMATOLOGY in U.S. BILLION-DOLLAR WEATHER AND CLIMATE DISASTERS (last accessed May 17, 2022), https://www.ncei.noaa.gov/access/billions/climatology.

[5] NOAA NCEI, 2021 U.S. BILLION-DOLLAR WEATHER AND CLIMATE DISASTERS IN HISTORICAL CONTEXT.

As emphasized by the Government Accountability Office (GAO), the cost of these disasters is already a major source of federal financial exposure.[6] On top of that existing exposure, the severity and frequency of extreme events is projected to significantly increase[7] and become increasingly complex and more difficult to manage.[8] Both the hurricane rainfall and intensity on the East Coast as well as the frequency and severity of landfalling "atmospheric rivers"[9] on the West Coast are projected to increase.[10] The current Western mega-drought is now the driest period in 1200 years,[11] and future droughts in most U.S. regions are projected to be stronger and likely last longer.[12] Western wildfire risk is also increasing, with 17 of the 20 largest California wildfires occurring since 2000.[13] And globally, the warmest seven years on record have all occurred since 2015, with current global temperatures about 1.1° C warmer on average than pre-industrial levels.[14]

The combination of two or more extreme hazard events that occur simultaneously or consecutively has a multiplying effect on the risk to water infrastructure systems, as the failure of one system can lead to the failure of interconnected systems.[15] For example, Hurricane Irma, a recent Category 5 storm, shattered the existing record for length of time over which it sustained winds of 185 miles per hour,[16] caused $50 billion in damages to residential and commercial property and impacted about 85% of Florida's drinking water and wastewater facilities.[17] The rainwater from Irma caused around 600 sewer overflows, which occur when wastewater treatment facilities release untreated sewage and stormwater into waterways.[18]

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[6] U.S. GOV'T ACCOUNTABILITY OFFICE, LIMITING THE FEDERAL GOVERNMENT'S FISCAL EXPOSURE BY BETTER MANAGING CLIMATE CHANGE RISKS, https://www.gao.gov/highrisk/limiting-federal-governments-fiscal-exposure-better-managing-climate-change-risks; U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-15-515, HURRICANE SANDY: AN INVESTMENT STRATEGY COULD HELP THE FEDERAL GOV'T ENHANCE NATIONAL RESILIENCE FOR FUTURE DISASTERS (2015), https://www.gao.gov/assets/gao-15-515.pdf. The GAO has recommended that the Office of Management and Budget (OMB) adopt budgeting and forecasting procedures to account for such fiscal risk, such as major disaster costs, as part of the federal budget process.

[7] U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-20-100-SP, DISASTER RESILIENCE FRAMEWORK: PRINCIPLES FOR ANALYZING FEDERAL EFFORTS TO FACILITATE AND PROMOTE RESILIENCE TO NATURAL DISASTERS (2019), https://www.gao.gov/products/gao-20-100sp citing U.S. GLOBAL CHANGE RESEARCH PROGRAM, IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME II (Nov. 23, 2018), https://nca2018.globalchange.gov/downloads/NCA4_2018_FullReport.pdf.

[8] Intergovernmental Panel on Climate Change, *Climate Change 2022 Impacts, Adaptation and Vulnerability Summary for Policymakers*, at 20 (2022) https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf.

[9] Increases in atmospheric river frequency and intensity lead to the likelihood of more frequent flooding conditions. U.S. GLOBAL CHANGE RESEARCH PROGRAM, IMPACTS, RISKS, AND ADAPTATION, at 117.

[10] U.S. GLOBAL CHANGE RESEARCH PROGRAM, IMPACTS, RISKS, AND ADAPTATION, at 74.

[11] A. Park Williams, Benjamin I. Cook, Jason E. Smerdon, *Rapid intensification of the emerging southwestern North American megadrought in 2020-2021*, NATURE CLIMATE CHANGE 12, at 232-234 (Feb. 14, 2022), https://www.nature.com/articles/s41558-022-01290-z.

[12] U.S. GLOBAL CHANGE RESEARCH PROGRAM, IMPACTS, RISKS, AND ADAPTATION, at 91.

[13] NOAA NCEI, CLIMATOLOGY in U.S. BILLION-DOLLAR WEATHER AND CLIMATE DISASTERS.

[14] 2021 joins top 7 warmest years on record: WMO, (Jan. 19, 2022), https://news.un.org/en/story/2022/01/1110022.

[15] U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-20-24, WATER INFRASTRUCTURE TECHNICAL ASSISTANCE AND CLIMATE RESILIENCE PLANNING COULD HELP UTILITIES PREPARE FOR POTENTIAL CLIMATE CHANGE IMPACTS, at 17 (Feb. 13, 2020), https://www.gao.gov/assets/gao-20-24.pdf.

[16] U.S. GLOBAL CHANGE RESEARCH PROGRAM, IMPACTS, RISKS, AND ADAPTATION, at 95.

[17] EPA OIG, 20-P-0001, REGION 4 QUICKLY ASSESSED WATER SYSTEMS FOR HURRICANE IRMA BUT CAN IMPROVE EMERGENCY PREPAREDNESS, at 1 (Oct. 7, 2019), https://www.epa.gov/sites/default/files/2019-10/documents/_epaoig_20191907-20-p-0001.pdf.

[18] *Id*.

The costs and losses from natural disasters are at historical highs and are expected to increase as these events become more frequent and severe. As the world moves past 1.1° C warming and towards the 2.7° C warming now projected,[19] continuing to deal with natural disasters after-the-fact will prove to be an increasingly expensive endeavor. To better enable these critical resiliency investments and cut down on the government's overall disaster spending over time, it will be critical to account for and link watershed resiliency investments with avoided future disaster spending when evaluating the economic impacts of legislatively approved funding that will help reduce overall risk exposure.

Proactive natural resilience investments can help significantly reduce the federal government's financial exposure: Strategic natural resiliency investments made before a disaster event can significantly reduce response requirements and spending.[20] In its recent *Natural Hazard Mitigation Saves* publication, the National Institute of Building Sciences (NIBS) found that every dollar of federal money spent on pre-disaster mitigation will return six dollars in benefits.[21] These types of savings have been demonstrated in more specific contexts as well:

- **Nature-based solutions—which align with the outlined investments in the WRA—save an average of $3.50 per $1 invested.** Natural resilience investments reduce losses and recovery costs. For example, a 2018 study explored the cost-effectiveness of restoration of coastal wetlands, barrier islands, beaches, and oyster reefs in the Gulf Coast region.[22] The authors estimated that losses from storm-related flooding will increase to $134–$176 billion/year by 2030. The authors estimate that if nature-based resilience investments were made in this region, they could offset losses by ~$50 billion/year with an average benefit-cost ratio of 3.5.[23] In other words, for every $1 spent, $3.50 in future flood damage would be avoided.
- **Coastal wetlands avoided $625 million in damages during Hurricane Sandy.** A 2017 study showed that areas affected by Hurricane Sandy that had healthy coastal wetlands experienced significantly less losses than areas without.[24] The study found that the presence of wetlands reduced storm surge intensity, which reduced flood elevations and damages. Collectively, these wetlands reduced total losses by $625 million.[25]
- **Private companies see major returns from proactive disaster resiliency spending.** The private sector, too, is increasingly seeing the business case for allocating resources towards disaster resilience. FM Global analyzed nearly 100 corporate 10-K statements in the aftermath of hurricanes Harvey, Maria, and Irma. In reviewing more than 10,000 investments made by

[19] Intergovernmental Panel on Climate Change, *Climate Change 2021 The Physical Science Basis*, IPCC AR6 WGI, at SPM-18 (Aug. 7, 2021), https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf.

[20] FEMA, NATIONAL MITIGATION FRAMEWORK, SECOND EDITION, at 1 (2016), https://www.fema.gov/sites/default/files/2020-04/National_Mitigation_Framework2nd_june2016.pdf.

[21] National Institute of Building Sciences, *Natural Hazard Mitigation Saves* (2019), https://www.nibs.org/projects/natural-hazard-mitigation-saves-2019-report. NIBS is an independent entity commissioned by Congress to study the return on investment to the federal government of investing in resilience.

[22] Borja G. Reguero et al. (2018), *Comparing the cost effectiveness of nature-based and coastal adaptation: A case study from the Gulf Coast of the United States*, PLoS ONE 13(4) (2018), https://doi.org/10.1371/journal.pone.0192132.

[23] *Id.*

[24] Siddharth Narayan et al., *The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern US*, Scientific Reports 7(1) (2017).

[25] *Id.*

more than 1,800 companies over a ten-year period, FM Global found, for every $1 a company spends to protect structures from hurricane, wind, and flood damage, estimated loss exposure decreased by an average of $105.[26]

Reducing the impact of disaster on people and small businesses will safeguard tax revenue: The true cost of disasters is much greater than cleanup costs. The cascading economic effects on people, businesses, and local governments are difficult to measure precisely, but when people cannot travel their usual routes or lose their jobs because local businesses close, there are significant economic implications. According to the Federal Emergency Management Agency (FEMA), 40% of small businesses do not reopen after a disaster and another 25% fail within one year.[27] And even if the businesses persist, they often do in a weakened state. For example, two years after Hurricanes Katrina and Rita, 60% of local small businesses that remained open were earning less revenue than before the storms.[28] In addition to impacting communities, these major effects on small businesses affect the ability of the U.S. Treasury Department to collect business and employee income taxes.

To actually avoid future disaster spending, investments must be coordinated across federal programs, be outcomes-oriented, and leverage private investment consistent with the framework established by the WRA: To minimize future disaster spending in the face of these growing stressors, the federal government must proactively and strategically invest in natural infrastructure to help make communities considerably more resilient to severe events than they currently are. The GAO, along with the Inspector Generals of several agencies, have each separately recommended three key strategies to ensure that investments in natural infrastructure and disaster resilience achieve their intent and minimize federal fiscal exposure. The WRA infuses the analytics, coordination, and leverage elements encapsulated by these strategies and so is a great framework for showing that high-impact natural infrastructure investments actually avoid future disaster spending.

- **Coordination across federal programs and agencies.** The GAO found that no federal agency, interagency effort, or other organizational arrangement has been established to implement a strategic approach to resilience investment.[29] The lack of a strategic approach to identifying, prioritizing, and implementing investments increases the risk that the federal government will lose key opportunities to strengthen infrastructure and resilience.[30]

  To focus federal funding on high-priority resilience projects, GAO recommends "coordinating funding provided through multiple existing programs with varied purposes."[31] Even if the programs were not designed specifically for resilience, their purposes may be

[26] FM Global, *Master the Disaster: Why CFO must Initiate Natural Catastrophe Preparedness in 2019 and Beyond*, at 3, 10 (2019), http://cms.ipressroom.com.s3.amazonaws.com/240/files/20190/Master+the+disaster+-+CFO+natural+disaster+preparedness+in+2019+and+beyond.pdf.

[27] FEMA, *Ready Business Hurricane Toolkit* (2022), https://www.ready.gov/sites/default/files/2020-04/ready_business_hurricane-toolkit.pdf.

[28] Howe, P. *Hurricane Preparedness as Anticipatory Adaptation: A Case study of Community Business.* Global Environment Change (2011), https://www.sciencedirect.com/science/article/abs/pii/S0959378011000239.

[29] U.S. GOV'T ACCOUNTABILITY OFFICE, CLIMATE RESILIENCE at 60.

[30] U.S. GOV'T ACCOUNTABILITY OFFICE, HURRICANE SANDY.

[31] U.S. GOV'T ACCOUNTABILITY OFFICE, CLIMATE RESILIENCE at 46.

compatible with resilience and thus should be part of a coordinated effort.[32] Similarly, FEMA's National Mitigation Framework states that it is critical to coordinate the planning and development of interconnected initiatives.[33]

With its watershed targets, cross-agency funding plan, and precision watershed analytics, the WRA includes all the major elements outlined by GAO and FEMA. The Louisiana Coastal Protection and Restoration Authority (CPRA) is another prime example. Each of the high-priority resilience projects implemented by CPRA are funded by one or more federal programs compatible with the project's purpose.[34] CPRA identifies and prioritizes high-priority resilience projects, then coordinates existing and new federal and nonfederal funds to implement those projects.[35]

- **Outcomes-oriented investments.** To successfully orient funding in a prioritized way, the GAO recommends quantification and outcomes-oriented analytics to help decision-makers identify potential criteria, assign weights to the criteria, visualize project trade-offs, rank proposed projects, and identify high-priority projects.[36] Quantified environmental outcomes not only help to measure and compare results, but to prioritize amongst potential investment opportunities to maximize resilience benefits and reduce impacts of future disasters.[37] With advance watershed analytics and a focus on purchasing outcomes, the WRA likewise aligns well with this plank of GAO's recommendations.
- **Leveraging the private sector.** The GAO's Disaster Resilience Framework also recognizes the importance of catalyzing private and nongovernmental participation.[38] According to FEMA's National Mitigation Framework, public-private partnerships are critical for reducing long-term natural disaster vulnerability.[39] Coordinating with the private sector reduces duplication of efforts, encourages complementary efforts,[40] and maximizes the use of available resources.[41] Public-private partnerships also bring in diverse perspectives across sectors and increase the likelihood that actions will capture all aspects of natural hazard risk, mitigation, and resilience.[42] Leveraging the private sector can also accelerate progress because private investment can provide upfront capital to accelerate work. The WRA specifically includes several elements that are meant to leverage, provide certainty to, and pull in the private sector.

[32] U.S. GOV'T ACCOUNTABILITY OFFICE, CLIMATE RESILIENCE at 47.
[33] FEMA, NATIONAL MITIGATION FRAMEWORK at 21.
[34] U.S. GOV'T ACCOUNTABILITY OFFICE, CLIMATE RESILIENCE at 47.
[35] U.S. GOV'T ACCOUNTABILITY OFFICE, CLIMATE RESILIENCE at 43.
[36] U.S. GOV'T ACCOUNTABILITY OFFICE, CLIMATE RESILIENCE at 42.
[37] U.S. GOV'T ACCOUNTABILITY OFFICE, CLIMATE RESILIENCE at 42.
[38] U.S. GOV'T ACCOUNTABILITY OFFICE, DISASTER RESILIENCE FRAMEWORK at 5.
[39] FEMA, NATIONAL MITIGATION FRAMEWORK at 28.
[40] FEMA, NATIONAL MITIGATION FRAMEWORK at 28.
[41] FEMA, NATIONAL MITIGATION FRAMEWORK at 22.
[42] FEMA, NATIONAL MITIGATION INVESTMENT STRATEGY at 9.