Forests and Water: Opportunities for protecting critical forests and improving forest health to ensure safe and reliable water for people and nature

A collaborative project of the National Wildlife Federation and the Water Foundation

Executive Summary

Summary: With the support from and close cooperation with the Water Foundation, the National Wildlife Federation engaged in an interactive process between December, 2022 and May, 2023 to identify and describe opportunities for protecting critical forests and improving forest health to ensure safe and reliable water for people and nature. The assessment outlines challenges and opportunities, highlights elements of successful strategies, and proposes goals and metrics for measuring success—all focused on the role of philanthropy in leveraging public and private funding and supporting diverse collaborative partners for maximum impact. This summary outlines the key points of the full assessment but does not replicate its analysis, examples and illustrations, or resources for learning more.

Problem Statement: Western forests and the watersheds they support face unprecedented challenges. For decades, forest managers have grappled with the legacy of past and present management practices (timber harvest and associated infrastructure, livestock grazing, fire suppression, beaver eradication, and mineral/energy development)
and ongoing threats from diseases and invasive species. More recently, they’ve struggled to keep up with rapidly increasing motorized recreational use, residential developments, and homelessness in forested landscapes. A changing climate greatly accelerates and magnifies these challenges, increasing the frequency and/or severity of droughts and floods, catastrophic wildfires, insect epidemics, and climate-induced tree mortality. All of these conditions threaten the ecological integrity of our forests, and particularly their ability to provide high-quality, sustainable water for people and nature.

Protecting critical forests and improving forest health to ensure safe and reliable water for people and nature is a complex undertaking, requiring a variety of actions that, collectively:

1. **Protect** the integrity and function of forested watersheds and riverscapes through land management and land conservation emphasizing water source protection

2. **Restore** degraded forest watersheds and riverscapes to improve ecological functions, ecosystem services such as water quality, and resilience to drought, wildfires, and flooding

3. **Re-connect** terrestrial and aquatic watershed function, from mountain headwaters to valley riverscapes and groundwater through integrated, cross-boundary planning and management and strategic land conservation

4. **Engage** members of the public, their elected leaders, resource managers, tribes, local and state government agencies, water and power utilities, and other diverse partners to understand and value forest watersheds and to take actions to protect and improve them

**Successful Strategies:** Diverse watershed partnerships throughout the West engage federal, state, tribal, nonprofit, and private-sector entities to improve forest health, using a variety of approaches to:

» Work across boundary lines
» Proactively assess risks and opportunities
» Focus on watershed integrity and function
» Combine and sustain public and private funding sources
» Engage diverse communities and ways of knowing
**Goal:** The assessment frames a broad goal of “protecting critical forests and improving forest health to ensure safe and reliable water for people and nature.” It proposes this goal statement (along with suggested metrics) to define and evaluate success, and to highlight essential building blocks necessary to achieve desired outcomes:

In the next 20 years, western forests and the waterways that flow through them are managed with explicit objectives and demonstrated progress to:

1. Protect and restore terrestrial, aquatic, and riparian ecosystem health, function, and services, including fisheries and wildlife habitat integrity and connectivity
2. Provide secure, high-quality, affordable water supplies for dependent aquatic and terrestrial wildlife/fish species, human domestic and agricultural use, and other community benefits (including recreation, flood control, water-holding capacity, and other values)
3. Ensure resilience to climate change, and support ecosystem transition where it makes sense to do so
4. Reduce the risks of atmospheric river impacts and catastrophic wildfires, prepare fire-adapted ecosystems and landscapes for receiving fire, and restore landscapes to healthy, functioning ecosystems from their ecologically departed or degraded state
5. Effectively engage community leaders and members of the public to promote mutual learning, collaborative solutions, and “watershed literacy”
6. Co-create knowledge to better co-manage with tribal partners

**Strategic Actions:** The assessment highlights priority actions to maximize the impact of new funding initiatives aimed at protecting critical forests and improving forest health to ensure safe and reliable water for people and nature:

1. Support proactive, holistic landscape-scale restoration planning to assess risks and prioritize actions
2. Protect and restore forests and riverscapes to mitigate impacts from atmospheric rivers and wildfires, including restoring natural/historic fire regimes where appropriate
3. Support and enhance watershed partners’ capacity to participate in scaled up restoration through technical and financial literacy training, project planning and implementation support, fiscal sponsorship, and convenings/networking
4. Leverage new federal investments with targeted philanthropic support, including matching grants, long-term life-of-project grants, community enterprise/workforce development, and pooled funds in a hub/spoke model, incorporating emerging conservation finance practices to make the most of private investments in forest health
5. Support **improved community planning and preparation** for fire resilience in the Wildland Urban Interface, including professional communications about the role of fire in forest and watershed health

6. Advocate for supportive **policies and investments** that:
   - Incorporate watershed values into wildfire mitigation strategies
   - Integrate/streamline restoration permitting and environmental reviews
   - Protect/prioritize watersheds and aquatic resources in national and state forest plans
   - Enable and promote tribal co-management where appropriate

7. Improve **data sharing** to facilitate learning and collaboration
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PREFACE

With the support from and close cooperation with the Water Foundation, the National Wildlife Federation engaged in an interactive process between December, 2022 and May, 2023 to identify and describe opportunities for protecting critical forests and improving forest health to ensure safe and reliable water for people and nature.

The Water Foundation asked the National Wildlife Federation to produce a written assessment for an audience of private foundations and individual funders that:

- Articulates an ambitious goal relative to forest health that is bold enough to rally around yet specific enough to measure;
- Describes the challenges for managing forests for the benefit of source water protection, including funding and financing, market forces, and management policies;
- Identifies the organizations and coalitions currently working on these issues, and considers who is missing and the need for new partnerships, coalitions, skills, leadership, systems, mindsets, or incentives;
» Maps a strategic path to confront and move through or around critical challenges, including attention to the resources necessary for success; and

» Considers the role of philanthropy in this area, looking at what’s needed and opportunities for leveraging public and private sources of funding for best outcomes.

In order to produce a practical document to inform the funding community, we interviewed knowledgeable individuals representing diverse interests in forest and watershed health, many of whom are affiliated with the Healthy Headwaters Alliance, a western coalition coordinated by the National Wildlife Federation. A draft version of this assessment was the subject of a convening in Denver, Colorado, followed by revisions informed by those discussions and submitted comments.

The analysis and recommendations contained in this assessment are those of the primary author, Sarah Bates, informed by the participants in this project. With deep appreciation for the substantive input they provided, the author assumes full responsibility for any errors included herein. Further, none of the conclusions or recommended actions should be attributed to any of the project participants or the organizations with which they are affiliated.

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May, 2023
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1. Introduction

Forested mountains provide most of the water supporting human communities in the American West. This water falls as snow in the winter, seeps into the ground and melts into streams in the spring, and flows downhill to feed springs, rivers, and valley aquifers. Along the way, water flowing through complex forest ecosystems supports the entire web of life—from microscopic organisms to fish, wildlife, and the vegetation they depend on for food and habitat. In turn, forest soils and vegetation help slow and hold runoff, and filter out sediment and other pollutants.

In short, our forests are such an essential part of our water supply that we now refer to them as part of our “natural” or “green” infrastructure, along with the familiar “hard” or “gray” infrastructure—canals, ditches, and pipes that move water from its natural source to meet human needs. Protecting and restoring forests to enhance water for people and nature falls within a broader concept of nature-based solutions—a phrase now widely used to describe the potential for natural systems to support communities by delivering both climate adaptation and mitigation outcomes.¹

“Forests and water are directly tied. If we don’t address our forests, our watersheds are going to suffer, with real impacts for a lot of people. We can’t strive for perfection, because it doesn’t exist and we don’t have the time. We have to do what we think is best, move forward and be adaptive.”

—Assessment interviewee

¹ See more detail about the evolution of nature-based solutions in Incorporating Nature-based Solutions in Community Climate Adaptation Planning at p. 7-14. For a concise list of challenges that can be addressed by investing in natural infrastructure, see Natural and Green Infrastructure in the Colorado River Basin at p. 2.
Watershed health is a matter of equity and environmental justice, since water suppliers pass on costs of water treatment to their customers. For example, one utility applied the U.S. Environmental Protection Agency’s EJScreen tool and determined that the costs it incurred responding to fire and degradation in its watershed disproportionately impacted the lowest quintile of people living in the service area.

In addition to the substantial utilitarian value of abundant, clean water flowing from forests to serve human needs, water is a critical component of a functioning ecological system—not apart from, but a broader source of support and sustenance for, human welfare.

Over the past several years, Congress has invested substantially in actions to protect and restore forested watersheds in order to improve their resilience to climate change, wildfires, insects and disease, and impacts of past and current forest management practices. State and tribal governments, federal resource agencies, and community-based organizations are also increasingly prioritizing forest health with an eye toward water quality, reliable water supplies, and community well-being.

### What is Restoration?

What is Restoration? We use the word “restoration” throughout this assessment to include various methods to improve ecological function so that watersheds, and ecological systems, can continue to function in the context of climate change. Restoration does not necessarily mean returning a landscape to pre-disturbance conditions.

Much of this attention focuses on national forests managed by the U.S. Department of Agriculture’s Forest Service because of their outsized importance as a water source. While national forests comprise just under a fifth of the land in the American West, they contribute nearly half of this region’s water supply. (Detailed statistics are available here.) In the 1897 legislation authorizing the federal government to reserve and manage what

“People tend to see water as this thing they need, so let’s go find it, stick a straw in it and send it to where it will be used. But water flows through landscapes and has a purpose and a vital function for human health as well.”

—Assessment interviewee
we now call national forests, Congress explicitly acknowledged the importance of these forested lands “to protect and enhance supplies, reduce flooding, [and] secure favorable conditions of water flow . . . .” In other words, managing for healthy watersheds has always been part of the Forest Service’s primary mission—if not always a priority in practice. In addition to national forest lands, public lands managed by the U.S. Bureau of Land Management include forested watersheds, as do tribal, state, and private lands.

Forests and Water in Colorado

» Public and private forests supply drinking water to approximately 80 percent of Colorado’s population, including:

» Forest Service: over 14.5 million acres of forested lands, with nearly 90 percent of these lands in watersheds that contribute to the state’s public water supplies

» Bureau of Land Management: over 3.5 million acres of forested lands

» Private forests: approximately 7 million acres of forested lands

Jackie Corday compiled these figures from Colorado State data.

Protecting critical forests and improving forest health to ensure safe and reliable water for people and nature is a complex undertaking, requiring a variety of actions that, collectively:

1. **Protect** the integrity and function of forested watersheds and riverscapes through land management and land conservation emphasizing water source protection

2. **Restore** degraded forest watersheds and riverscapes to improve ecological functions, ecosystem services such as water quality, and resilience to drought, wildfires, and flooding

3. **Re-connect** terrestrial and aquatic watershed function, from mountain headwaters to valley riverscapes and groundwater through integrated, cross-boundary planning and management and strategic land conservation

4. **Engage** members of the public, their elected leaders, resource managers, tribes, local and state government agencies, water and power utilities, and other diverse partners to understand and value forest watersheds and to take actions to protect and improve them

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2 For a map showing public and private forested lands in relation to river basins throughout the continental U.S., see Quantifying the Role of National Forest System and Other Forested Lands in Providing Surface Drinking Water Supply for the Conterminous United States, at p. 5.

3 Riverscapes are the connected floodplain and channel habitats that together make up valley bottoms. They are an integral part of the forest ecosystem, but often are treated separately from terrestrial habitats in planning and management activities.
This assessment surveys and provides examples of challenges and opportunities to address them in the western U.S., focusing on national forests and adjacent forested watershed lands and emphasizing the role of philanthropy in supporting high-priority actions.

1.1. Methodology and Acknowledgements

In order to compile this assessment, we interviewed people involved in forest and water conservation around the West, listed with their affiliations in Appendix A. Their observations provided tremendously valuable information and examples, for which we are grateful; their quotes (without attribution, to encourage candor) appear throughout the document. This assessment draws most examples from the western national forests and the communities they support, but notes several initiatives to improve conditions on private lands, as forested watersheds typically involve a mix of land ownership.

A draft version of the assessment provided a catalyst for discussion at a convening in Denver, Colorado, on May 1-2, 2023, which also served as a planning meeting for the Healthy Headwaters Alliance. The people participating in that convening, and those who provided feedback on the draft assessment, are also included in Appendix A.

1.2 How to Use this Assessment

This assessment may be of interest and utility to a variety of readers, but we have organized and presented the information primarily for the consideration of private philanthropic funders interested in providing strategic and timely support for initiatives to protect critical forests and enhance forest health to provide sustainable, high-quality water for people and nature. We hope this information provides background, context, and specific examples to inform strategic philanthropic initiatives.

Section 2 summarizes major challenges to the healthy functioning of western forested watersheds, along with opportunities to address those challenges, along with some examples of effective action. These range from biophysical conditions in the forests (all exacerbated by climate change) to a variety of social and economic factors that complicate efforts to address them. Interviewees identified the recent influx of federal funds to address forest health and natural infrastructure as both an unprecedented opportunity to get work done and a substantial logistical challenge for under-resourced watershed partners who urgently need capacity support to do so.

Section 3 considers options to strengthen and expand the impact of existing efforts, broaden engagement by partners not currently involved, and prioritize particular areas for investment. This section references examples of innovative watershed partnerships illustrating key strategies that might be replicated to scale up efforts throughout the West, acknowledging that each watershed community has unique attributes and challenges that will shape a successful, place-based approach.
Section 4 proposes a long-term goal statement to protect and improve forested watersheds, drawing from input from interviewees and informed by goal statements guiding the Forest Service and several collaborative and NGO initiatives with similar interests. We suggest how to assess progress in meeting this goal, with examples ranging from broad programmatic evaluation measures to very specific (in some cases, place-based) metrics.

Section 5 integrates this information into a list of strategic actions to respond to identified challenges and opportunities, building upon and addressing gaps in existing initiatives and funding.
Major challenges to the healthy functioning of western forested watersheds range from biophysical conditions in the forests (exacerbated by climate change) to a variety of social and economic factors that complicate efforts to address them. Newly authorized federal funds to address forest health and natural infrastructure (including the 2021 Bipartisan Infrastructure Law and the 2022 Inflation Reduction Act) provide a tremendous opportunity to improve conditions in western watersheds. At the same time, accelerated demands on under-resourced nongovernmental organizations and other community partners and tribes involved in this work present a new set of logistical and capacity challenges.

This section matches each set of challenges with a summary of opportunities to address them, along with select examples from around the West and links for more information.

### 2.1. Water in a Warming West

Western forests and the watersheds they support face unprecedented challenges. For decades, forest managers have grappled with the legacy of past and present management practices (timber harvest and associated infrastructure, livestock grazing, fire suppression, beaver eradication, and mineral/energy development) and ongoing threats from diseases and invasive species. More recently, they’ve struggled to keep up with rapidly increasing motorized recreational use, residential developments, and homelessness in forested landscapes. A changing climate accelerates and substantially adds to these challenges.

“With climate change and drought, we’re operating in a deficit with our water supplies coming out of our forests in the higher elevations.”
—Assessment interviewee
Climate Change and Western Forests
Rising temperatures, increasingly erratic precipitation, and more powerful storms are exacerbating the impacts of existing forest threats and disrupting key ecological processes. Climatic changes are increasing the frequency and/or severity of droughts, wildfires, insect epidemics and other forest disturbances, and climate-induced tree mortality events are becoming widespread, especially in the West. Further, changing climatic conditions can complicate—or even prevent—the recovery and regeneration of forests following such disturbances. Climate Smart Restoration at p. 1, citations omitted

All of these conditions threaten the ecological integrity of our forests, and particularly their ability to provide high-quality, sustainable water for people and nature. In 2020 the Forest Service reported that just over half of all watersheds on national forest lands were functioning properly; 44 percent were functioning “at risk”; and three percent had impaired function. (Watershed Condition Framework 2011-2020 at p. 4) Similarly, an assessment of five critical watersheds in northern California that serve 28 million people found nearly half the lands in these watersheds at risk and unable to meet future water needs without substantial restoration and protective measures. (Pacific Forest Trust at p. 1)

“[H]alf of the source watersheds that supply northern California’s primary reservoirs are at risk due to impacts from climate change, management patterns and development. . . . [W]atershed function, already severely degraded, cannot be relied upon to sustain California’s water needs without significant repair and maintenance.” Pacific Forest Trust at p. 1.

Moreover, the rivers and streams flowing through western forests are highly modified, and less able to absorb impacts of climate change and other stressors. A Center for American Progress assessment of river systems found that 36 percent of headwaters stream flows in western states have been altered from their natural state through human development (especially dams and diversions), with far higher percentages in particular watersheds. The same assessment looked at conditions of floodplains—the essential interface between land and water—and found high levels of impacts from land-based development. For example, 45 percent of the floodplains in Colorado’s headwaters have been modified, followed by 44 percent in Utah, and 41 percent in Washington. 

4 For CAP’s policy recommendations based on this assessment, see Restoring Balance (2018).
Opportunities to Address Climate Change Challenges:

1. **Assess watershed climate change vulnerability** and prioritize areas for water source protection and restoration actions; these actions can be local and focused on agency planning and management priorities (e.g. Lolo National Forest Watershed Climate Change Vulnerability Assessment) or regional/statewide and aimed at prioritizing policy action and investment (e.g. Pacific Forest Trust).

2. **Enhance watershed resilience** to climate change impacts through forest and riverscape restoration (Pacific Forest Trust at p. 5 lists water benefits of specific restoration activities; Ten Strategies Technical Appendix at p. 11-20 describes benefits and methods of increasing natural distributed water storage through process-based restoration techniques; when possible and appropriate, Stage Zero restoration optimizes watershed function) and protective designations (e.g. Wild and Scenic River corridors, Outstanding Natural Resource Waters), including tribal designations (e.g. Confederated Salish & Kootenai Tribes’ Cultural Waterways designation for a portion of the Flathead River).

3. **Support climate-smart planning and management** on national forests (Climate-Smart Restoration at p. 20) and on other lands where appropriate.

2.2. **Fire and Water**

A great deal of public attention (and political action) has focused on increasingly frequent and severe fires in western forests. While most of this attention has focused on loss of property, the most widespread impact of wildfires is on water resources. Intense fires remove vegetation that prevents excessive erosion and can cause soils to lose the ability to absorb water for a few years after a burn. When rain falls on burned lands, the fast-moving runoff can erode the slopes and carry large amounts of sediment, pollutants, and debris, transporting them into rivers. These flows can fill reservoirs with sediment, decreasing water storage and impacting water quality. The damaged soils and loss of vegetation following a severe burn can also increase the threat of downstream flooding and landslides. In some cases, these slides can become dangerous “debris flows”—fast-moving rivers of mud, rock, and other materials that can take out everything in their path.

Communities in the wildland urban interface face immediate risk, while water supply infrastructure further downstream may be damaged by debris carried over long distances. The “drought to deluge” whiplash has grown increasingly common across the West.

Fires are a natural and in many cases essential part of western forest ecosystems. Indigenous cultures long incorporated fire into their way of living on the land, and many

“Fear is a great motivator—how do we focus it for good results?”

—Assessment interviewee
traditional foods and cultural practices are fairly described as “fire dependent,” as illustrated in the Karuk Climate Adaptation Plan at p. 45. Unfortunately, over a century of fire suppression on national forests, exacerbated by insufficient and underfunded forest vegetation management and climate change, has resulted in uncharacteristically severe wildfires with deleterious effects on the landscape and on public water supplies and quality.

**Wildfire Impacts on Public Water Supplies:**
- Direct damage to drinking water infrastructure
- Increases in sediment and other toxic pollutants which interfere with drinking water treatment and water supply infrastructure, and can cause drinking water emergencies (which occur when treatment plant operations are impaired to such a degree that the treatment plant must shut down)
- Increased costs of water treatment as a result of sedimentation
- Severe sedimentation and debris which often collects in reservoirs, decreasing water storage and conveyance

*Correspondence to the Wildland Fire Mitigation and Management Commission (2/21/2023) (used by permission of the authors: Alex Funk, Fay Hartman, Alicia Marrs, and Amy McNamara)*

When conducted strategically pursuant to a landscape-scale forest assessment, forest thinning and other means of fuels reduction can prepare fire-adapted ecosystems and landscapes for receiving fire to reduce the risk of catastrophic wildfire. Resources and examples of assessments aimed at informing these practices are available from the Watershed Wildfire Protection Group in Colorado. A nonprofit group called Wildfires.org, launched in 2022 by a group of software and hardware engineers, product managers, designers, entrepreneurs, and forest conservationists, is developing tools to reduce the time and cost of planning, monitoring, and implementation of wildfire mitigation activities.

Additionally, and together with other forest treatments, strategic use of intentional (prescribed) fire can reduce fuels and help restore a more natural fire regime to the landscape. A growing number of networks support and connect these efforts, including the Indigenous People’s Burning Network and the Prescribed Fire Training Exchanges. The Karuk Climate Adaptation Plan aims to restore a historic fire regime in the mid-Klamath ecosystem in northern California, including traditional management and lightning ignitions, with a goal of restoring “pyrodiversity.” Despite these initiatives, The Nature Conservancy
and Aspen Institute reported that annual prescribed burning in the western U.S. has remained stable or decreased over the past two decades, with 70 percent of all prescribed fires nationwide taking place in the Southeast.\(^5\) Thus, while rare in western states, the cities of Myrtle Beach and Conway, South Carolina, and the City of Little Rock, Arkansas, all regularly use prescribed fire around their drinking water intakes.

### How Healthy Riverscapes Mitigate Wildfire Impacts:

- Offer refugia and movement corridors for wildlife during or following wildfire
- Absorb and store sediment, water, and nutrient runoff from scorched uplands post-wildfire, reducing downstream impacts to water supplies and communities
- Can serve as critical fire breaks or areas that slow fire
- Provide higher survivorship of post-fire mature trees, yielding valuable seed sources for recovery

*Correspondence to the Wildland Fire Mitigation and Management Commission (2/21/2023) (used by permission of the authors: Alex Funk, Fay Hartman, Alicia Marrs, and Amy McNamara)*\(^6\)

People interviewed for this assessment repeatedly noted that far more attention goes to forest thinning and other fuels reduction than to equally important proactive actions to enhance landscape resilience to fire and planning for post-fire recovery. Some additional areas needing support include evaluating appropriate vegetation to plant in burned areas, stabilizing soil and streambanks to prevent erosion and flooding, and restoring riverscapes to improve capacity to absorb burned-area runoff. When appropriate for the site, riverscape restoration aims at Stage Zero, defined as a river’s initial, pre-disturbance condition. Existing resources for burned-area landscape recovery programs and post-fire reforestation (e.g., site preparation, direct seeding and planting) include the Reforestation Trust Fund and the Burned Area Emergency Response (BAER) program on national forests, and funding for native-seed collection and storage through the National Seed Strategy.

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5  **Wildfire Resilience Policy Roadmap** at p. 19: “Topography, land-ownership patterns, differing legal and policy regimes, and cultural factors all contribute to this geographic variability in controlled burning. While limited capacity and funding were the most frequently cited barriers, air quality regulations, smoke impacts and risks to local communities, narrowing burn windows and liability concerns have been cited as obstacles to scaling prescribed fire in the West.”

6  See also *A possible role for river restoration enhancing biodiversity through interaction with wildfire.*
In March, 2023, The Nature Conservancy and Aspen Institute released a Wildfire Resilience Policy Roadmap, intended as a reference for policy makers and forest health and community advocates and suggesting policy actions applicable the challenges and opportunities highlighted here, recommending an “all-of-society approach to restore and manage landscapes, reduce impacts and improve the safety of wildfire response actions, and enable communities to better coexist with fire in their landscapes.” Two other valuable resources highlighting solutions deserving investment include Prescribed Fire Policy Barriers and Opportunities (2018) and Fighting Fire With Fire (2021).

In addition to fires, forested watersheds and the communities they serve in the Pacific Coast states are at risk from atmospheric rivers—flowing columns of condensed water vapor in the atmosphere producing significant levels of rain and snow. When atmospheric rivers move inland and sweep over mountain ranges, they can cause extreme rainfalls and floods capable of inducing mudslides, damaging infrastructure (including water delivery), and causing catastrophic damage to life and property. According to the National Oceanic and Atmospheric Administration, about 30-50 percent of annual West Coast precipitation occurs in just a few atmospheric river events, contributing both to the region’s water supply and flooding risk. Research looking at impacts of climate change on atmospheric rivers predicts future increases in daily extreme precipitation events, a decrease in seasonal snowpack, and a shortening of the wet season, particularly in California.

Opportunities to Address Challenges Related to Atmospheric Rivers and Wildfires:

1. **Assess risks from atmospheric rivers and catastrophic wildfire**, and prioritize areas for pre-fire/flood mitigation and post-fire/flood recovery; facilitate this work by supporting and connecting practitioners with emerging technology tools (e.g. Wildfires.org) to improve and speed up risk evaluation, treatment planning, and evaluation of outcomes

2. Where appropriate, **restore natural/historic fire regimes**, informed by ancestral and modern sources of knowledge, and accompanied by education and outreach to increase public acceptance of fire; note that some areas may be predicted to move away from their historic fire regimes due to climate change, so restoration goals may be toward a near-term future fire regime

3. **Protect and restore healthy forests and riverscapes** to mitigate impacts from atmospheric rivers and wildfires (see Restoring Western Headwaters Streams With Low-Tech Process-Based Methods at p. 30); facilitate this work by:
   - Supporting research and connecting practitioners with best practices in post-flood and post-fire recovery, including climate-informed vegetation

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7 For detailed recommendations on communicating effectively to build support for sound wildfire policies, see Wildfire Resilience Policy Roadmap, Appendix B, at p. 46-49; see also Forest Fire Facts for a ready source of educational resources.
choices, and examining how new technology (unmanned aerial drones, remotely-sensed vegetation datasets, and virtual fencing) can increase the efficacy of targeted grazing practices

» Designing restoration methods that aim to meet multiple objectives with one management action (e.g., a trail serving as a fuel break, fuels reduction improving wildlife habitat or reducing insect threats)

4. Support improved community planning and preparation for fire resilience in the Wildland Urban Interface (e.g. Firewise Communities), and create incentives for development in areas that can be defended effectively from fire; facilitate this work by advocating for land use planning to reduce urban encroachment into wildland areas, and discourage development in fire-prone landscapes, which increases the risks and potential costs of wildfire

5. Advocate for supportive policies and investments in forest health and wildfire mitigation, such as:

» Expanded hazardous fuels authorizations allowing for a certain percentage of appropriations above agency base levels to be used across ownership boundaries, including through voluntary engagement of private landowners, based on demonstrated needs for integrated project implementation to address risks

» Establish a new cost-share authority, allowing for states, tribes, and federal partners to use a certain percentage of appropriations to enter into cooperative cost-share agreements that allow for fuels projects to be implemented and funded in accordance with a cost-share formula based on a project’s ownership profile and treatment types; following treatments, the parties could then negotiate any deviation based on jurisdiction and outcomes (similar to the longstanding practice in wildfire suppression of effectively prepositioning resources to allow for rapid response and deployment)

» Advocate for the Natural Resources Conservation Service (NRCS) and federal land management agencies to establish clearer, more predictable and replicable processes for funding and enrolling private landowner participation in cross-boundary fuels treatments

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8 Expanded authorizations could build upon the 2018 Farm Bill’s amendment to section 103 of the Healthy Forests Restoration Act (16 U.S.C. § 6513), allowing the Forest Service to spend up to $20 million on grants to state foresters for hazardous fuel reduction projects that cross land ownership boundaries.
2.3. Institutional Landscape

2.3.1. Legal Authorities and Constraints on Watershed Restoration

Myriad federal laws and regulations govern management of western national forests, ranging from congressional authorization for Forest Service planning and management actions to mandates to protect water quality (including wetlands), endangered species, Wild and Scenic River corridors, designated Wilderness, motorized vehicle travel management plans, and more. Federal laws and regulations further require public engagement and environmental reviews, and govern everything from contracting to hiring to purchasing materials. This is far from an exhaustive list, which would be beyond the scope of this assessment.

State, tribal, and private forest lands are also subject to some of these legal restrictions and permitting requirements. In addition, a watershed enhancement project (on non-tribal lands) may be subject to state or local land use regulations and state in-stream permitting requirements. Despite their shared aim of protecting land and water from damaging activities, the result is a mosaic of requirements and restrictions that can be a barrier to achieving what one interviewee described as the ideal “multi-sector headwater-to-groundwater approach” to watershed management.

We summarize here four laws that interviewees remarked upon as directly impacting their ability to pursue watershed enhancement opportunities.

“Agencies should be encouraged to combine hillslope, mid-slope and in-channel projects. These combined projects are the most effective together, but often get separated because they have different permitting processes. The result is that some of them do not get implemented.”

—Assessment interviewee

“When people are stuck in silos, they only see their choice of solution . . . but watersheds are complex, and the methods to address threats have to be equally complex.”

—Assessment interviewee

National Forest Management Act: Along with other provisions governing management of national forests, this statute requires each national forest to revise its land and resource management plans (referred to as “forest plans”) to set the sideboards for future management decisions. Forest plans include sections addressing watershed and aquatic resources, which can—but often inadequately—address watershed health, climate resilience, and
riverscape integrity. Current forest plan revisions are underway throughout the West, offering an important and timely opportunity to influence management decisions affecting watershed health for decades to come.

**Clean Water Act (CWA):** This law (and the extensive regulations governing its implementation) aims to protect the nation's waters from pollution and set goals for recovery of impaired waters. Section 404 of the CWA regulates the discharge of dredged or fill materials into streams and wetlands on public and private lands. The U.S. Army Corps of Engineers or an approved state/tribal program reviews permit applications for riverscape restoration projects in consultation with other agencies. Interviewees reported that the Section 404 permitting process is unnecessarily slow and expensive, bogging down restoration efforts that require expediency for much-needed improvements. Multiple efforts are underway to streamline the process of obtaining a General Permit and/or to exempt some restoration activities from this requirement under well-defined conditions.

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**California Facilitates Habitat Restoration Project Review and Approval**

» **Sustainable Conservation** is working in partnership with the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, NOAA Restoration Center, and the State Water Resources Control Board to develop two statewide simplified and coordinated authorizations that will cover a common set of environmentally beneficial aquatic and riparian restoration project types and related environmental protection measures. In 2022, the California State Water Resources Control Board unanimously approved a statewide restoration general order, a programmatic (pre-written) permit that expedites high-priority aquatic restoration project types.

» California's legislature supports these efforts, and in 2015 enacted first-of-its-kind legislation, the Habitat Restoration and Enhancement Act, which expedites the permit process with the California Department of Fish & Wildlife for small-scale, voluntary projects that improve rural habitats, urban watersheds and coastal water quality.

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9 Although beyond this discussion, more information on the scope of this regulation is available at the Environmental Protection Agency website on Waters of the United States.

10 For a more detailed discussion, with examples, see Restoring Western Headwater Streams with Low-Tech Process-Based Methods at p. 52-53.
**National Environmental Policy Act (NEPA):** Every federal agency, including the Forest Service, must evaluate any potential environmental impacts of forest actions before committing to take any “major action” as defined by NEPA regulations. Congress has declared some activities exempt from this requirement, and agencies have the authority to develop their own regulations for activities that qualify for “categorical exclusions.” The Forest Service updated its NEPA Regulations in 2020, including new language for activities aimed at restoring streams to improve forest health and watershed conditions. Larger projects including fuels treatment and other activities require preparation of environmental assessments or environmental impact statements, depending on the potential impact. These analyses often proceed slowly due to limited agency staff capacity or requirements of consultation with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. NEPA review can be streamlined by preparation of programmatic environmental assessments, which include broad analyses of impacts and conditions under which particular activities might be approved without site-specific environmental assessment. In some cases, project partners pay to outsource NEPA review and document preparation, speeding up the process considerably. Emerging technology tools (such as Turboplan from Wildfires.org) may further facilitate NEPA review.

**Tribal Forest Protection Act:** Enacted in 2004, this statute aims to protect tribal trust lands by authorizing tribes to lead restoration initiatives outside reservation boundaries to address risks on adjacent federal public lands. The 2018 Farm Bill authorized tribes to enter into Good Neighbor Authority agreements with the Forest Service to accomplish this work, but federal funding has been slow to follow, agency staffing has been inadequate to support these agreements, and agencies’ commitment to engage with tribal partners has been inconsistent. In February 2023, the Forest Service released an action plan for tribal engagement through co-stewardship, consultation, capacity-building. The Intertribal Timber Council described four success stories of tribes exercising their authority under the Tribal Forest Protection Act, but urged for a more proactive recognition of tribal priorities through the national forest plan revision process.

**Opportunities to Address Institutional Challenges:**

1. Pursue comprehensive **landscape-scale or regional restoration strategies** (e.g. Forest Service Pacific Northwest and Pacific Southwest Regions Riparian and Aquatic Ecosystem Strategy), and facilitate their implementation through:
   - Programmatic environmental assessments (e.g. Forest Service Pacific Northwest Region’s Aquatic Restoration Project Environmental Assessment)
   - Integrated permitting and environmental reviews (e.g. California’s Statewide Restoration Order)
   - Where appropriate, outsourcing and/or providing funding for environmental analyses, utilizing emerging technology (e.g. Wildfires.org)
2. Support **national forest plan revisions** adding strong watershed and aquatic resource language in planning documents guiding future decisions (see sample language in *Climate Smart Restoration* at 28) and recognizing priorities for protecting and restoring tribal trust resources on national forest lands

3. Engage with **state Forest Action Plan revisions** through the National Association of State Foresters and individual state forestry agency planning processes, advocating for enhanced restoration, source water protection, engaging tribal and community partners, and conservation finance (look to the *New Mexico Forest and Watershed Health Plan* for an example of an integrated approach)

4. Provide **financial support for tribes** to plan and implement watershed restoration actions on federal forest lands to benefit tribal trust resources and priorities, and to assume co-management responsibility where appropriate

### 2.3.2. Financial Support and Capacity Challenges

Western cities and water providers have long seen the value of protecting municipal watersheds on public and private forest lands. In the beginning of the 20th Century, for example, Salt Lake City and the state of Utah petitioned the federal government to create the Wasatch Forest Reserve. Set aside by President Theodore Roosevelt in 1904, this main purpose of this reserve (now Uintah-Wasatch-Cache National Forest) was to provide drinking water to the communities in the valley below, with the additional benefits of biodiversity and providing habitat for native fish and wildlife. Federal investments in the Civilian Conservation Corps supported work to rehabilitate headwater streams degraded by mining and livestock grazing. A century later, in a collaborative initiative called *Utah Shared Stewardship*, Salt Lake City joined with other public, private, and nonprofit organizations to raise funds and work together to address wildfire risk and water quality and quantity issues utilizing landscape-scale projects throughout the state. (See more about this example in Appendix B.)

When watershed protection requires paying for fee-simple land acquisition or conservation easements on private lands, the funding may come in part from the *Land and Water Conservation Fund (LWCF)*, established in by Congress in 1964 to safeguard natural areas, water resources and cultural heritage, and to provide recreation opportunities. For example, in 2016 funding derived in part from the LWCF supported a conservation
easement on 3,020 acres of land owned by a timber company in Haskill Basin, in northwest Montana; benefits from this easement include protecting the City of Whitefish’s water supply, ensuring ongoing forest management activities and timber jobs, and expanding local recreation opportunities. In 2020, for the first time since the LWCF was established, Congress authorized $900 million annually in permanent funding, ensuring that this program will continue to offer foundational support for collaborative initiatives involving federal, tribal, state, and local partners working in watersheds with private landholdings.

Private land conservation can also be funded through state and local public sources, as well as private land trusts. For example, King County, Washington, uses income from the Conservation Futures Program/Tax to purchase land outright or to pay for easements on private lands to protect conservation values. Several counties in Washington State have a Conservation Futures Tax which is used to protect open space throughout the county.

In recent years, escalating costs of fighting larger and more intense fires led to a large backlog on necessary restoration and management projects to improve forest health and resilience—with an estimated price tag of $100 billion. Public outcry about wildfire risk prompted historic congressional legislation and executive actions in 2021-22. Funding authorizations included in the Bipartisan Infrastructure Law and Inflation Reduction Act (described below) will provide a good deal more federal support over the next decade for implementing forest health projects, with a heavy emphasis on reducing fire risks through fuels reduction. For a complete list of the new federal funding opportunities, with links to relevant grant programs, see this Grant Summary from Rep. Jared Huffman (D-CA).

This new federal funding to address western forest and watershed health presents both great opportunities for action and a complex set of challenges for the partners responsible for planning, prioritizing, and doing the work. As described in more detail below, community partners are largely unprepared for the anticipated acceleration and scaling up to meet these demands. Moreover, funding to improve forest health is needed not just for project implementation, but also for long-term maintenance, stewardship, and monitoring.

The Infrastructure Investment and Jobs Act of 2021 (also referred to as the Bipartisan Infrastructure Law, or BIL) authorizes $3.4 billion for wildfire mitigation and $2.1 billion for ecosystem restoration. In addition to the heavy emphasis on fuels mitigation, this legislation also provides substantial financial support for work to improve forested watersheds:

» $400 million to the Department of the Interior to award grants to states and tribes for implementing voluntary ecosystem restoration projects on private and public lands, in consultation with the Forest Service

» $100 million to the Forest Service for projects under the Collaborative Forest Landscape Restoration Program
$200 million for post-fire restoration activities that are implemented not later than three years after the date that wildland fire is contained ($100M Forest Service; $100M Department of the Interior)

$300 million for entering into contracts, including stewardship contracts or agreements, the purpose of which shall be to restore ecological health on not fewer than 10,000 acres of forest lands ($150M Forest Service; $50M Department of the Interior)

$200 million to support forest restoration through good neighbor authorities with tribes and states ($160M Forest Service; $40M Department of the Interior)

$80 million to the Forest Service to establish a collaborative-based, landscape-scale restoration program to restore water quality or fish habitat on federal lands, including tribal forest land and rangelands

$180 million for the Joint Chiefs Landscape Restoration Partnership Program, through which the Forest Service and the Natural Resources Conservation Service collaborate with county, state, non-governmental, tribal, utilities, and private landowners to mitigate wildfire risk, improve water quality, and restore forest ecosystems.\[11\]

Note that the authorizations listed above are only within the U.S. Forest Service. The BIL also authorized funding for fire mitigation and watershed enhancement by the U.S. Department of the Interior, including allocations to the Bureau of Land Management and the Bureau of Reclamation. (See CRS Bureau of Reclamation Report for a breakdown of the federal support that will enhance the BOR’s engagement with watershed groups and ecosystem restoration projects.)

The Inflation Reduction Act of 2022 (IRA) authorizes $1.8 billion for hazardous fuels reduction projects on National Forest System land within the wildland-urban interface and $200 million for implementation of the Watershed Condition Framework and Water Source Protection Program using vegetation management projects on National Forest System land.

The Forest Service is implementing its share of this wildfire mitigation funding from both the BIL and the IRA through a 10-year Wildfire Crisis Strategy, which calls for:

1. Treating up to an additional 20 million acres on the National Forest System in the West, over and above current treatment levels
2. Treating up to an additional 30 million acres on other federal, state, tribal, and private lands in the West
3. Developing a plan for long-term maintenance beyond the 10 years

\[11\] Thanks to Alex Funk and the Theodore Roosevelt Conservation Partnership for summarizing these examples from Sections 40803 and 40804 of the BIL. For more detail on each sector, see Federal Funding Opportunities.
To implement this strategy, the Forest Service first identified 250 high-risk firesheds through the West and then prioritizing investments in 22 landscapes. An interactive storymap shows the locations and descriptions of the priority landscapes and the agency’s funding allocations under the Wildfire Crisis Strategy. Water providers, conservation groups, and others focused on watershed health expressed concerns that the strategy does not prioritize the full range of risks facing western communities from a changing fire regime, particularly the risk to their water sources from watersheds far from the wildland-urban interface.

The BIL established a Wildland Fire Mitigation and Management Commission with authority to make federal policy recommendations on a variety of issues related to the legislation, including community water supplies and utility corridors. With active participation from agency leaders and stakeholders (including Denver Water), these recommendations may ultimately broaden the focus of future investment priorities to more comprehensively address community watersheds.

The Congressional Research Service (CRS) analyzed 2021 Bipartisan Infrastructure Law’s authorizations for ecosystem restoration and highlighted “questions and issues associated with new authorizations and increased funding for ecosystem restoration provided by the [BIL], including (1) the extent to which restoration programs addressed by the [BIL] are coordinated with existing efforts and follow a strategy, (2) if federal and nonfederal entities can promptly and effectively obligate restoration funding, and (3) how best to monitor the implementation progress and performance of these activities.” (CRS Ecosystem Restoration at 21) These questions and concerns match and are reinforced by what we heard from interviewees in this assessment.

“The cost of mechanical treatments and prescribed burns varies among different forest types and landscapes, but $1,000 per acre is a commonly used average. The infrastructure bill, however, represents only about $30 per acre toward the Forest Service’s 10-year goal and only $20 per acre toward the larger forest restoration backlog. Thus, it will be essential that the agency work with outside partners to stretch the money further and, through collaboration, overcome conflict.” Property and Environment Research Center, Ramping Up Forest Restoration (2022)

12 The Forest Service defines a fireshed as a geographic area where fires ignite and are likely (or not) to spread to communities and expose buildings. Firesheds show where fuel treatments are needed to stop fire transmission from national forests to developed areas. Among other things, they do not assess exposure of community water supplies to fire, although watershed data can be combined with fireshed data for this purpose.
The new federal funding comes with a mandate for the Forest Service (and other agencies) to expand existing collaborative partnerships, with an unprecedented infusion of support for watershed projects that require local partners for implementation. Trout Unlimited and other national conservation groups are queued up to manage multi-million federal pass-throughs to coordinate large-scale restoration work; smaller, community-led groups in priority landscapes will likewise find ready support for watershed projects aligned with agency priorities. And, while new funding offers great opportunities, it simultaneously challenges partners’ capacity to shoulder the responsibilities for securing, administering, and reporting on large grants, as well as planning and implementing large restoration projects.

This generational public investment will require new capacity to deliver on these ambitious goals. This need for capacity means there has never been a better time for everyone from small dollar donors to philanthropic organizations to leverage their knowledge and resources with these public funds to build the required capacity to solve the wildfire crisis. Blue Forest blog post (2022)

The non-federal matching funds requirement alone can be a major obstacle. In a January, 2023, blog, Headwaters Economics described how rural and low-capacity communities are often unable to muster local matching funds to access federal climate resilience funding. The authors recommended three changes in federal grant policies to address the problem: (1) expand definitions of what counts as local match [most programs accept in-kind contributions in addition to cash]; (2) create funding and capacity at the state level to help local governments [as is the case in California, and to a lesser extent in Colorado]; and (3) eliminate local match requirements for local climate resilience funding [this is happening in some programs for tribal entities, but is not widespread].

Interviewees described a variety of capacity challenges in relation to new federal investments in forest health:

» “Community partners are going to be hesitant about getting bigger and bigger, because at some point the money is going to dry up and you’ll have to lay people off.”

» “Do [community-based groups] have the right management structure? Do they have human resources support? Do they have the right finance person now, instead of bringing in $500,000 a year they’re bringing in $5 million? Are they able to deal with the tracking and accounting for the grants, for the money for their people? We’re definitely seeing some swirling issues here because we’ve asked people to pretty much double their staffing capacity. You’re also having people come in who don’t have institutional knowledge. Training is really important, getting everybody on the same page.”
“Local governments themselves don’t have the skills or capacity to leverage these funds; they need a lot of support from things as simple as map making to grant writing to contracting the work.”

“I think many funders don’t realize how much effort it takes to pull a project together—just bring the partners to the table and identify what are the needs and lay out how to do that and then apply for the grants.”

“We need funding for the full life cycle of the project, from the design phase through the ‘meaty middle’ and on to implementation and monitoring.”

Federal funding is a driver for a great deal of activity on forested watersheds, but state, local, and private sources of investment are growing as well. We summarize here some leading types of funding that support watershed enhancement activities around the West; for a more complete analysis of natural infrastructure finance mechanisms, see World Resources Institute’s comprehensive report, Natural Infrastructure, at 80. Some of the watershed investment partnerships referenced below are described in more detail in Appendix B.

**State-based funding:**

» **California’s** Assembly Bill 2480, enacted in 2016, formally recognized the state’s watersheds as water infrastructure and authorized use of infrastructure financing towards the restoration of five watersheds that feed Northern California’s primary reservoirs, along with the state’s traditional water infrastructure like dams, canals and levees. With the passage of AB 2480, California can now fund watershed maintenance and restoration through revenue bonds rather than general obligation bonds, which rely on the state’s taxing power.

» The Water Infrastructure Authority of **Arizona** administers the Clean Water State Revolving Fund Program for the state, providing financial support to communities’ water quality needs, including projects that address watershed health, green infrastructure, and nonpoint source water quality challenges. The state’s Nonpoint Source Management Plan specifically identifies wildfire as a source of water quality impairment, and has provided funding for wildfire mitigation in forested watersheds.

» Combining funds from the Oregon Lottery, federal dollars, and salmon license plate revenue, the **Oregon** Water Enhancement Board provides grants for collaborative restoration projects.

» Proceeds from the **Colorado** lottery, administered by Great Outdoors Colorado, support riparian land acquisition and watershed restoration projects, as well as a variety of recreation and conservation projects.

» The **California** Department of Conservation’s Regional Forest and Fire Capacity Program works with regional block grantees (such as the Sierra Nevada
Conservancy) to build capacity, develop project pipelines, and coordinate landscape planning and prioritization for forest restoration and wildfire resilience projects, with an increasing emphasis on landscape-scale projects.

**Municipal/utility funding:**

- Denver Water, a Colorado public utility, uses a customer surcharge to provide direct support for watershed projects on national forest, state, and private forest lands, and has treated over 120,000 acres of forests in areas where Denver Water collects water.
- In 2012, Flagstaff, Arizona, passed a municipal bond measure, committing $10 million for treatments to reduce severe wildfire and subsequent flooding risk.
- Santa Fe, New Mexico, developed its Municipal Watershed Management Plan in cooperation with the Forest Service and is implementing projects prioritized in the plan through a collaborative fund involving The Nature Conservancy and other partners.
- The Willamette National Forest, Eugene Water & Electric Board, and other partners work together through Pure Water Partners to protect Eugene’s drinking water supply by providing incentives to private landowners to protect and restore riparian buffers.
- The Yuba Water Agency, in California’s Sierra Nevada Mountains, supported the first piloted Forest Resilience Bond with a $1.5 million cost-share contribution to help fund the Yuba Project, a public-private partnership that enables private capital to reduce the risk of catastrophic wildfire by financing much-needed forest restoration; Yuba Water subsequently committed to an additional $6 million Forest Resilience Bond (Yuba II), which leverages $25 million in total funding and will be used to complete priority work on 16,800 acres in the North Yuba Forest Partnership area.
- Members of the Healthy Headwaters Alliance, representing innovative watershed investment partnerships in the western states, meet regularly to share lessons learned and advocate for public policies and funding to support watershed health and source water protection.\(^\text{13}\)

“We focus on fire, but these projects to improve watershed resilience and forest health bring all kinds of other values into play, including recreation and wildlife. The water community has stepped up [to invest in restoration projects] because they see economic impacts from these events [fires], but there’s a lot more intersectionality to it than that.”

—Assessment interviewee

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\(^\text{13}\) For more details on the examples listed here, see Appendix B. For a map showing watershed investment partnerships around the country, see *Natural Infrastructure,* at 55.
Private funding and public-private partnerships:

- **Corporate investments** can directly support particular watershed restoration projects, working through a partner such as the Bonneville Environmental Foundation’s Business for Water Stewardship program; alternatively, corporate support can be aggregated with other private and public funds by organizations such as the National Fish and Wildlife Foundation or the National Forest Foundation to support regional or national restoration initiatives. A recent Pacific Institute white paper highlights opportunities for “co-funding”—leveraging corporate spending by pairing it with other existing and emerging funding streams—to address water supply limitations in the Colorado River Basin.

- The nonprofit Blue Forest’s Forest Resilience Bond on the Tahoe National Forest, California, combines **private capital** and public dollars to implement planned forest restoration activities like thinning and prescribed burning to reduce wildfire risk and protect water resources in landscapes with high fire risk. The Forest Resilience Bond uses a collaborative framework that brings together stakeholders who benefit from restoration to share the cost of reimbursing investors as work is completed.

- The Forest Service’s Conservation Finance Program aims to expand the use of **conservation finance tools** such as the Forest Resilience Bond through pilot projects, agency training, and policy development.

- Private philanthropy dollars support all aspects of these partnerships, including paying interest on loans and directly investing endowment funds in restoration projects that will generate returns over time.

- Insurance companies are beginning to enter the field as well, attracted to opportunities to combine “green and gray” infrastructure for maximum impact.

There is great unrealized potential for private capital to support scaled-up forest restoration. As one of our interviewees stated, “There is more funding on the sidelines looking to invest, whereas there is a dearth of investable projects.” Some limiting factors for accessing these funds include lack of financial literacy among agency and watershed partners, which is beginning to be addressed through trainings such as the Conservation Boot Camp Training Course. Other limiting factors include the small scale of most projects (not justifying the time and cost of investing) and limited options for repaying the investments.

“We need to demonstrate success with what’s available, prove leveraging from other sources, and deliver ecological success across the land—not ‘postage stamp’ projects. If we deliver, this will lead to more investments for long-term success.”

—Assessment interviewee
To reiterate a point made at the beginning of this section: The expanded and diversifying sources of funding available to address western forest and watershed health present both a great opportunity for action and a complex set of challenges for the partners who will be essential for planning, prioritizing, and doing the work. Beyond a call for “shovel ready” projects to direct initial investments, there’s a pressing need for community partner readiness to accelerate and dramatically expand their existing good work. With funding heavily weighted toward project implementation, partners are largely unprepared for the demands of working at scale. As one remarked, “I feel that if we don’t do a good job of spending this [federal] money in the next few years, it’s not coming back.”

**Opportunities to Address Financial and Capacity Challenges:**

1. Support **watershed partners’ capacity** to apply for and implement projects on national forests and adjacent lands through:
   - Sustained **technical assistance and fiscal sponsorship** (examples: National Forest Foundation’s Conservation Connect; National Association of Wetlands Managers’ webinars and publications; and the U.S. Bureau of Reclamation’s Cooperative Watershed Management Program)
   - **Financial literacy** trainings for agency staff, tribal entities, watershed partners, and funders (example: Conservation Finance Boot Camp Training Course)
   - **Convenings and networking** to share lessons learned and best practices demonstrated by local watershed investment and conservation finance partnerships
   - Readily accessible sources for **matching funds** to enable community-based entities to secure federal grants (example: Native Americans in Philanthropy covers tribal applicants’ matching funds for NFWF’s America the Beautiful Challenge 2023 RFP)
   - Ensure that pooled funds to support the **full project life cycle**, from planning, design, and implementation through long-term stewardship and monitoring
   - Improve efficiencies with a hub/spoke model, (i.e., everyone doesn’t have to have the capacity to perform all functions, but all need to be connected)

2. Pursue **corporate water stewardship co-funding** to leverage other public and private funds.

3. Support **private land conservation** through long-term funding for conservation easements, fee land acquisition, and other incentives, as well as stewardship and monitoring for restoration projects to ensure successful implementation and to facilitate adaptive learning
4. Support these efforts with policy advocacy aimed at:

» Broadening implementation of the Wildfire Crisis Strategy and other federal forest investments to focus on opportunities to protect and restore natural water infrastructure to improve wildfire resilience while maximizing other public co-benefits, such as protecting drinking water supplies and associated infrastructure, restoring at-risk fish and wildlife habitat, and building water security for the long term

» Streamlining federal grants and agreements and clarify opportunities to build efficiency for partners and cooperators by relying on programmatic agreements augmented by project-specific task orders

» Addressing tax and other financial incentives, zoning, and transfer of development rights that influence development decisions and facilitate the transfer and continued management of family forestlands

2.4. Market Forces

In addition to the laws and regulations that govern what can be done on national forests and adjacent watershed lands, emerging restoration initiatives face a number of implementation challenges related to market forces. New federal support flowing to western forests will increase demand for nearby forest product processing, as well as workforce development and housing.

Watershed restoration projects often involve thinning and other active forest management techniques, requiring local forestry operators with access to a mill or other processing facility for small-diameter trees and high volumes of biomass. Over the past several decades, western states have lost dozens of mills, as wood processing has shifted across the country to the South. Without a local mill, a restoration project will be more expensive, or possibly not feasible. Similarly, local forestry operators familiar with the landscape and ready to do the work on the ground face challenges of financing their equipment, competing for contracts, and absorbing the costs of long haul routes and other issues. As one operator remarked about his restoration-focused business, “We’ve had to overcome hurdle on top of hurdle.”

The Forest Service provides Innovation Grants to local mills to help them remain in business by improving their capacity to process smaller diameter logs. Local economic development initiatives prioritize keeping mills in operation, or attracting new processing facilities. Agency researchers and partners are experimenting with new approaches to

Management goals for public forests don’t necessarily link to revenue-generating activities”
—Assessment interviewee
addressing the issue, including chipping wood waste onsite and using as mulch in restoration projects, using biochar\textsuperscript{14} to transform harvested materials into soil amendments for agricultural applications, and transporting materials to nearby facilities for other uses. Northern Arizona University’s Ecological Restoration Institute provides practical information about economic uses for restoration byproducts, and the Sierra Nevada Conservancy launched a $17-million Biomass Utilization Fund in 2020 to support new or expand existing wood-utilization businesses in Tuolumne County, California. The recently released Wildfire Resilience Policy Roadmap (at p. 27-29) includes specific recommendations for federal actions to “reduce barriers to and incentivize innovation and investment in hazardous fuels byproduct use and related forest products and processing infrastructure.”

Substantially expanded forest restoration demands people at all levels to do the work, and the labor force is already stretched thin—including staffing within the agencies responsible for facilitating funded projects. For example, since 2010 Denver Water and its partners committed $66 million toward forest health and fire risk reduction in critical watersheds in Colorado, but the municipal water utility reported in 2021 that millions of dollars remained unspent. “Even when funding is available for projects,” Denver Water asserted in a letter to Congressman Joe Neguse, “[the Forest Service] lack[s] the staff necessary to plan, permit and implement hazardous fuels reduction projects. Our federal partners need additional dedicated staff resources to increase the pace and scale at which project dollars are converted into forest health and wildfire risk reduction projects in critical watersheds.” Among other recommendations, Denver Water expressed support for the 21\textsuperscript{st} Century Conservation Corps as one strategy to develop a skilled workforce to implement restoration projects.

For its part, the California Forestry and Fire Recruitment Program provides career support to formerly incarcerated firefighters and those currently incarcerated in California’s Conservation Camps who are interested in careers in the wildland fire and forestry sector. This program is a direct response to the growing need for fire-related personnel, with the added benefit of job training for skilled forestry technicians.

\textsuperscript{14} Producing biochar offers additional climate benefits by storing carbon removed from the atmosphere through photosynthesis, offering the opportunity for carbon credits to help pay for fuels mitigation.

“If you have an industry, it’s easier to grow it versus bringing it back.”
—Assessment interviewee

“We also need just transitions to new technologies and industries.”
—Assessment interviewee

“We need a prescribed fire workforce, separate from the wildland firefighting workforce.”
—Assessment interviewee
Skilled workers need affordable housing, which is another pervasive challenge throughout the western states, particularly in booming mountain towns adjacent to national forests. In some cases, the Forest Service has adjusted its staff salaries to account for the housing crunch in select communities. Where this is insufficient, employers or community partners can purchase workforce housing and make it available at a below-market rate to employees. The Karuk Tribe in California used grant funds in this way, investing the workers’ rent in a fund to cover maintenance and to save for future housing purchases.

**Opportunities to Address Implementation Challenges Related to Market Forces:**

1. Support community-based economic development including:
   - Assisting existing forest product enterprises to continue operating and respond to changing forest management and restoration opportunities
   - Investing in local initiatives aimed at regenerative economic development necessary to support long-term forest and watershed health, including support for individuals seeking to establish new forestry operations (e.g. loggers, restoration practitioners)

2. Support project-level collaborations between federal and state agencies, local governments, communities, and the forest products industry

3. Expand workforce training opportunities, including:
   - Prescribed fire and watershed restoration skills and knowledge, e.g. conservation corps and technical apprenticeships
   - Restoration-focused training and certification to private sector nursery, arboriculture, design, and maintenance professionals to increase local capacity to engage in forest health projects

4. Support community-based enterprises addressing affordable housing and other limitations on workforce availability

**2.5. Data and Information Sharing**

Just as institutional silos challenge efforts to scale up watershed restoration and address landscape problems at scale, so do the sources and types of information that inform management actions. As well stated by one person we interviewed for this assessment: “Our indicators and data are as siloed as our water sectors and forest sectors and other sectors. And therein lies the challenge: to manage holistically we need to think of a whole new type of indicator that shows these connections of various resources. Our siloed metrics tend to encourage optimization of one sector over another . . . We need new indicators that can show concurrent improvement and interdependence on the resilience.”

Several people noted the challenge of compiling comparable data statewide to visualize high priority areas and their existing ecological conditions, and to illustrate
accomplishments in treating and managing high-risk areas across forested landscapes. This information is essential for meaningful planning and setting priorities for action, but it is also valuable as a means of communication to elected officials and others who wish to see the results of their investments. For the most part, the problem isn’t that the data don’t exist; rather, the data exist in many different places, using incompatible metrics.

In fact, the Forest Service has a powerful outcome-based performance tool for prioritizing and evaluating progress in restoring watersheds on national forests and grasslands. Launched in 2010, the Watershed Condition Framework established a nationally consistent reconnaissance-level approach for classifying watershed condition, using a comprehensive set of 12 indicators representing ecological, hydrological, and geomorphic functions and processes that affect watershed condition. The framework includes assessments of existing watershed condition, identification of work needed to restore or maintain condition in priority watersheds, implementation of integrated restoration activities, monitoring of implementation, and aggregation of performance data for national reporting.

According to a 2022 Forest Service update, all 15,082 subwatersheds containing at least five percent Forest Service land were initially assessed in 2010, and 24 percent have been reassessed in the past decade because of changing conditions or new information. Watershed restoration action plans developed with this framework identify priority areas for action, useful to Forest Service managers and to partners seeking to focus their efforts where it is most needed.

“We do really value the Watershed Condition Framework where forests are actually using it. . . It’s such an amazing tool, and we don’t have to reinvent anything. We use it to identify which subwatershed to work in to improve the overall watershed.”

—Assessment interviewee

“Without comprehensive data, statewide efforts fall short, and the same is true for the Forest Service acting on a national level.”

—Assessment interviewee

15 These indicators are illustrated in the original Watershed Condition Framework at p. 9.
Despite its great potential, we heard the following feedback about the Watershed Condition Framework:

» Inconsistent application among national forests; some assessments originally conducted in 2011 have not been updated
» Backlog in implementing Watershed Restoration Action Plans, in part due to agency funding and staffing limitations discussed above
» Difficulty for non-agency resource managers to access data (“like pulling teeth”), or general lack of knowledge and understanding about this resource outside of the Forest Service
» Disconnect between the Watershed Condition Framework and another Forest Service data source, Forests to Faucets 2.0, which identifies watersheds of interest for protecting or restoring forests to benefit surface drinking water supply

The Forest Service is currently “modernizing” the Watershed Condition Framework to comply with federal statutory requirements and increase efficiency of the process. Details of this process are included in a briefing session hosted and recorded by the National Forest Foundation (Dec. 2021).

Several people noted that developing new data tools isn’t necessary, but urged consolidation and improved access to existing data, possibly in state agencies, universities, or statewide watershed coordination organizations. The Wildfire Resilience Policy Roadmap (at p. 31) calls for federal agencies to “convene a panel of public, private and university partners to develop a set of common methodologies and decision support tools for measuring avoided costs and impacts from wildfire events and to incorporate those methodologies into an online geographic system that allows for users to conduct analyses at different geographic scales on an all-lands basis.” Another pressing issue is the need to provide sustained funding to maintain and update tools and databases so they remain relevant and useful.

Opportunities to Address Data and Information Sharing Challenges:

1. Expand access to the Watershed Condition Framework data to support complementary assessment and prioritization on tribal, state, and private lands
2. Develop standardized data sources with shared and regularly updated statewide repositories (e.g. state university water centers, state watershed coordination offices, etc.)
3. Support research and information sharing to improve field-level information about how fuel reduction benefits water quality and runoff timing, along with carbon sequestration and air quality; large-scale experimental programs are needed to measure and track these benefits over time.

2.6. Social and Cultural Factors

Public polls consistently show strong support for protecting clean water, but the average water customer likely has no idea where the water flowing from a tap originated. In particular, very few members of the public understand that distant national forests are part of their community’s natural infrastructure. Often their local elected officials don’t appreciate the relationship between their water supplies and public land management. As a result, they may oppose investing in preventive measures to address risks from atmospheric rivers or wildfires, or in post-flood or fire recovery actions to improve their water security and provide other community benefits.

Despite this general disconnect, emerging and established partnerships around the West illustrate ways that local leaders can and do collaborate effectively with the public agencies and others responsible for the forested watersheds that serve their communities. Section 3, below, references various examples of such collaboration. Water utility managers are often the critical link between municipal leadership and other watershed interests, supported by initiatives of the American Water Works Association, the U.S. Environmental Protection Agency, and conservation finance initiatives aimed at source water protection. County commissioners and emergency services personnel engage with public land managers regarding wildfire risk, and through this connection gain awareness of how their natural infrastructure may be at risk.

Participants in our Denver convening emphasized the importance of storytelling and compelling communications strategies, informed by professional polling. One of the examples of a communications strategy to build acceptance of prescribed burning is a bobwhite mascot called Burner Bob in the Southeast U.S. Participants also emphasized that utility leaders have a great deal of credibility in the public eye, and should be speaking out more publicly about the need for and benefits of forest protection and restoration to enhance watershed health.

“We live in a very big valley, and all of our water comes from the neighboring county. [Our elected leaders] don’t have a clue that a big fire could take out their reservoirs.”

—Assessment interviewee
In some cases, the problem is not lack of knowledge, but failure to listen or active suppression of ancestral/indigenous voices. Several interviewees described how their community was overrun with outside experts after a large fire, few of whom engaged meaningfully with the long-time residents and local landowners about areas likely to flood and other impacts. In the case of indigenous burning practices, for decades the federal government prohibited and punished traditional use of fire, contributing to conditions today in which catastrophic fires are increasing. The Confederated Salish & Kootenai Tribes’ Fire on the Land education initiative provides rich information and resources about the traditional role of fire on tribal homelands, cultural values associated with fire, and modern practices to restore fire for multiple benefits.

Opportunities to Address Social and Cultural Challenges:

1. Expand and improve communications and relationships aimed at building watershed literacy, awareness, and advocacy by:
   - Relationship building, field trips, and compelling messaging, utilizing the Water Hub, and working through local watershed organizations when available
   - Including qualitative metrics for grant reporting to encourage compelling storytelling to illustrate success and lessons learned
   - Working with communications professionals to develop a vision for fire-prone forests and forest-adjacent communities, and a roadmap to achieve this
   - Supporting collaborative efforts to connect community leaders with forest watershed managers, including programs such as Sonoran Institute’s Growing Water Smart
   - Amplifying the influential, trusted voices of municipal water managers and utility leaders through coalitions such as the Healthy Headwaters Alliance
   - The Forest Service, in coordination with partners, should develop a comprehensive communications framework to engage the public, and share messages regarding accomplishments and changing land management requirements under the agency’s 10-Year Wildfire Crisis Strategy; this framework should allow for consistent and appropriately tailored messaging at national, regional, local forest, and unit scales, and should reflect insights from recent polling and ongoing efforts to test and improve messaging

“We need to tell the story of success, not just provide numbers.”
—Assessment interviewee
2. Support **tribal engagement and leadership** in watershed health, including:

» Incorporating **ancestral and indigenous ways of knowing** in watershed protection and restoration, and supporting relationship building to expand mutual understanding and receptivity

» Providing direct financial support for **tribal engagement** in watershed collaborations

» **Co-creating knowledge** with tribal and community partners by diversifying communications and engaging in mutual learning

» Advocating for and supporting **tribal co-management** as outlined in *Bridges to a New Era: A Report on the Past, Present, and Potential Future of Tribal Co-Management on Federal Public Lands*
3. Strengthening the Field

Improving forest health to protect and enhance watersheds is an all-hands exercise, demanding a long timeframe and well-informed strategies. Successful initiatives engage diverse agencies, organizations, industry, and individuals, looking beyond jurisdictional or subject-matter sideboards. People interviewed for this assessment emphasized the urgency of breaking down traditional silos, approaching watershed health comprehensively, and being strategic about “how you sequence, stack, and bundle work”—avoiding the tendency to “commit random acts of restoration.” They also urged promotion of successful watershed partnerships to other states and communities experiencing similar challenges.

“Too often, federal land management agencies and their partners default to projects focused on limited geographic footprints and restoration actions, where ease of implementation and ability to meet outdated, top-down performance targets, in combination with predictable funding and capacity, have long governed budget allocations, planning and progress.” Wildfire Resilience Policy Roadmap at p. 14

This section suggests ways to strengthen and expand the impact of existing watershed partnerships, broaden engagement to include interests not currently involved, and address pressing needs. Examples of innovative watershed partnerships illustrate key strategies that might be replicated to scale up efforts throughout the West, although each watershed community has unique attributes and challenges that will shape a successful, place-based approach.
3.1. Key Watershed Partners and Resources

**Federal agencies** include the primary resource management agencies (Forest Service, Bureau of Land Management, Fish & Wildlife Service) whose lands provide watershed benefits, but also regulatory agencies such as the Environmental Protection Agency, Army Corps of Engineers, and Federal Emergency Management Agency (FEMA). The EPA enforces the federal Safe Drinking Water Act and the Clean Water Act’s Nonpoint Source Protection Program, both of which provide funding and incentives for source water protection. The Natural Resources Conservation Service provides financial and technical assistance to private landowners to improve land and water management in priority watersheds pursuant to its National Water Quality Initiative, which includes source water protection. FEMA supports community efforts to address wildfire risk and recovery, but its preparedness and response programs are poorly aligned with strategies targeting landscape resilience and fuels reduction. (See Wildfire Resilience Policy Roadmap at 24) The U.S. Bureau of Reclamation is another key financial partner, thanks to new levels of funding in the BIL targeted for watershed health, ecosystem restoration, fish recovery, and watershed management (see CRS Bureau of Reclamation report for detailed breakdowns).

**State agencies** participate in watershed partnerships and support their work through direct resource management authority (for example, state-owned lands and permitting authority for work affecting streams) and through grants for projects eligible for forest, watershed, or habitat enhancement funds. For example, California’s Infrastructure Bank provides a valuable source of funding to match federal grants, and the forthcoming update to the California State Water Plan will include a watershed resilience planning framework with strategies and toolkit, and indicators and metrics to track progress, sustainability, and resilience. State environmental agencies provide financial support for projects to reduce nonpoint source pollution, pursuant to an approved watershed restoration plan (e.g. Montana’s Sec. 319 program). State forestry agencies can be valuable partners in prioritizing watershed enhancement projects in coordination with the state Forest Action Plan, and may help secure funds to implement them. And in the Pacific Northwest, state programs for salmon habitat protection and enhancement are a major source of support for watershed partnerships and forest health projects.

**Tribal entities**, while historically excluded from management decisions on their ancestral homelands, play an increasingly influential role as the Forest Service and other agencies act to fulfill their federal trust responsibility, enforce and protect treaty obligations, and honor tribal sovereignty. “Tribes are becoming keystone partners in a lot of projects at the landscape level,” observed one interviewee, explaining that, “Tribes tend to manage for multiple values beyond just timber. Water is embedded in virtually everything they do.” For example, the Nez Perce Tribe’s 200 fisheries employees work with a $20 million annual budget to implement “ridgetop-to-ridgetop” watershed restoration strategies.
throughout ancestral Nez Perce homelands in north-central Idaho, northeastern Oregon, and southeastern Washington. The Intertribal Timber Council provides resources for tribes and their partners to implement the 2004 Tribal Forest Protection Act, which authorizes tribally led forest health projects on tribal trust lands and adjacent public lands. Every ten years, the ITTC publishes an Indian Forest Management Assessment, with the next one due for release in 2023. Tribal-focused regional nonprofit organizations such as Lomakatsi Restoration Project engage directly in implementing restoration projects, while providing job training for participants.

Local government officials may not pay attention to the connection between local water supplies and management actions in national forests and other watershed lands—until a major flood, fire, or water quality threat demands immediate action. Rural county commissioners in agricultural communities might look at water supply as a matter of delivery, emphasizing ditches and pipes. For their part, community planners engaging in wildfire mitigation tend to focus on structures in the Wildland-Urban Interface, rather than recognizing threats to their watersheds. Major exceptions to this generalization (Santa Fe, NM; Flagstaff, AZ) represent communities that have experienced major fires and have followed up by engaging with forest partners to address threats and impacts to their watershed. Hoping to encourage sustained, proactive engagement, the Hispanic Conservation Leadership Council is a network of Hispanic and Hispanic-serving elected, appointed, and community leaders who prioritize public land and water conservation and climate change mitigation in their decision-making and community advocacy efforts, including an explicit focus on forest health and watershed protection in Arizona, New Mexico, Nevada, and Colorado. Sonoran Institute’s Growing Water Smart program guides local leaders in Arizona and Colorado to plan for a more sustainable water future, including resilient watersheds. Local government leaders participate in coalitions such as the California Forest Watershed Alliance to advocate for “all lands” approach to improving forest health covering large landscapes and all ownerships, including local, state, private and federal lands, and highlighting these forest lands’ importance to watershed health and water supply.

Water providers and water user groups who look to forested watersheds as the source of their water supplies are natural partners, and often leaders, in watershed protection and enhancement initiatives. Members of the Healthy Headwaters Alliance include utility leaders from Utah, Colorado, Arizona, California, Washington, and Oregon (as well as

“Where tribes can really help is creating a world where these partnerships work more effectively. That’s true for water, endangered species recovery, fuels. Tribes can be an anchor to building greater partnerships.”

—Assessment interviewee
other partners from around the West) who share a commitment to improving public watersheds throughout the western U.S. that provide safe and reliable water supplies for all downstream users while supporting healthy, functioning forested ecosystems. Professional associations such as the American Water Works Association support and share stories about water providers engaging with the Forest Service and other partners to improve forested watershed health. Nearly half the agenda of the 2022 Colorado Water Congress annual conference focused on the relationship between forest health and water, with special emphasis on partnerships to improve watershed conditions on national forests. And the Family Farm Alliance engages in forest management policy advocacy on behalf of its agricultural water user members, focusing on protecting water rights for irrigation.

**Forest industry partners** include associations of forest products companies (e.g. Colorado Timber Industry Association and Intermountain Forest Association) and local forestry operators (see a first-hand account of launching a forestry business in Arizona in Guardians of the Forest). Forestry operators bring practical knowledge about the logistical practicalities of implementing landscape-scale restoration projects, and thus should be engaged in the planning stages.

**Watershed organizations** range from small, volunteer-run groups to regional inter-governmental coordinating bodies. A recent survey by Utah State University identified over 450 watershed organizations in the Intermountain West. In rural areas, many of these groups work with private landowners to promote soil and water conservation, water quality, and streambank stabilization. Increasingly, state and federal forest managers work together with these groups to assess watershed health, prioritize actions to improve conditions, and implement restoration projects. An example on the Tahoe National Forest in California is the South Yuba River Citizens League, which helps to facilitate the North Yuba Forest Partnership forest collaborative. In some western states public agencies (Oregon Watershed Enhancement Board), public-private coalitions (California Watershed Network), or nonprofit organizations (Montana Watershed Coordination Council) provide grants, technical support, and networking for watershed organizations. The River Network provides this kind of support on national level.

**Forest health collaboratives** operate on a similar model to watershed organizations and with overlapping interests. Members generally include federal and state agency representatives, nongovernmental organizations, industry groups, local decision makers (county commissioners, mayors, and sometime federal staff), and sometimes recreation users and user groups. The Washington Forest Collaboratives Network connects and provides support and resources to eight collaboratives in that state; similarly, the mission of the Montana Forest Collaboration Network is “to assist collaborative groups across Montana in forest and grassland restoration, conservation, and resource utilization for the benefit of all.”
Nonprofit conservation organizations often work under broader mandates that encompass forest, watershed, and/or river conservation. Many focus on specific geographic areas and partner effectively with communities, tribal entities, and agencies; others elevate local efforts through outreach and advocacy. National organizations such as Trout Unlimited and National Wild Turkey Federation are scaling up western watershed restoration by consolidating grant funds from public\textsuperscript{16} and private sources to lead project planning and implementation in priority landscapes—an increasingly important role given federal agencies’ staffing and contracting limitations. For its part, The Nature Conservancy engages in forest policy advocacy, implements restoration on private lands, and leads the Indigenous People’s Burning Network to restore historic fire regimes in western forests. Land trusts incentivize watershed and riverscape protection and restoration on private lands; in turn, the national Land Trust Alliance provides them with technical support, training, and accreditation.\textsuperscript{17} Other nonprofit organizations provide policy expertise, support for the planning process, and training on new tools and techniques to support local initiatives. Examples include the Sierra Institute for Community and Environment (California) and Sustainable Northwest (Oregon and Washington).

Funding partners such as the National Forest Foundation, National Fish & Wildlife Foundation, and numerous private foundations support these partnerships by raising and aggregating funds from various public and private sources, and then providing watershed partners with grants and direct service (e.g. fiscal sponsorship). Other region-specific funding initiatives that focus on watershed health include the Drinking Water Providers Partnership in the Pacific Northwest and the Sierra Nevada Conservancy’s Watershed Improvement Program in the Sierra Nevada region. Conservation finance nonprofits (e.g. Blue Forest) help scale up restoration with infusions of private capital and investment returns linked to benefits of project implementation. The National Forest Foundation also manages implementation of two Forest Resilience Bond projects (and many other priority projects) on the Tahoe National Forest and across the western U.S.

Emerging and under-represented watershed partners suggested in interviews conducted for this assessment include:

- Insurance companies, whose coverage decisions and policy provisions could provide incentives for residential development and other activities impacting forest and watershed health\textsuperscript{18}; insurance companies are increasingly interested in the

\textsuperscript{16} Trout Unlimited: $40 million from the Forest Service over five years; National Wild Turkey Federation: $50 million from the Forest Service over 20 years

\textsuperscript{17} E.g., Land Trusts and Water: Strategies and Resources for Addressing Water in Western Land Conservation (2014).

\textsuperscript{18} See the Wildfire Resilience Policy Roadmap at 32 for specific recommendations for improving insurance model to encourage resilience investments. See Innovating Wildfire Insurance for a pilot project using insurance savings to pay for ecological forest management.
opportunities to combine investments in “green and gray” infrastructure to mitigate risks from catastrophic wildfires

» **Electric utilities**, whose efforts to reduce fire risk under transmission lines by clearing wide swaths of vegetation can impact forest and watershed health through erosion, sedimentation, and invasive weeds

» **Motorized recreation** groups, representing a rapidly growing demographic in forest use with outsized impacts on water quality, and whose activities are inadequately addressed by national forest travel management plans

» **Local industry and businesses**, with vested interests in forest products, the recreation economy, and quality of life for employees and clients

» **Health care providers**, including those that deal with impacts from poor air quality (wildfire smoke and dust) or water quality threats (sedimentation, nutrient pollution)

### 3.2. Successful Strategies

Diverse watershed partnerships throughout the western U.S. work to address the challenges outlined in this assessment, using approaches shaped around their landscape and pressing concerns. None is a perfect model for replication elsewhere, but each offers lessons and methods worth considering. As a starting point, Appendix B provides detailed summaries and commentary about watershed partnerships involving national forest public watersheds in seven western states, all of which involve members of the Healthy Headwaters Alliance. Throughout this assessment we’ve provided additional examples of watershed partnerships mentioned by interviewees and highlighted in other analyses.²⁹ We summarize here key strategies, along with representative examples and factors important to their success. Note that any given watershed partnership may employ several but not all of these strategies.

> “The [off-highway vehicle] industry has certainly compounded the problem of OHV abuse through their advertisements (e.g., OHVs traveling off roads/trails, upstream channels, etc.) and should be approached as a potential funding source and partner . . . to promote responsible use and the protection of forest watersheds and water resources which are critical for all the needs as described in this assessment.”

—Assessment interviewee

²⁹ Several outstanding resources include Guide to Watershed Investment Partnerships; Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States; Ten Strategies for Climate Resilience in the Colorado River Basin; and Building Formal Collaboratives to Leverage Federal Funding.
3.2.1. Work Across Boundary Lines

Although dominated by national forests, western watersheds include a mosaic of land ownership and management authorities—federal, state, tribal, local, and private. Moreover, it’s not uncommon for water providers to divert water from one watershed and move it into another, and for the communities served to be located far from the forested watershed from which the water flows—creating interconnected watersheds, or “hydrocommons.” Recognizing this geographic and political reality, watershed partnerships look beyond national forest lands in their comprehensive planning and implementation and engage the appropriate land owners and management authorities in crafting solutions.

Examples:

» **Forest First** (CA): In 2011 the Santa Ana Watershed Project Authority (a joint power authority made up of five public water districts) entered into agreements with the two national forests that manage about a third of their shared watershed lands. The Forest First partnership leveraged state and federal funding to reduce fuels through vegetation treatment, reduce sedimentation by improving stream crossings, and support research on forest biomass conversion.

» **Rocky Mountain Restoration Initiative** (CO): A joint effort of the National Wild Turkey Federation and the Forest Service, this shared stewardship pilot project seeks to scale up restoration across Colorado, engaging federal, state, and local stakeholders to restore forests and habitat, protect communities, support recreation and tourism, and ensure clean and secure water.

» **Rio Grande Water Fund** (NM): Over 100 organizations support a 20-year program to restore 600,000 acres of forests and protect water supplies for Santa Fe, Albuquerque, Native American Pueblos, and other communities in northern New Mexico and southwestern Colorado. Managed through The Nature Conservancy, this partnership aims to provide sustainable funding for large-scale forest and watershed restoration treatments, educating youth about the connections between forests and water, providing research to policy makers, and creating forestry and wood products jobs.

3.2.2. Proactively Assess Risks and Opportunities

As summarized by one interviewee, “We have a pretty good idea of how to identify areas at risk”—the challenge is motivating local leaders to act before a major wildfire or other event compromises their watershed’s health. Successful watershed partnerships lay

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the foundation for their long-term objectives by assessing current conditions, analyzing vulnerabilities, and prioritizing actions that will build or restore resilience. A total watershed risk and current condition assessment includes uplands, riparian zones, and water holding and transport systems (rivers, streams, springs, and wetlands).

**Examples:**

- **Colorado Springs Utilities** (CO): This utility, which collects water for municipal supplies from a variety of sources, including some from Colorado’s Western Slope, commissioned a Watershed/Wildfire Hazard Assessment and Prioritization to get a handle on the impacts that wildfires would have on water supplies, including flooding, debris flows, and increased sediment yields, and to prioritize management actions to mitigate these hazards.

- **California Key Source Watershed Infrastructure:** The Pacific Forest Trust prepared a comprehensive analysis of conditions and restoration needs for the five source watersheds that deliver water to California’s two largest reservoirs and the core of the state’s water supply. The analysis is intended to be a cross-boundary planning framework rather than a prescription for site-specific work. It makes a compelling case for support of forest fuels reduction, reintroduction of prescribed and managed fire, wet and dry meadow restoration, road repair, and protecting watershed integrity by preventing fragmentation and future degradation.

- **Watersheds for Firesheds:** This online resource provides information and analysis to support community-based partners and local water providers advocating for Forest Service investments in watersheds, wildlife habitat, and climate resilience projects.

**3.2.3. Focus on Watershed Integrity and Function**

Although a great deal of public attention and funding aims to reduce fuels on national forests, other forest and riverscape management actions provide multiple benefits in addition to building landscape resilience to wildfire. Depending on the location, measures such as aspen regeneration, low-intensity prescribed fires, and floodplain reconnection can improve ecological function and water security, while also enhancing conditions for wildlife, recreation, and other public values. Moreover, post-fire activities and other watershed restoration actions need to be closely coordinated with any planned livestock grazing/management actions that may occur on the same acreage in order to ensure that the restoration actions are effective and not negated by livestock grazing impacts. This may require the area (e.g., grazing allotment pasture) to be rested from livestock grazing for several successive grazing seasons.
Examples:

» McKenzi River (OR): The Eugene Water and Electric Board (OR) pursues a Stage Zero watershed restoration strategy that uses wood harvested from forest thinning to create log jams aimed at resetting the floodplain and enhancing watershed function, salmon habitat, and fire resilience.

» Snoquera Project (WA): Diverse stakeholders working with the Mt. Baker-Snoqualmie National Forest aim to restore a subwatershed currently functioning at risk, through plantation thinning, vegetation treatments that support tribal priorities, road decommissioning and repair, improved aquatic habitat connectivity, stream improvements, and trailhead enhancements.

» Sierra Meadows Partnership (CA/NV): This landscape-scale collaborative aims to restore 30,000 acres of high-elevation meadows by 2030 using low-tech process-based restoration techniques to enable floodwaters to spread out and soak in, replenishing groundwater and prolonging summer streamflow, which will improve habitat and increase baseflows for fish. To date, the project has restored 388 acres in four meadows.

3.2.4. Secure and Leverage Public and Private Funding Sources

Even with accelerating federal funding to address wildfire mitigation in priority landscapes, restoration at landscape scale requires sustained financial resources from all sectors. In some cases, shared funding is modest and local, but represents an important step toward long-term collaboration. Some watershed partnerships benefit from regional or program-focused collective funding, enabling them to focus on the work they need to do on the ground, rather than pursue matching dollars or grant renewals. Innovative conservation finance models offer new opportunities to scale up restoration with infusion of investment capital. Long-term success requires investment well beyond project implementation, including capacity support for partner organizations, and funds for monitoring and stewardship activities.

Examples:

» Provo River (UT): The Central Utah Water Conservancy budgeted $500,000 annually for wildfire mitigation on national forests in the Provo River watershed, and created a new Watershed Scientist position to develop and implement watershed projects with a focus on mitigation of wildfire impacts to source water quality for three drinking water treatment plants, coordinated with federal, state, and local partners working under a Shared Stewardship agreement.

» Northern Arizona Forest Fund (AZ): Established by the National Forest Foundation and Salt River Project (one of Arizona’s major water and electricity providers), the fund expedites watershed restoration in the Salt and Verde watersheds through
collection and distribution of funding for shovel-ready watershed improvement projects in five national forests in northern Arizona. Additional contributors and implementation partners include local businesses, large corporations, non-governmental organizations, and municipalities.

» **Yuba Forest Resilience Bonds** (CA): In partnership with the Forest Service, National Forest Foundation, and World Resources Institute, Blue Forest issued its first *Forest Resilience Bond* on the Tahoe National Forest in 2018, deploying private capital to finance forest restoration projects on public lands to reduce the risk of catastrophic wildfire and enhance landscape resilience. A larger, follow-on project to the original pilot will utilize the same set of contracts and partners to scale up restoration work from 6,000 to 35,000+ acres. Funding for this second project comes from the Yuba Water Agency, several California state agencies, and Fortune 500 companies.

### 3.2.5. Engage Diverse Communities and Ways of Knowing

The very concept of forest and watershed health assumes many values and metrics. Increasingly, we understand a broader range of forest and watershed values, including connections to cultural identity and traditional practices. Watershed partnerships committed to equitable conservation look as broadly as possible at community benefits, impacts, and values, and are open to integrating traditional and ancestral ways of knowing with modern scientific analyses. Yet there are persistent obstacles for historically underserved and marginalized communities accessing investments and engaging in forest management processes. As noted in the *Wildfire Resilience Policy Roadmap* (at p. 34), “rewarding collaborative processes, a norm that appropriately recognizes the importance of diverse stakeholders defining compromise and shared solutions for land management, also implicitly biases investments toward communities with the capacity to effectively organize and participate.”

**Examples:**

» **Karuk Climate Adaptation Plan** (CA): This comprehensive plan, finalized in 2019, asserts that climate adaptation is about restoring human responsibilities and appropriate relationships to the natural world. Utilizing a combination of western science and Karuk traditional ecological knowledge, the plan presents climate adaptations for species and habitats centered around the revitalization of Karuk cultural management, the restoration of traditional fire regimes, reducing impacts from intervening factors, the expansion of Karuk tribal management authority and capacity, community engagement and public education, increased interjurisdictional coordination, and expanded research and monitoring. The
Karuk assert that the priorities articulated in this plan should be incorporated into forthcoming national forest plan revisions.

» **Hispanics Enjoying Camping and Hunting in the Outdoors (HECHO):** This coalition is seeking to increase Hispanic representation on local water boards throughout the southwest United States to ensure the voices of Hispanic communities are not just heard, but are part of making decisions that directly impact their communities.

» **Salt Lake City Public Utilities (UT):** In addition to longstanding partnerships with national forest managers in the Wasatch Mountains watershed, Salt Lake City Public Utilities approaches watershed management with a holistic view toward community benefits. The Salt Lake City Watershed Stewardship Plan incorporates environmental justice into its assessment of the populations served, and utility managers apply an equity lens to their planning and management decisions.

3.3. Watershed Partners’ Priority Needs

When asked how private philanthropy can directly help strengthen watershed partners’ ability to respond to identified challenges and opportunities, the most frequently stated priority was **capacity.** (Or, as one interviewee stated it, “Capacity, capacity, capacity.”) Many predicted that community-based entities will be challenged to take on the scale of projects anticipated in the landscapes prioritized for federal investments, as well as those emerging in other watersheds with pressing needs. Their specific needs include:

» Staff time to participate in partnerships (one interviewee described this as “baseline funding for collaboration”)

» Staff time to conduct advance planning, proposal writing, grant administration, and reporting (typically not covered in project implementation grants)

» Fiscal sponsorship by larger entities to ease the administrative burden and ensure accountability (especially important with more complex federal grant agreements)

» Resources to address challenges to project implementation, such as affordable housing and workforce development (e.g. portion of project grant goes toward long-term community endowment aimed at regenerative economic development)

» Long-term support to ensure staff retention

We heard a need for **training and technical support** to ensure success from the initial stages of project planning through implementation and long-term stewardship, including:

» Professional, neutral facilitation for watershed and forest health collaborations (several interviewees mentioned that the facilitator role is crucial to the success of a complex initiative, but typically is relegated to a team member lacking training or skills)
Training and technical support in:

- Complex restoration project planning, management, implementation, stewardship, and monitoring
- Finding, successfully applying for, and properly reporting on public and private funding (interviewees suggested a regular webinar series with recorded sessions available as resources)
- Financial literacy and the fundamentals of conservation finance
- Leadership skills

In addition, and related to the question of capacity, we heard suggestions about the types of grants and expectations of grantees, including:

- Simplified proposal requirements ("keep the process as easy, accessible, and equitable as possible")
- Longer-term grants, to avoid temporary staffing and budget instability and to better match the seasonal cycles of project implementation ("[Short grant cycles] give you a boom-and-bust cycle that’s not sustainable"; "Grant cycles often do not match field seasons very well, and you end up with only a few months of the year to actually execute on the ground.")
- Unrestricted or lightly restricted grants that empower recipients to adapt their approach according to changing conditions and opportunities
- Ready access to matching funds to help secure/leverage federal grants ("The non-federal match requirement can break things, and it’s a barrier")

3.4. Prioritizing Landscapes, Watersheds, and Networks

Virtually every forested watershed in the West would benefit from additional protection and restoration. The Forest Service has estimated 58 million acres of national forest land in need of restoration (of a total 193 million acres the agency manages nationwide). Adjacent lands managed by other federal agencies, states, tribes, or private landowners are equally important to include when aiming for landscape-scale conservation.

Twenty-two landscapes throughout the West are now in the spotlight, thanks to funding priorities emerging from Forest Service’s Wildfire Crisis Strategy. In these landscapes, private investment could immediately and productively help leverage federal dollars and expand watershed benefits by extending work to adjacent lands, supporting long-term monitoring and stewardship, and complementing fuels treatment with process-based restoration to enhance watershed function and resilience. In some cases, existing watershed investment partnerships in the priority landscapes have completed detailed assessments of restoration priorities and needs. Support for high-priority, shovel-ready
projects should complement and add as few additional requirements as possible to the new and forthcoming federal grant programs being run through the National Fish and Wildlife Foundation, National Forest Foundation, and other umbrella entities.

In addition, and equally importantly, private philanthropy can help shape future opportunities by looking beyond the federal priority landscapes, and by helping community-based entities build their capacity to plan and engage on larger projects to improve their chances of receiving future support that often goes towards previously identified “low-hanging fruit” and “shovel ready” projects. Since the Forest Service’s criteria for selecting priority landscapes did not include watershed value or vulnerability, a strategic investment strategy could focus on these “left-out” landscapes. Interviewees suggested a variety of criteria for prioritizing investment in specific watersheds that:

- Serve as the sole source of community water supplies and are vulnerable to fire/climate/other threats
- Are the focus of existing watershed organizations, forest health collaboratives, and/or engaged local elected officials
- Provide habitat to salmonids or other priority species linked to watershed condition (“If you protect salmon, you’re protecting a whole suite of other things as well”)
- Experience heavy recreation use
- Are currently in good shape and not adjacent to degraded lands that may risk destruction of restoration work (“some landscapes are so degraded that the juice may not be worth the squeeze”)

Apart from focusing on particular landscapes, the larger goal of scaling up watershed protection and restoration demands a stronger institutional infrastructure supporting the diverse partners necessary for successful implementation. In a 2022 blog, Blue Forest characterized different types of capacity provided by partner organizations who play critical roles in creating impact through forest restoration projects on public lands:

- Implementation Capacity (“the Doers”)
- Local Capacity (“the Guides”)
- Forest Capacity (“the Workforce Developers”)
- Regional Capacity (“the Conveners”)
- Technology

All of these types of partners would benefit from improved networking, sharing information/lessons learned, and training. In particular, innovations in one geographic area (financing, planning/permitting, restoration techniques, evaluating outcomes, etc.) can be tremendously helpful for those working on other areas. It does not appear necessary to create new organizations, but it would be beneficial to support better connections between state-specific or regional entities to strengthen West-wide lines of
communication and learning. Broader coalitions, such as the Healthy Headwaters Alliance, could more effectively support policy changes or funding consistent with emerging understanding of priority needs and best practices.
4. Defining Success, Measuring Progress

Decisions about strategic priorities for philanthropic investments require agreement about desired outcomes. We share here a suggested long-term goal and metrics that could be applied to measure progress toward achieving it.

4.1. Goal Statement

This assessment frames a broad goal of “protecting critical forests and improving forest health to ensure safe and reliable water for people and nature.” The following long-term goal statement could help envision success and identify the building blocks necessary to achieve this goal:

In the next 20 years, western forests and the waterways that flow through them are managed with explicit objectives and demonstrated progress to:

1. Protect and restore terrestrial, aquatic, and riparian ecosystem health, function, and services, including fisheries and wildlife habitat integrity and connectivity
2. Provide secure, high-quality, affordable water supplies for dependent aquatic and terrestrial wildlife/fish species, human domestic and agricultural use, and other community benefits (including recreation, flood control, water-holding capacity, and other values)
3. Ensure resilience to climate change, and support ecosystem transition where it makes sense to do so
4. Reduce the risks of atmospheric river impacts and catastrophic wildfires, prepare fire-adapted ecosystems and landscapes for receiving fire, and restore
5. Effectively engage community leaders and members of the public to promote mutual learning, collaborative solutions, and “watershed literacy”

6. Co-create knowledge to better co-manage with tribal partners

This goal statement can be expressed most specifically if limited to national forests, but a successful strategy throughout the western states requires attention to the mosaic of land ownership and management authority present in most watersheds, including federal, state, tribal, and private lands. The box below illustrates how this goal statement complements the Forest Service’s strategic objective for providing “abundant clean water.”

USDA Forest Service’s Strategic Plan’s Water Goals

- **Strategic Goal:** Deliver Benefits to the public
- **Strategic Objective:** Provide abundant clean water
- **Long-term Result:** Watersheds on our Nation’s forests and grasslands are in good condition, functioning as they should.
- **Means and Strategies:**
  - Conserve, maintain, and restore watersheds, ecosystems, and the services they provide to people.
  - Use the Forest Service’s Watershed Condition Framework to classify watershed conditions, identify restoration priorities, and monitor program accomplishments.
  - Maintain water of sufficient quantity and quality to sustain aquatic life and support terrestrial habitats, domestic uses, recreation opportunities, and scenic character.
  - Deliver the knowledge, tools, and technologies to restore, sustain, and enhance watersheds in a changing future.
  - Facilitate partnerships that foster water conservation and citizen stewardship.
  - Illustrate the importance of the link between forests and faucets from both surface and groundwater sources through educational programs.

USDA Forest Service Strategic Plan (2015)

### 4.2. Metrics

Each of the components of the long-term goal suggests actions and metrics to assess success. The metrics summarized below include links to real-life-examples of their application. This is not an exhaustive list of relevant metrics, but is intended to be suggestive of the ways to measure progress in several priority areas for action. Evaluation resources directly related to forest restoration and watershed health are available from Northern Arizona University’s Ecological Restoration Institute and Blue Forest Conservation.
4.2.1. Protect and restore terrestrial, aquatic, and riparian ecosystem function and services, including fisheries and wildlife habitat integrity and connectivity

Metrics:

» Improved conditions as assessed by the Forest Service’s Watershed Condition Framework and other management tools focused on watershed uplands (e.g. grazing allotment condition)

Example:

» Number of subwatersheds with assessments improved from “poor” to “good” (example: Watershed Condition Framework 2011-2020)

» Increase in abundance/fitness/distribution of selected focal species

Examples:

» Number of subwatersheds occupied by beavers (example: Rio Grande National Forest at 97)

» Number of native trout occupying newly connected tributary streams (example: Conservation Strategy for Colorado River Cutthroat Trout)

» Landscapes restored to improve ecosystem function and connect fish and wildlife habitat

Examples:

» Acres of meadow and/or riparian habitat restored, including invasive species removal and native species replanting (example: National Fish & Wildlife Foundation, Southwest Rivers Headwaters Fund 2023 RFP)

» Miles of riverscape in priority watersheds restored to Stage Zero, the initial, pre-disturbance condition in the “Stream Evolution Model” (example: South Fork McKenzie River Stage Zero restoration monitoring)

» Number of priority watersheds or subwatersheds restored to achieve specific ecosystem outcomes

» Improved management practices to protect and enhance watersheds

Examples:

» Miles of livestock exclusion fencing installed to protect riparian habitat (example: National Fish & Wildlife Foundation, Southwest Rivers Headwaters Fund 2023 RFP)
» Number of range riders employed to alleviate livestock impacts on riparian and aquatic habitat (example: Amigos Bravos range rider program)—need to get more from Steven Fry

» Adoption of National Forest motorized travel restrictions and enforcement of off-highway vehicle (OHV) use violations (example: Mt. Baker-Snoqualmie National Forest—get example from Jen Syrowitz)

» Number of miles of unauthorized OHV created “wildcat” trails and roads restored to reduce damage to forest watersheds and reduce sedimentation in streams

» Miles of stream included in new protective management designations (e.g. Wild and Scenic Rivers, Outstanding National Resource Waters, and Cultural Waterways)

4.2.2. Provide secure, high-quality, affordable water supplies for dependent aquatic and terrestrial wildlife/fish species, human domestic and agricultural use, and other community benefits (including recreation, flood control, water-holding capacity, and other values)

Metrics:

» Acres of source watershed lands protected and restored, and associated hydrologic changes throughout the watershed

Examples:

» Reduced evapotranspiration of selected species in restoration project area (example: Roche et al. research in Sierra Nevada Yuba watershed, CA)

» Longer period of alluvial aquifer recharge early in the season, and higher volumetric discharge at baseflow (example: Brissette research on Ninemile restoration, MT)

» Changes in depth, extent, and duration of inundation on the landscape following flood events, with elevated water table during high and low flows (example: Westbrook et al. research on beaver dams and overbank floods)

21 Several interviewees cautioned against evaluating success solely by enhanced flows, noting that the benefits of watershed protection and restoration affect the forest landscape broadly and there is not necessarily a direct relationship with water replenishment.
Benefits and avoided costs for municipal water suppliers and their customers attributable to implementing effective land management actions, restoration, and other measures that reduce risks and thus protect source water quality.\(^{22}\)

**Examples:**

- Best Management Practices successfully implemented (with effective monitoring) in source watershed
- Actual sediment reduction measured at drinking water intakes and treatment plants
- Prospective analysis: Estimated costs of additional water treatment that would have been necessary to address post-fire or atmospheric river sedimentation and other impacts (examples: Natural Infrastructure at 27-29)
- Prospective analysis: Analysis of social, environmental, and economic benefits provided by a watershed to the surrounding community, in order to assess impact of a proposed fuel reduction treatment (example: Greater Santa Fe Fireshed Analysis) or watershed restoration (Big Quilcene River Watershed Analysis)
- Retrospective analysis: Efficiency of actual investments in mitigation activities, including community and environmental stewardship co-benefits (example: Cost-Benefit Analysis of Denver’s Forests to Faucets Program)

**Quality and availability of water-related recreation**

**Examples:**

- Local economic benefits of fishing/rafting/birding measured over succeeding years in response to watershed improvements

4.2.3. **Ensure resilience to climate change, and support ecosystem transition where it makes sense to do so**

**Metrics:**

- Improved landscape capacity to absorb peak rainfall/runoff events and restore terrestrial/riparian/aquatic connectivity

**Examples:**

- Number of watersheds restored to absorb runoff, reduce peak flow, and keep water on the landscape longer
- Number of undersized culverts replaced with appropriate structures

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\(^{22}\) New York City’s public water system provides a classic illustration of avoided costs, as a comprehensive watershed management program allows the City to serve 9 million people from unfiltered water sources. See Watershed Protection for a World City.
to facilitate flow and aquatic connectivity (example: National Fish & Wildlife Foundation California Forests: Targeted Headwaters Resilience Implementation and Monitoring)

» Miles of forest roads decommissioned, stored, or modified to mitigate sediment-laden flow into streams (example: National Fish & Wildlife Foundation California Forests: Targeted Headwaters Resilience Implementation and Monitoring)

» Expanded stream refugia to reduce vulnerability of native coldwater fish from increasing water temperatures

Examples:

» Miles of priority stream restoration completed to support survival/recovery of selected species (National Fish & Wildlife Foundation Bring Back the Native Fish 2022 RFP)

» Acres of private forested land in priority subwatersheds protected through land acquisition (fee simple or conservation easement) and improved through stewardship activities (example: Pure Water Partners)

4.2.4. Reduce the risk of atmospheric river impacts, prepare fire-adapted ecosystems and landscapes for receiving fire, and restore landscapes to healthy, functioning ecosystems from their ecologically departed or degraded state

Metrics:

» Forest-wide watershed restoration assessment, prioritization, and treatment

Examples:

» Number of Watershed Restoration Action Plans and implementation plans completed

» Pre- and post-fire risk assessment, prioritization, and treatment (example: Colorado Wildfire Ready Watersheds)

Examples:

» Number of assessments and treatment plans completed

» Number of watersheds receiving pre- and post-fire treatments such as thinning, fuels reduction, meadow restoration, and prescribed fire
» Expansion of prescribed fire over the next decade

_Examples:_

» Number of watersheds treated with prescribed fire (or acres mitigated)
» Expanded Forest Service program and workforce capacity dedicated to prescribed fire
» Number of cultural burning partnerships with tribes

» Secure sustainable financial support to scale up treatments

_Examples:_

» Number of watersheds included in conservation finance initiatives (example: Forest Resilience Bond)
» Number of people trained and informed in conservation finance best practices (example: Conservation Finance Boot Camp Training Course)

» Public education to build understanding and receptivity for prescribed/managed fire and to address public health impacts of smoke

_Example:_

» Number of demonstration projects and other outreach activities

4.2.5. **Effectively engage tribal partners, stakeholders, community leaders, and members of the public to achieve mutual learning, collaborative solutions, and “watershed literacy”**

_Metrics:_

» Co-create knowledge to better co-manage with tribal partners, and incorporate ancestral/indigenous knowledge and cultural values in assessments of watershed health and planning forest restoration activities

_Examples:_

» Revised national forest plans include tribal priorities (example of new Forest Service Strategy, announced February, 2023)
» Co-stewardship agreements with tribes to implement tribal watershed priorities (example: Santa Clara Pueblo Forest Resiliency Story Map)

» Tribal government, local government, and civic organization engagement and participation in trainings, assessments, planning, and implementation of projects to improve watershed health
Examples:

» Number of tribal entities engaged in watershed efforts where they have a stake

» Amount of capacity support provided to tribal entities for engagement (through dedicated funding, technical assistance, and other resources)

» Number of local elected officials regularly engaged in forest watershed collaborative meetings and field trips

» Number of people actively engaged in watershed-focused community science initiatives (example: Watershed Education Network Stream Team)

» Creation/funding of shared positions and programs to formalize collaboration (example: Flagstaff (AZ) Watershed Protection Project)

» Skills training and youth engagement to build restoration workforce and constituency

Examples:

» Number of participants in youth/young-adult programs focused on forest health (example: Forest Stewards Youth Corps)

» Number of tribally led youth engagement programs for forest restoration

» Public education/surveys assessing understanding of the importance and values of maintaining and protecting healthy and properly functioning upland watersheds, riparian zones, and stream conditions.

Example:

» Improved understanding demonstrated in surveys conducted before and after educational and outreach activities (example: Environmental Protection Agency’s Watershed Academy outreach evaluation resources)
5. Strategic Steps Forward

These high-priority actions will respond to opportunities identified and illustrated in this assessment and emphasized in feedback from interviewees, reviewers, and participants in our Denver convening:

1. Support proactive, holistic landscape-scale restoration planning to **assess risks and prioritize actions**

2. **Protect and restore forests and riverscapes** to mitigate impacts from atmospheric rivers and wildfires, including restoring natural/historic fire regimes where appropriate

3. Support and enhance **watershed partners’ capacity** to participate in scaled up restoration through technical and financial literacy training, project planning and implementation support, fiscal sponsorship, and convenings/networking

4. Leverage new federal investments with **targeted philanthropic support**, including matching grants, long-term life-of-project grants, community enterprise/workforce development, and pooled funds in a hub/spoke model, incorporating emerging conservation finance practices to make the most of private investments in forest health

5. Support **improved community planning and preparation** for fire resilience in the Wildland Urban Interface, including professional communications about the role of fire in forest and watershed health
6. Advocate for supportive **policies and investments** that:
   » Incorporate watershed values into wildfire mitigation strategies
   » Integrate/streamline restoration permitting and environmental reviews
   » Protect/prioritize watersheds and aquatic resources in national and state forest plans
   » Enable and promote tribal co-management where appropriate

7. Improve **data sharing** to facilitate learning and collaboration
6. Conclusion

This assessment process provided a valuable opportunity to look at the big picture of forest and watershed health and resilience in the western United States with an eye toward opportunities for strategic funding and support from the philanthropic community. While the depth of analysis is necessarily limited in a project completed in just a few months, the interactive dialogue with members of the Healthy Headwaters Alliance and others yielded rich details and insights.

We offer here a few final observations to conclude the assessment.

First, it is clear that the philanthropic community is poised to play a critical role in (1) filling gaps where new federal investments don’t cover essential activities; (2) catalyzing and leveraging private investments to scale up restoration; and (3) providing critical capacity support for the watershed partners who are expected to play a key role in implementing ambitious forest health projects.

Second, we have not outlined a single strategic approach to prioritize landscapes for investment. Instead, we provided an overview of the current federal investment priorities and highlighted the need for holistic, proactive watershed restoration planning to identify risks and prioritize actions. This essential preliminary step, combined with broad and sustained support for community-based partners ready to help implement the work, will help avoid piecemeal, isolated “random acts of restoration” and instead promote quality work that’s appropriately “sequenced, stacked and bundled.”

Finally, the scale and complexity of these challenges demand robust collaboration, including not just federal and state agencies and local community partners, but an
enhanced role for tribes to exercise leadership as co-managers where tribal trust resources and cultural values are involved. Existing networks, including the Healthy Headwaters Alliance, can help build stronger connections among those working for forest and watershed health by sharing stories of successful projects, drawing attention to issues needing management or policy changes, and connecting diverse partners to learn from one another.

With appreciation to the Water Foundation for proposing and supporting this assessment, the National Wildlife Federation will continue to work to protect critical forests and improve forest health to ensure safe and reliable water for people and nature.
The following individuals generously provided confidential input on this assessment through interviews, providing written feedback on an earlier draft, and/or participating in a convening in Denver, Colorado on May 1-2, 2023. None of the errors in this document or any specific opinion or recommendation contained in the review draft should be attributed to any of these participants or the organizations with which they are affiliated.

- Matt Ashley, Aurora Water (Colorado)
- Elle Benson, Theodore Roosevelt Conservation Partnership (Colorado)
- Arthur “Butch” Blazer, National Wildlife Federation Board of Directors (New Mexico)
- Christina Burri, Denver Water (Colorado)
- Audrey Miles Cherney, Upper South Platte Partnership/Colorado State Forest Service (Colorado)
- Jackie Corday, American Rivers (Colorado)
- Joe Crawford, Central Utah Water Conservancy District (Utah)
- Rebecca Davidson, National Forest Foundation (Arizona)
- Glen Dickens, Arizona Wildlife Federation (Arizona)
- Charlie Ester, Salt River Project (Arizona)
- Nancy Fishering, Consultant (Colorado)
- Susan Fricke, Eugene Water and Electric Board (Oregon)
- Steven Fry, Amigos Bravos (New Mexico)
- Alex Funk, Theodore Roosevelt Conservation Partnership (Colorado)
- Todd Gartner, World Resources Institute
- Sterling Grogan, Consultant (New Mexico)
- Kamyar Guivetchi, California Department of Water Resources (California)
- Zach Knight, Blue Forest Conservation (California)
- Adrian Leighton, Salish-Kootenai College/Intertribal Timber Council (Montana)
- Robert Masonis, Trout Unlimited (Washington)
- Mike McHugh, New West Environmental; Aurora Water (ret.) (Colorado)
- Joel Murray, U.S. Forest Service (Colorado)
- Kirstin Neff, National Fish and Wildlife Foundation (Colorado)
- Emily Olsen, National Forest Foundation (Colorado)
- Jonathan Paklaian, Arkansas River Watershed Collaborative (Colorado)
- Brad Piehl, JW Associates (Colorado)
• Molly Pitts, Colorado Timber Industry Association (Colorado)
• Marian Rice, Salt Lake City Public Utilities (Utah)
• Andrea Rogers, U.S. Forest Service (Colorado)
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• Camilla Simon, Hispanics Enjoying Camping, Hunting and the Outdoors (Virginia)
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• Elizabeth Söderström, Water Foundation (California)
• Tracy Stanton, Emerald Alliance (Washington)
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• Devon Suarez, Suarez Forestry LLC (Arizona)
• Jen Syrowitz, Conservation Northwest (Washington)
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• Max Trujillo, Hispanics Enjoying Camping, Hunting and the Outdoors (New Mexico)
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• Bob Vahle, Arizona Wildlife Federation (Arizona)
• Janice Varela, Hispanics Enjoying Camping, Hunting and the Outdoors (New Mexico)
• Garrit Voggesser, National Wildlife Federation Tribal Partnerships Program (Colorado)
• Kitty Weisman, Blue Forest (Washington)
• David Willms, National Wildlife Federation Public Lands Program (Wyoming)
• Josh Wilson, U.S. Forest Service (Colorado/Washington, D.C.)
• Kimery Wiltshire, Confluence West (California)
• Travis Woolley, Arizona Wildlife Federation (Arizona)
• Anne Zimmermann, U.S. Forest Service, retired (Virginia)
APPENDIX B: EXAMPLES OF WATERSHED INVESTMENT PARTNERSHIPS

Leaders of the Healthy Headwaters Alliance prepared this summary in 2021 to provide background in a dialogue with U.S. Department of Agriculture and U.S. Forest Service leaders. It provides detailed examples of partnerships that illustrate various strategies but similar goals of protecting municipal drinking water and associated ecosystem benefits. Special thanks to Rebecca Wolfe for leading this effort, and to Michael Anderson and the named representatives of the Healthy Headwaters Alliance leadership team who prepared/contributed to each of these summaries.

Several examples cited here were added or updated following the Forests and Water convening in Denver in May, 2023.

This memo highlights the following examples:

- Aurora, CO
- Denver, CO
- Eugene Water & Electric Board, OR
- Flagstaff, AZ
- Salt Lake City, UT
- Summit County, UT
- Salt River Project, AZ
- Santa Fe, NM
- Sierra Nevada: French Meadows and North Yuba, CA
- Snoquera Project, WA

The Healthy Headwaters Alliance leadership team includes representatives involved with or possessing detailed knowledge of each of these examples. They are prepared to support and provide additional information concerning investments in and implementation of watershed restoration partnerships, and suggest the following key lessons or best practices illustrated by the examples that follow:

- **Wildfires and climate change** continue to pose a growing threat to watersheds and water supplies, with worsening drought, longer fire seasons, and expansion even into historically fire-resistant areas like the western Oregon Cascades.

- Water utilities and others are using several types of **funding strategies** to invest in watershed restoration, such as matching voluntary contributions by utility customers (Salt River Project), surcharges on monthly utility bills (Eugene), and forest resilience bonding (Sierra Nevada/North Yuba).
Watershed partnerships vary in their geographic scale, members, and land ownerships, with some focusing on national forest lands and others on downstream private lands. Key partnerships include the Front Range Fuels Treatment Partnership in Colorado, Northern Arizona Forest Fund, Rio Grande Water Fund in New Mexico, Pure Water Partners in Oregon, and the North Yuba Forest Partnership in California.

Lack of Forest Service resources and capacity has been a barrier to effective partnerships in some cases (e.g., Denver and Salt River Project/4FRI).

Economic analyses in Santa Fe and Denver show that benefits (in the form of avoided costs) typically exceed the expense of restoration treatments in watersheds that supply municipal drinking water.
Aurora, Colorado (prepared by Michael McHugh)

Background

Aurora Water provides water to more than 388,000 residents of the City. Aurora, like many other Colorado cities, has built water diversion and collection systems all over Colorado’s high country to corral and store this valuable resource. Aurora depends on renewable surface water for approximately 95 percent of its raw water supply. Aurora’s raw water system is designed to provide highly reliable service. Diverse and high-quality sources of water supply are maintained in three (3) major river basins; the Colorado (25%), the Arkansas (25%), and the South Platte (50%). Facilities in the Colorado Basin include the Homestake Project, the Busk-Ivanhoe system, and the Twin Lakes Reservoir and Canal Company’s trans-mountain diversions. In the Arkansas Basin, Aurora has interests in the Turquoise Reservoir, Twin Lakes, Lakes Meredith, and Henry, variable storage in the Pueblo Reservoir and former irrigation rights from the Rocky Ford Ditch, the Colorado Canal, and two ranch transfers.

Water from both the Colorado and Arkansas basins is delivered to the South Platte Basin via the Otero Pump Station and Pipeline. Water from the Lower Arkansas Basin is moved to the upper basin via exchanges. Aurora’s South Platte Basin water rights are predominantly transferred irrigation rights out of South Park. Other facilities and supplies include Spinney Mountain Reservoir, Aurora Reservoir, Strontia Springs Reservoir, Last Chance Ditch Company shares, and groundwater supplies. The Prairie Waters Project is the newest addition to the water supply portfolio. It captures reusable return flows from Aurora’s wastewater and lawn irrigation return flows and returns them to the potable water system after treatment.

Watersheds in these basins are shared with many Front Range water providers including Colorado Springs, Denver, Pueblo and Pueblo West, and the Southeastern Water Conservancy District. The overlapping of these watersheds and our shared facilities contribute to a natural partnership to protect our watersheds.

Aurora participates with these partners and other NGO’s and private entities to restore source water watersheds and riparian corridors to reduce sedimentation in our main diversion reservoir, Strontia Springs just southwest of the metro area.

Shared Stewardship

Beginning after the Buffalo Creek fire in 1996 many watershed protection groups began to form with the goal of reducing the chances of severe fires. Unfortunately, the Buffalo Creek fire was followed by another catastrophic fire which further damaged Aurora’s and Denver’s South Platte watershed. The Hayman Fire in 2002 burned approximately 138,000 acres and resulted in six lives lost. Shortly thereafter the Front Range Fuels Treatment Partnership (FRFTP) was formed and published “Living with Wildfire.”
Then in 2005, FRFTP funded “Protecting Front Range Forest Watersheds from High Severity Wildfires: An Assessment by the Pinchot Institute for Conservation.” That report detailed the poor conditions of the forest ecosystems in the Front Range and the threats to municipal water systems. That report spurred the water system officials into action. By 2010, many Front Range Municipalities negotiated Memorandums of Understanding to co-fund mitigation efforts to recover from past wildfires and to prevent severe wildfires in the future. Ten years later it quickly became clear that not enough was being done and that the pace and scale of treatments needed to be increased. More work and more funding were needed to accomplish more mitigation—not just on U.S. Forest Service lands but also on state and private lands.

In 2018, the U.S. Forest Service released a shared stewardship plan that included three core elements:

» Determine forest management needs statewide
» Do work in the right places at the right scale
» Use all available tools for active management

Governor Polis and USDA Undersecretary Jim Hubbard signed the memorandum of Understanding on October 23, 2019.

The next year, Colorado faced the worst fire year on record with more than 100 days of fire burning over 665,000 acres. Colorado had three major fires that each eclipsed the Hayman Fire which had set the record as the largest fire in the state in 2002. One of the smaller fires, the Grizzly Creek fire (32,631 acres) closed the main east-west interstate I-70, not only because of the smoke and fire, but also because of the flash flooding that occurred several times last year (2020) and resulted in a major flood that disrupted commerce for two weeks. Governor Polis has requested $116 million for repairs from the Federal Highway Administration.

Last year [2020] demonstrated that even more resources-funding and personnel are needed to do more upfront mitigation, treat more acres, and repair infrastructure. This year’s major challenge is to ensure that federal funding can be used in special lands designated as “Roadless” or “Wilderness.” These high severity fires are not controlled by land use boundaries and are destroying the places, species, and ecosystems that we sought to protect. We need to work together to address these issues and look for creative solutions.

For more information: Matt Ashley, Aurora Water: mtashley@auroragov.org
Denver Water provides water to 1.5 million people in the Denver metropolitan area. Strontia Springs Reservoir supplies 80% of Denver’s water and 90% of Aurora’s water. Following severe wildfires in the Upper South Platte watershed in 1996 (Buffalo Creek Fire) and 2002 (Hayman Fire), a major flood event brought 1 million cubic yards of sediment into Strontia Springs Reservoir, equal to 40 years of normal sedimentation.

Denver Water spent over $27.7 million on recovery costs from the fires and flooding, of which $18.5 million was spent on a dredging operation in 2013 to try to remove the sediment and debris that drained into Strontia Springs Reservoir. Because of the severity and location of the Buffalo Creek and Hayman fires, the burn scars have not recovered and have continued to be a perpetual sediment/debris source into the reservoir. While not currently an issue for Strontia Springs Reservoir, sediment and debris could cause concerns over dam safety. Another dredging project is likely in the future.

**Forests to Faucets**

In 2010, Denver Water and the U.S. Forest Service announced a Forests to Faucets Partnership, agreeing to jointly fund restoration work in areas critical to Denver’s water supply. The two agencies agreed to split the $33 million in costs evenly between the Rocky Mountain Region of the Forest Service and Denver Water (from its operating budget).

In February 2017, Denver Water and the U.S. Forest Service, joined by the Colorado State Forest Service and Natural Resources Conservation Service, renewed a $33 million agreement for work on 40,000 acres of public land and also on more than 5,000 acres of private land. The renewed Forests to Faucets agreement builds on the 2010 initiative that led to thinning on 48,000 acres of public land.

In recent years, the Forest Service has not been able to spend all of the funding anticipated in the 2017 agreement within the planned 5-year timeframe because of lack of staff and capacity constraints. Currently, Denver Water has more than $4 million of funding available that is awaiting a match from the Forest Service.

**Economic Benefits**

Denver Water considers investing in proactive forest and watershed health projects to be a smart business decision. First, as noted above, dredging of the Strontia Springs Reservoir following wildfires has cost Denver Water millions of dollars. If through watershed and forest health projects, Denver Water reduces as little as just 5% of the sediment draining into Strontia, they experience a return on investment. It’s much more costly to repair the
damage to Denver’s water infrastructure, rather than proactively investing in upstream watershed projects with have multiple benefits (including wildlife, recreation, and community protection).

Second, we have to protect the infrastructure that we have. Utilities cannot just build new reservoirs. To lose and replace an existing reservoir or a dam from a wildfire would be extremely costly and time prohibitive. The ability to avoid such costs is invaluable.

Third, it is much cheaper to invest in forest treatments rather than post-fire restoration. For example, aerial mulching is expensive -- about $5,000 per acre in the Williams Fork burn scar which burned in 2020. In comparison, forest treatments are about $2,000 per acre.

For more information: Christina Burri, Watershed Scientist, Denver Water, christina.burri@denverwater.org
**Eugene Water and Electric Board, Oregon** (Susan Fricke)

**Background**

“Back in 2000, Eugene was one of the first larger metropolitan areas to take its watershed as part of its water infrastructure and to recognize that,” EWEB’s Watershed Restoration Program Manager Karl Morgenstern said. “Now we have the trust and relationships to do projects like large-scale floodplain restoration. Other places are facing disasters and those relationships are not in place, and they’re having to build those in the midst of a disaster and that just adds complexity and delays action.”

Eugene Water and Electric Board (EWEB) has been a leader in developing innovative watershed investment partnerships ever since 2000. EWEB relies on the McKenzie River watershed in the Lower Cascades of the Willamette National Forest to supply clean drinking water to nearly 200,000 people. EWEB’s Drinking Water Source Protection Program works with partner organizations across the local, state, and federal levels as well as with environmental non-profits, businesses, and local landowners to identify and address threats to water quality in the McKenzie watershed. One of our flagship programs, for example, is to assess riparian conditions on private lands bordering the river and assist landowners to implement watershed restoration activities. Not only do we preserve our water quality for our fish and wildlife, but we develop relationships with our neighbors and help EWEB to avoid future water treatment costs.

In 2018, EWEB adopted a 10-year strategic McKenzie Watershed Recovery and Restoration Plan and established the Pure Water Partners (PWP) Program to reward McKenzie landowners who protect high-quality land along the river. PWP provides technical assistance for landowners who need restoration work on their properties to protect water quality. Restoration work that PWP assists with includes fuels reduction, invasive vegetation removal, erosion issues, revegetation, and wetland, riparian and floodplain restoration. PWP members, in addition to EWEB and the U.S. Forest Service, include the Cascade Pacific Resource Conservation & Development, McKenzie Watershed Council, McKenzie River Trust, Metropolitan Wastewater Management Commission, Upper Willamette Soil & Water Conservation District, and University of Oregon.

**Response to 2020 Holiday Farm Fire**

In September 2020, the 173,000-acre Holiday Farm Fire occurred in the middle of the McKenzie River watershed, causing significant damage to Eugene’s sole source for drinking water. In October 2020, the EWEB Board authorized $1,000,000 to implement immediate actions in response to the direct threat, of which approximately $500,000 carried over into 2021.

The PWP members quickly adapted the PWP framework and processes that had been developed over the past few years for conducting streamside health assessments and
pivoted to post-fire assessments on landowner properties. EWEB’s commitment to financial support as well as strong relationships with partner organizations developed through the PWP allowed this new program to be setup and functional within two weeks of the post-fire response. The McKenzie Watershed Council, Upper Willamette Soil & Water Conservation District, and McKenzie River Trust mobilized staff resources to allow 5-7 survey teams to work concurrently surveying landowner sites on the ground. In this way 15-20 properties could be surveyed in a day. By January 2021, we've conducted over 200 burn assessments on landowner properties and implemented over 85 additional erosion control measures, including hydroteening, installing check dams, wattles, silt fencing, jute mats, and mulching.

In February 2021, EWEB staff updated the McKenzie Watershed Recovery and Restoration Plan, leveraging programs and partnerships developed in the implementation of the 10-year strategic plan to minimize impacts of the Holiday Farm Fire on the river’s water quality. In accordance with the water utility’s updated plan, the Board approved the utility staff’s request for additional 2021 funding of $3.95 million for watershed restoration.

**Paying for Watershed Recovery**

In March 2021, the EWEB Commissioners approved a new program that will pay for wildfire restoration projects in the watershed through a flat fee assessed to customer water bills beginning in mid-2021. The community-funded watershed recovery and restoration initiative will supplement EWEB’s McKenzie River Source Protection Program to safeguard drinking water for Eugene residents by addressing immediate risks such as erosion from high burn areas and redevelopment along the river, as well as longer-term resiliency investments to restore floodplain areas that are critical to water quality and habitat.

The Watershed Recovery Fee will be assessed to all residential and commercial customers based on meter size. For most customers, the fee will be a flat $3 per month (based on a 1-inch or smaller water meter). Some customers, such as large businesses and those with extensive irrigation needs, will pay more ($4.50 to $30 per month) based on meter size. The fee will go into effect mid-2021 and will be in place for 60 months (5 years), at which time it will automatically sunset. The fee will generate approximately $2.4 million a year. The EWEB’s decision to adopt a surcharge on residential water utility bills was bolstered by survey research conducted by the University of Oregon. Conducted in 2018, the survey found that over 70% of customers surveyed supported up to $1/month fee for watershed protection.

EWEB’s surcharge will be used to leverage additional funds from local, state, federal, and grant sources to work on a variety of restoration activities. For private property landowners impacted by the Holiday Farm Fire, the PWP will be able to offer a variety of
services including revegetation, identifying and treating invasive species, fuels reduction, erosion control, and implementing naturescaping and Firewise principles. EWEB also has incentive programs for home site relocation to set back homes from critical riparian areas, septic repair or replacement, and moving electrical service lines underground.

For more information:

» 10-Year Strategic Plan Technical Report: Holiday Fire Burned Area Emergency Response Summary
» EWEB Fire Recovery and Watershed Restoration website
» 2020 State of the McKenzie Watershed Report
» EWEB Watershed Recovery Fee
Flagstaff, Arizona (Neil Chapman)

Flagstaff, Arizona is surrounded by the largest continuous ponderosa pine forest in the world. It is flanked by sacred peaks and canyons. The ponderosa pine forests of northern Arizona have existed for thousands of years and evolved to benefit from frequent fires ignited by both seasonal monsoonal weather patterns and cultural burning practices. Unfortunately, more than a century of fire suppression-based management has left the forest in an altered condition. These changes threaten Flagstaff’s natural resources, infrastructure, quality of life, and recreation-based economies.

The threats and preventive solutions are complicated but well understood. Restoring the forest to its natural, fire adapted pattern can mitigate unnatural wildfire threats. Long term forest restoration strategies will also stabilize and enhance carbon storage. Collaborative efforts that involve agencies, communities and stakeholders are required to advance risk reduction projects.

The Coconino National Forest, which surrounds Flagstaff, has invested considerable energy and resources in restoring forest ecosystems and reducing fire danger over the past decade, and has treated tens of thousands of acres. Likewise, the City of Flagstaff has pioneered efforts within the City itself, and has worked pro-actively with various partners, including the Greater Flagstaff Forests Partnership (GFFP), and land management agencies for years to restore forests and reduce fire risk to the community at-large.

In November 2012, residents of Flagstaff overwhelmingly approved a $10 million bond to support forest restoration work within key watersheds on the Coconino National Forest and on State and City lands. The Flagstaff Watershed Protection Project, led by the Flagstaff Fire Department’s Wildland Fire Management Program, is a unique effort in which forest restoration work on the National Forests is being funded by a municipality. This $10M investment is designed to mitigate between $573 million and $1.2 billion in future costs.

During the summer of 2020, the City of Flagstaff developed an innovative way to further invest in the prevention of undesirable wildfire impacts. The Water Resource and Infrastructure Protection fee is now included on City of Flagstaff water services monthly bills. This fee will support the Flagstaff Fire Department’s Wildland Fire Management Program’s ability to protect Flagstaff and its priority watersheds from the effects of catastrophic wildfire. A fee of $0.52 per 1000 gallons of water used will provide a reliable and stable source of funding for the Wildland Fire Management Program.

There has been notable success in these efforts, both within and adjacent to the City in the past two decades, where emerging wildfires entered treated areas and were able to be effectively and safely suppressed with minimal damage. However, the experience...
of the Schultz Fire in 2010 demonstrated the potential for severe downstream impacts even when residential areas are spared from the fire itself. Following the Schultz Fire, severe and repeated flooding occurred in unincorporated neighborhoods just outside Flagstaff city limits, causing tens of millions of dollars of damage to infrastructure and private property.

The risk of wildfire and post-wildfire flooding cannot be completely eliminated, but the objective guiding this effort will be to reduce those risks as effectively as possible, given the constraints inherent to the project area (inaccessible, rocky terrain; presence of threatened species; cost of treatments; etc.). Every treatment option will be considered, something that has never been feasible until the passage of the bond initiative.
Salt Lake City, Utah (Marian Rice)

Salt Lake City (City) is one of the oldest retail water providers in the western United States. For over one hundred years, the mountainous expanse of Little Cottonwood, Big Cottonwood, Parleys, and City Creek Canyons has served as the City’s municipal watersheds. The City is dedicated to protecting drinking water sources and protecting public health through the provision of high-quality water and treatment. The Salt Lake City Department of Public Utilities (SLCDPU) public water system (PWS) provides drinking water equitably to more than 360,000 residents. The service area includes all of Salt Lake City and portions of the cities of Cottonwood Heights, Holladay, Midvale, Millcreek, Murray, and South Salt Lake. These watersheds are critical sources of water for the city residents, businesses, and industries that they serve.

The Wasatch Mountains have been an island oasis in the middle of a sagebrush ocean for a very long time. Many different Native American tribes such as the Ute, Goshute, Shoshone, and Paiute found respite from the arid climate along the streams of the Wasatch. In 1847, settlers arrived to the Salt Lake Valley. While Salt Lake City was built up by these settlers, trees were cut down to help build the city below and shore up the mines found in the Wasatch. Water quality suffered and many in the valley that relied on these mountain streams for their drinking water began to notice. Because of the need to manage these watersheds to provide clean and reliable water, the City and the state of Utah petitioned the federal government to create the Wasatch Forest Reserve, and it was established in 1904 by President Theodore Roosevelt. Now called the “Uinta-Wasatch-Cache National Forest,” the main management goal for municipal watersheds to this day remains the protection of culinary water supply (see the current Wasatch-Cache Forest Plan, 2003). Federal legislation from 1914 and 1934 directs the United States Forest Service (USFS) to manage the federal lands within these watersheds in a manner consistent with the protection of the City’s culinary water supply.

Salt Lake City and USFS have a long-standing partnership in the protection of these precious source waters. The City and the Forest Service collaborate closely on mitigating the water quality impacts of a forest located close to a major metropolitan area with a passion for outdoor recreation. Collaborative partnership frameworks focus on project implementation ranging from recreation infrastructure upgrades, fuels reduction, funding shortfalls for basic operations, and educational outreach.

Salt Lake City Public Utilities works in partnership with many non-profits, government agencies and organizations, ski areas, residents of the canyon, and the public on education and enforcement of the rules to “Keep It Pure.” [www.slc.gov/utilities/watershed/](http://www.slc.gov/utilities/watershed/).

The 2021 Regional Forester’s Award was given to the Parley’s and Lambs Canyon Fuels Reduction Project. “This award highlights the value of cross-boundary collaboration.
and the strength of public-private partnerships," Summit County Open Lands Manager Jess Kirby said. “It is a testament to the type of work that is needed in order to achieve watershed-scale fire adaption and concurrent wildfire resilient communities.”

The project helped fund the work that was recently done at the Summit Park open space. The overall objectives of the project were to reduce fuel loading in areas such as Lambs Canyon Road, I-80, and other communities in the area. The 541-acre Parley’s Canyon Fire in August 2021 started just near I-80, burning through timber, brush and short grass.

The desired outcomes of the project include:

» Protect lives and infrastructure
» Improve resiliency of the forest
» Protect water supply
» Maintain a sustainable recreation experience
» Improve wildlife habitat

Homeowners are also strongly encouraged to play their part in the effort to reduce wildfires.

» For more information: Salt Lake City Watershed
» Laura Briefer, MPA, Director laura.briefer@slcgov.com
» Patrick Nelson, Watershed Program Manager patrick.nelson@slcgov.com
Summit County, Utah (Jessica Kirby, Natasha Collins, Lizzie Marsters, Todd Gartner)

Background

The Weber River watershed encompasses 740,000 acres, of which 78,000 acres are classified as high or very high fire hazard in the headwaters in Summit County, Utah. The Weber River is a critical water source to Utahans, providing drinking and irrigation water to 1.5 million downstream users and delivering water to the rapidly shrinking Great Salt Lake. This area is also home to popular recreation trails for visitors who contribute significantly to the local and state economy. Decades of forest fuel buildup, however, has significantly increased catastrophic fire risk, which could result in tragic impacts on residents, critical water and power infrastructure, and Utah’s $6.5 billion recreation economy. Fully mitigating this landscape-scale risk is a difficult task: management of these high-fire risk lands span multiple jurisdictions (USFS, State, and private) and are difficult to access due to steep topography. This has resulted in fragmented planning, constrained budgets, and limited capacity to implement treatments at the pace and scale necessary to protect people, infrastructure, economic interests, and drinking and irrigation water for downstream water users.

Nearby fires, such as the 2018 Dollar Ridge Fire in Duchesne County, Utah, have demonstrated the devastating economic and environmental impacts of inaction. The Fire destroyed 74 homes, unleashed hazardous flooding and landslides, and required a $29 million treatment plant to remove sediment from the drinking water. There is clear evidence that investing in the upfront costs of wildfire fuel reduction treatments instead of paying for the costs of clean-up can deliver a 4:1 investment return nationwide, according to the 2021 National Hazards Mitigation Report.

The Weber Resilience Fund

To tackle this cross-boundary issue, the Weber River Watershed Resilience Fund (RF) was created in a united effort by the Weber River Watershed Coalition, which includes Summit County, the Weber Basin Water Conservancy District, the Mountain Regional Water District, the US Forest Service (USFS), Shared Stewardship, Utah’s Watershed Restoration Initiative, and the World Resources Institute (WRI) in collaboration with the Cities4Forests initiative. The RF pools funding from public and private beneficiaries to 1) fund the upfront costs of watershed restoration and forest health treatments across 78,000 acres in the Upper Weber Watershed, and 2) invest in the long-term maintenance costs of watershed protection through an endowment to increase community resilience in the Weber watershed.

The endowment was established by House Bill 131 to generate dividends to pay for future maintenance costs, ensuring long-term resilience. It is housed within Utah’s Watershed
Resilience Initiative and any county, utility, or foundation can contribute to the endowment to increase future flexible funds.

In 2021, with funding from the Innovative Finance for National Forests (IFNF) grant, Summit County was able to hire dedicated County capacity to work across public-private jurisdictions to enhance collaboration and planning with the USFS, water utilities, and private lands. In two years, the partners secured over $7 million for the RF from willing payors including water utilities, foundations, and federal, state, and county governments; formed a science-based planning committee to identify and prioritize optimal forest health treatments across the watershed to cost-effectively deliver the greatest risk mitigation benefits; and modeled innovative funding and financing options to increase the pace and scale of restoration. In recognition of the effective collaboration and persistent landscape vulnerabilities, the USFS designed the Uinta-Wasatch-Cache National Forest as a priority landscape, which allocates $18.5 million of funding for projects in FY 2023. The success of the RF has led to a request to expand the effort to include additional watersheds contributing to the Great Salt Lake. The partners are excited to continue the collaboration and deliver meaningful resilience outcomes for the Greater Uinta-Wasatch-Cache communities.

For more information:

» Natasha Collins, Research Analyst, World Resources Institute, natasha.collins@wri.org
» Lizzie Marsters, Environmental Finance Manager, World Resources Institute, lizzie.marsters@wri.org
» Todd Gartner, Director of Cities4Forests, World Resources Institute, todd.gartner@wri.org
» Jessica Kirby, County Lands and Natural Resources Director, Summit County, jkirby@summitcounty.org

Additional resources:

» Cities4Forests Initiative’s partnership with Summit County
» Summit County website
» Weber River Watershed Resilience Fund one-pager
Salt River Project, Arizona (Charlie Ester, with Michael Anderson)

**Background**

The Salt River Project (SRP) is a key partner for the Forest Service in northern and eastern Arizona, where they work with the National Forest Foundation (NFF) and many other organizations to help restore healthy forests and reduce wildfire risk. The Salt and Verde River watersheds, which cover 8.3 million acres located primarily in five national forests, provide 40 percent of Albuquerque’s water supply. SRP manages six reservoirs that produce hydropower, prevent flooding, and ensure a reliable water supply for downstream users.

Since 2002, nearly 3 million acres have burned in the Salt and Verde watersheds, including the massive Rodeo-Chediski Fire in 2002, Wallow Fire in 2011, and Bush Fire in 2020. Recognizing the serious threat that wildfires and climate change pose to water quality, SRP has been working tirelessly to educate the public and mobilize investment to increase thinning and reduce fuels in the headwater forests.

**Northern Arizona Forest Fund**

In 2014, SRP and NFF formed a partnership called the Northern Arizona Forest Fund (NAFF). The NFF manages the NAFF program, coordinating directly with the Forest Service and allocating funds to local contractors and nonprofit partners to implement high-priority watershed restoration projects. During the ensuing five years, 37 organizations contributed a total of $6.2 million to enable the Forest Service to implement 27 restoration projects in the Coconino, Kaibab, Prescott, Tonto, and Apache-Sitgreaves National Forests. Accomplishments have included 13,000 acres of fuel reduction, 170 miles of erosion control and drainage improvement, 2,600 acres of stream and wetland protection, and 90,000 trees planted. SRP has been the largest funding source for the NAFF; other contributors in 2019-2020 include the cities of Phoenix and Scottsdale, Boeing, Coca-Cola, REI, and Arizona Game and Fish Department.

Recently, SRP began a matching voluntary contribution program to increase its funding support for the NAFF and more directly engage its customers in forest restoration efforts. Under the Healthy Forest Initiative program, SRP will match any contributions of at least $3, up to a total match of $200,000.

**4FRI**

SRP has been concerned about the slow pace of restoration work in the Forest Service’s collaborative Four Forest Restoration Initiative (4FRI) in northern Arizona. In 2019, the Forest Service, in partnership with SRP, the Arizona Commerce Authority, the Arizona Department of Forestry and Fire Management, and the U.S. Bureau of Reclamation,
developed a request for proposals (RFP) for the next long-term, large-scale 4FRI contract(s) to promote a sustainable forest product industry and accelerate forest restoration. The RFP targeted 520,000 acres for mechanical thinning over a 20-year period, using the long-range stewardship contracting authority provided by Congress in 2018. However, after amending the RFP several times to make it economically viable, the Forest Service announced on September 14, 2021 that it was canceling the RFP, citing “significant financial and investment risks.”

Following cancellation of the RFP, the Forest Service met with SRP and other partners in October to discuss a new path forward for the 4FRI. On November 9, Forest Service Chief Randy Moore announced increased funding and a redesigned strategy for the 4FRI during a visit with elected officials in Arizona. Chief Moore said that the Forest Service will be committing $54 million dollars in fiscal year 2022 to accelerate the needs for implementing high-priority projects on 135,000 acres over the next 10 years. The Forest Service explained in a 14-page 4FRI Restoration Strategy document that it was shifting away from a large single contract to a “multi-pronged approach” that would focus on accelerating implementation of treatments to protect at-risk communities and watersheds, including the watershed surrounding the C.C. Cragin Reservoir, which is owned by SRP.

For more information:

» SRP watershed management website
» NFF Northern Arizona Forest Fund Annual Report, 2019-2020
» 4FRI Forest Service website
» 4FRI Restoration Strategy, November 9, 2021
Santa Fe, New Mexico (Sterling Grogan and Kimery Wiltshire)

Background

Like many other cities throughout the western United States, Santa Fe’s water supply depends upon forest health and protection from catastrophic wildfire. The Santa Fe Municipal Watershed consists of 17,200 acres within the upper Santa Fe River Watershed and the Santa Fe National Forest. Runoff from the municipal watershed is stored in two water supply reservoirs, from which water is supplied to four acequias as well as to Santa Fe’s water treatment plant.

Partnerships

The Forest Service and the City of Santa Fe work together with many partners to plan and carry out watershed restoration projects. The Greater Santa Fe Fireshed Coalition is an informal collaborative organization of landowners and stakeholders focused on the health and well-being of forests, watersheds, wildlife, and communities in the southern Sangre de Cristo Mountains. At a broader scale, the Rio Grande Water Fund is promoting a 20-year program to restore 600,000 acres of forests and protect water supplies for Santa Fe, Albuquerque, Native American Pueblos, and other communities in northern New Mexico and southwestern Colorado.

Watershed Planning

To address long-term Municipal Watershed health, in 2007 a collaborative planning group including the City, the Forest Service, the Santa Fe Watershed Association and the Nature Conservancy were awarded a Collaborative Forest Landscape Program grant to develop a 20-year watershed management plan. This planning effort culminated in 2009 with development of the 20-year Santa Fe Municipal Watershed Management Plan (revised in April 2013), which provides a framework and recommendations for ongoing watershed management, environmental monitoring, educational outreach, and long-term funding.

The plan identified City water customers as the beneficiaries of a healthy watershed and proposed that costs associated with ongoing water source protection activities in the watershed be paid for by the public. The cost to implement the planned fuel treatments within the Municipal Watershed was estimated to be $5.1 million over 20 years, an average of $258,000 per year.

Watershed Investment

Based on the 20-year watershed management plan, Santa Fe established a “Water Source Protection Fund” based on a “Payment for Ecosystem Services” model. Beginning in 2013, the Watershed Investment Program has been paid for by the City of Santa Fe Water Division, through direct support from the water utility’s rate payers. In effect, this means
that the beneficiaries of the healthy watershed (water customers) pay for the important work to protect their water source. The City's Water Source Protection Fund collects approximately $220,000 per year. In comparison, the City of Santa Fe Water Division estimates that if a wildfire were to impact a significant portion of the watershed, the required dredging would cost between $80 million and $240 million.

A Forest Service-commissioned economic analysis completed in 2020 by Earth Economics estimated that fuel treatments in the greater Santa Fe fireshed, which includes the municipal watershed, will generate between $1.44–$1.67 in benefits for every dollar invested in treatment. This is considered to be a conservative estimate; for example, it does not include the value of water from the watershed supplied to acequias.

For more information:

» Santa Fe Watershed Management
» Earth Economics report
Sierra Nevada: French Meadows/North Yuba, California (David Edelson and Todd Gartner)

There are at least two major forest and watershed restoration projects with significant water utility investment and engagement in California’s Sierra Nevada: the French Meadows Project and the Forest Resilience Bond/North Yuba Forest Partnership, both on the Tahoe National Forest.

French Meadows Project

The French Meadows Project is a forest restoration and fuels reduction project located in the headwaters of the Middle Fork of the American River on the Tahoe National Forest in California’s northern Sierra Nevada. The Project area includes 27,623 acres, of which 22,152 acres is national forest land. The Project was developed not only to improve the health and resilience of an important municipal watershed, but also to address critical barriers to increasing the pace and scale of forest restoration.

The 2014 King Fire, which burned approximately 97,000 acres, much of it at high severity, was an important catalyst for the French Meadows Project. PCWA and Placer County, which own and operate French Meadows and Hell Hole Reservoirs and associated hydropower and municipal drinking water facilities in the headwaters of the Middle Fork of the American River, suffered significant damage from the King Fire. Post-fire erosion from the King Fire resulted in major, ongoing damage to reservoirs and infrastructure, at a cost of millions of dollars per year. Beyond the King Fire, much of the watershed below the reservoirs has experienced high-severity wildfire in recent years. Damage from the King Fire motivated PCWA and Placer County to act to reduce the risk of high-severity wildfire in the upper watershed.

By using a partnership approach to developing, managing and implementing the project, the partners — The Nature Conservancy, Placer County Water Agency (PCWA), Placer County, Sierra Nevada Conservancy (a state agency), American River Conservancy, the Sierra Nevada Research Institute at the University of California, Merced, and the U.S. Forest Service — were able to significantly reduce the typical time for planning similar projects on Forest Service lands, while also reducing the burden on limited federal staffing and resources. The overall process, from public scoping through a signed decision notice, took under 18 months, compared to 4 years or longer for typical Forest Service projects of a similar scope and scale. For more information on the partnership approach to planning and lessons learned, please see Restoring Forests through Partnership: Lessons Learned from the French Meadows Project.

The project is also using a partnership approach to implementation. Mechanical treatments (thinning) are being managed by Placer County under a Master Stewardship Agreement; through 2020, over 3,000 acres of Forest Service land have been thinned.
Prescribed burning is being managed under a cooperative agreement between the Forest Service and The Nature Conservancy. To date, approximately 131 acres have been burned. The partners anticipate completing all proposed thinning by 2023; prescribed burning has been delayed due to factors beyond our control, including small to non-existent burn windows in consecutive years, extreme heat and drought, and unanticipated challenges for private contractors to secure insurance to cover prescribed burning activities.

The project also includes an important research component being led by the Sierra Nevada Research Institute at the University of California, Merced. Researchers are measuring the relationship between forest restoration, water yield, and soil moisture to test the hypothesis that ecologically based thinning, at scale, may increase water supply and enhance the resilience of trees to drought. Results will be incorporated into regional models that suggest that forest restoration, at a landscape scale, may increase downstream water supply and enhance forest resilience.

**Forest Resilience Bond and the North Yuba Forest Partnership**

The North Yuba Forest Partnership (NYFP) is working to scale up the partnership approach taken at French Meadows to plan and implement forest and watershed restoration across approximately 275,000 acres of the North Yuba watershed, while also building upon the innovative Forest Resilience Bond financing approach pioneered by Blue Forest Conservation, World Resources Institute (WRI), and others as part of the 15,000-acre Yuba project, encompassed within the NYFP project area.

The NYFP partners include Yuba Water Agency, Blue Forest Conservation, The Nature Conservancy, South Yuba River Citizens League, National Forest Foundation, Sierra County, the Nevada City Rancheria Nisenan Tribe, the Camptonville Community Partnership (which is planning to build a biomass energy facility that could be sourced by the project) and the Tahoe National Forest.

Through ecologically based thinning and prescribed fire, the partnership seeks to protect North Yuba communities from the threat of catastrophic wildfire and restore the watershed to a healthier, more resilient state. Restoration efforts are expected to take many years, with the most critical project areas targeted first, i.e. at-risk communities, emergency response, evacuation access routes, and treatments to areas that have the potential to stop a wildfire from spreading. The project area includes thousands of acres of old forest habitat, is an important source of water to downstream users, supports high biodiversity, is home to many communities, and offers excellent opportunities for recreation. A formal scoping notice was expected to be issued by the Forest Service in September of 2021. For more information about the project, please see the NYFP web site and related story map.
The North Yuba Forest Partnership will scale up the use of the Forest Resilience Bond (FRB) developed by Blue Forest Conservation as part of the initial 15,000 Yuba project, in partnership with Yuba Water Agency, WRI, National Forest Foundation, and others. The Yuba Project brought $4 million in private capital to finance ecological forest treatments, to be repaid as restoration work is completed; use of the bond has accelerated on-the-ground restoration, which is projected to be completed within several years, much more quickly than typical Forest Service projects. The restoration work is being managed by National Forest Foundation under a Master Stewardship Agreement.

Yuba Water Agency recently approved $6.5 million in funding to advance planning and implementation of the North Yuba Forest Partnership through a second Forest Resilience Bond; Yuba II FRB. This commitment is in addition to the $1.5 million that the agency previously committed to the initial pilot Yuba FRB. According to Yuba Water Agency, this financial commitment will enhance "restoration efforts [that] benefit Yuba County’s water supplies by safeguarding New Bullards Bar Dam and reducing the risk of post-wildfire sedimentation and large woody debris flows in the watershed. It is also expected to provide employment in forest restoration and management jobs, while reducing the threat of megafires for rural communities like Camptonville, Goodyears Bar, Downieville and Sierra City."

In total, the Yuba II FRB has secured $25M from market rate and concessionary investors to restore 48,000 acres in the Tahoe National Forest. In addition to Yuba Water, various CA state agencies are contributing, as well as, for the first time, Fortune 500 companies. Through a partnership with Bonneville Environmental Foundation and the World Resources Institute, plant-based food and beverage brand Silk, whose parent company is Danone North America, one of the world’s largest certified B Corporations, is leading by example in funding Yuba II. The larger Yuba II FRB will protect more acres than its predecessor and will expand the pool of funders by introducing corporate support into the FRB funding model. Garnering corporate support for financing models to leverage utility and state funding was one of the primary goals of a recent grant from the USFS’ Innovative Finance for National Forests program to WRI, Bonneville Environmental Foundation (BEF), American Water Works Association (AWWA), and Blue Forest Conservation. In addition to Danone, Target and Hunter Industries have also made financial commitments towards implementation, which will enhance water volumes and help these companies meet their public water stewardship targets.

For more information:

» How the Forest Resilience Bond Works
» [New Forest Resilience Bond will Finance $25 Million of Restoration to Reduce Wildfire Risk on the Tahoe National Forest in California](https://example.com)
» How Nature-based Solutions Can Protect Businesses from Water Risks
» Forest Resilience Bond 2022 Impact Report
Snoquera Project, Mt. Baker-Snoqualmie NF, Washington (Jen Syrowitz)

**Background**

The Mt. Baker-Snoqualmie National Forest (MBSNF) covers the western slopes of the Cascade Mountain crest in Washington state. These temperate forest headwaters supply the majority of drinking water to Puget Sound basin residents (including the large cities of Bellingham, Seattle, and Tacoma). This forest holds some of the largest carbon storage opportunities in the country and is home to healthy populations of ungulates, big cats, black bears, raptors, grouse, and songbirds. It is also home to several endangered species including the Northern Spotted Owl, fisher, and three salmon species. The region is experiencing increasing recreation disturbance from Puget Sound's ongoing population growth, and is in desperate need of restoration to repair overgrown plantations and to reduce the road network degrading aquatic ecosystems. These actions are necessary for the recovery of salmon and other species.

The MBSNF has identified and prioritized twenty subwatersheds with the greatest amount of restoration opportunity based on the current condition of terrestrial and aquatic resources. The Snoquera project is located in one of these functioning-at-risk subwatersheds (the Lower Greenwater River). High road densities, impacts to streams from dispersed campsites, off-road vehicle use, and a lack of large wood and complex structures within channels are affecting this part of the forest. This landscape is incredibly popular for outdoor recreation, from hikers, backpackers and equestrians to off-road vehicle users, mountain bikers, and target shooters. Elk and black-tailed deer are native food sources for hunters from the Muckleshoot and Snoqualmie tribes, and are resources for non-tribal hunters as well.

**Planning & Partnerships**

Although there is no formal forest collaborative in this region of the MBSNF, there has been extensive collaboration with stakeholders and Tribes through years of planning, and now implementation, of the Snoquera project. Forest treatments and restoration actions include:

- 12,000 acres of variable density timber thinning;
- 3,000 acres of non-commercial and habitat improvement vegetation treatments that include huckleberry enhancement and elk forage habitat;
- 24 miles of road decommissioning, 54 miles of stormproofing to hydrologically repair roads for access;
- 53 sites for improved aquatic habitat connectivity; and
- A suite of other restoration and recreation projects such as stream improvements, dispersed camping site improvements and trailhead enhancements.
This project is supported by numerous conservation and salmon NGOs, four-wheel drive clubs, sportsmen’s organizations, local WRIA representatives, local forest protection associations, state natural resource agencies, and tribes -- all working with the USFS to develop a project that approaches the landscape holistically to achieve full watershed health without excluding human use. This is a highly-functioning collective of individuals and organizations focused on shared values, balancing salmon and forest recovery with accessible and safe recreation opportunities.

**Investment**

As implementation gets underway, financial bottlenecks to action have surfaced. Examples include funding for rock pit development/accessible rock and gravel for road work, funding for aquatic organism passage design and installation, and funding to grow native seed stock to increase the volume available for use. Several grants submitted by the Forest Service and NGOs to help fund this work are pending. In the meantime, partners have been able to help move forward some work to decommission spur roads, prepare elk forage units for burning, restore a few campsites too close to riparian habitat, and begin dispersed recreation surveys to help develop a comprehensive database of dispersed recreation locations and site conditions in primary recreation corridors. Identified campsites with undesirable resource impacts will be prioritized with restoration recommendations.

A significant boost to this effort may come from a forest resilience bond (FRB) made possible by Blue Forest. A recent field trip to the project area with Blue Forest, stakeholders, tribes, and elected officials showcased the restoration progress already being made. We are hopeful that this momentum will lead to an FRB that will increase the pace of the Snoquera Project. Until now, Blue Forest FRB projects have focused on dry forests of the West – the ones we see burning up every year; fire makes a very convincing case for investment. However, we must not forget the historic logging degradation of Pacific Northwest temperate forests prior to the creation of the Northwest Forest Plan. Vitally important work needs to be done to reverse past damage and restore watersheds for diverse-function habitat and high quality water for downstream communities, listed fish species, wildlife, and human recreation needs.

**For more information:**


» [https://blueforest.maps.arcgis.com/apps/Cascade/index.html?appid=9b95db70497f4c50b272e257488b0b99](https://blueforest.maps.arcgis.com/apps/Cascade/index.html?appid=9b95db70497f4c50b272e257488b0b99)
APPENDIX C: RESOURCES

- Blue Forest. https://www.blueforest.org
- California Forest Watershed Alliance. https://www.caforestsandwatersheds.org
- Center for American Progress. The Disappearing West: Rivers. https://disappearingwest.org/rivers.html#big_picture
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