

The Forest Resilience Bond

ANNUAL IMPACT REPORT 2021



Financial Innovation for Sustainable Solutions



FOREST RESILIENCE BOND



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The 2021 Forest Resilience Bond Impact Report communicates the environmental, social, and economic impacts of Blue Forest's Forest Resilience Bonds during the 2021 calendar year. To ensure a comprehensive analysis of our efforts, Blue Forest has aligned impact monitoring and reporting with the U.N.'s Sustainable Development Goals, which outline how to achieve a better, brighter, more sustainable future for people and the planet.

A Letter from our Management Team

To Our Blue Forest Community

While the ongoing pandemic and dramatic wildfire season proved tough conditions for 2021, at Blue Forest we pushed ahead to achieve significant breakthroughs. Nationally, over seven million acres burned, and the state of California experienced the second-worst fire season on record (after 2020). While the wildfire danger limited the fieldwork that contractors were able to accomplish on the Yuba I Forest Resilience Bond (FRB), Blue Forest continued our project development work and launched our second FRB - while also building out our team and advisory boards. Meanwhile, at the federal level, the devastating wildfire season garnered not just national attention, but funding; President Biden signed the Infrastructure Investment and Jobs Act in November, allocating \$3.4 billion for wildfire risk reduction. This additional federal funding is important, but not nearly enough to address the full scale of the need. In January, the U.S. Department of Agriculture, Forest Service released the 10-year wildfire crisis strategy, calling for the agency and partners to treat an additional 50 million acres across public and private lands in the West over the next 10 years, which will cost an estimated \$50 billion. In 2021, the Forest Service expressed an increased need, desire, and commitment to financing and partnership with Blue Forest.

With the launch of our Yuba II Forest Resilience Bond (FRB), we are excited to scale our signature conservation finance mechanism and broaden forest restoration efforts across the American West. This new Yuba II FRB will finance \$25 million of forest restoration on the Tahoe National Forest to reduce wildfire risk and restore forest health across 48,000 acres. The Yuba II bond follows our pilot Yuba I FRB (also in the North Yuba Watershed of Northern CA), expected to be complete in 2022. Additional FRBs are in development across the American West that will begin in the coming years. In response to feedback from our partners and investors, our team is also exploring the creation of new financial structures to aggregate the growing pipeline of FRB projects.



In December the team met up in San Francisco and visited the California Academy of Sciences for a holiday party.

As our projects grow in size and scope, we are expanding our team to add critical capacity towards our mission of financial innovation for sustainable solutions. We recently added three new hires, bringing skills in project development, implementation, and policy, and bolstered our scientific expertise by assembling a team of [Science Advisors](#).

With Covid-19 vaccinations rising and case count dropping, our typically remote team was thrilled to (finally!) safely gather to conduct outdoor site visits, celebrate the Yuba II FRB launch, and meet our newest team members in person.

The past few years have solidified our vision of conservation finance through the cultivation of deep, long-lasting partnerships with a diverse group of stakeholders - including you. We are grateful for your alliance and commitment to co-creating a fire-resilient landscape.

Sincerely,
The Blue Forest Executive Team

Zach Knight
Chief Executive Officer

Nick Wobbrock, P.E.
Chief Operating Officer

Phil Saksa, PhD
Chief Scientist



2021 Wildfire Season in the United States

7.1 million acres
burned¹

\$70-\$90 billion
total damage and
cumulative economic
loss for the wildfire
season

Planned
3.5 million acres
treatment by the
Forest Service

Blue Forest Impact

Planned
63 thousand acres
protected

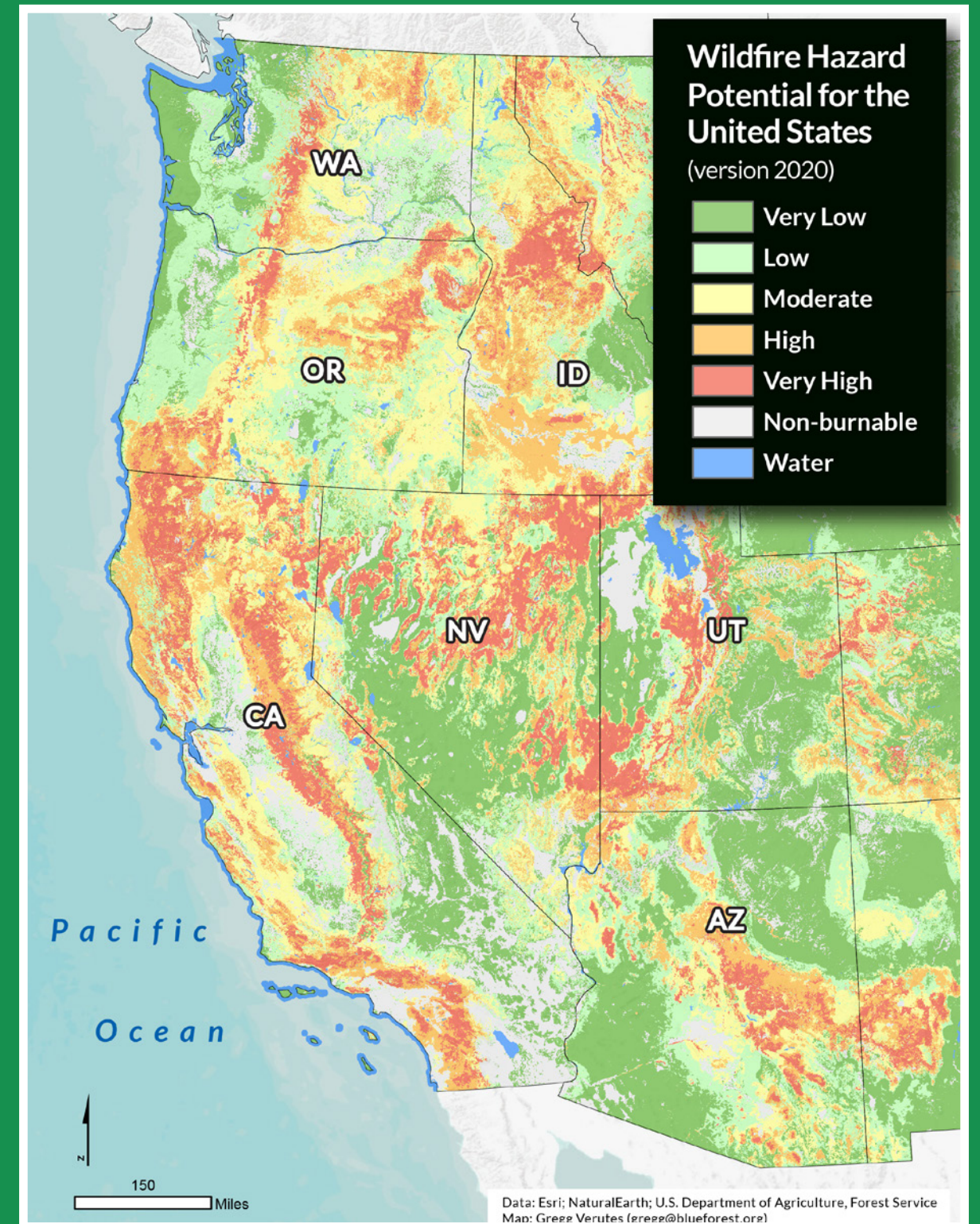
Raised financing to
complete
\$29 million+
in FRB forest
restoration projects

Planned
35 thousand acres
of treatment

“ We’re confident the Yuba Projects are the tip of the iceberg. The kind of solutions that the FRB model can provide directly intersect with the goals of many in California and other regions. ”

Todd Reeve

CEO of Bonneville Environmental Foundation



Climate change and historic fire suppression have amplified severe wildfire risk across the Western United States. Blue Forest’s innovative FRB accelerates forest treatments to reduce the risk of wildfire through financing, cost-sharing, and collaboration with a diverse group of stakeholders.

About the Forest Resilience Bond

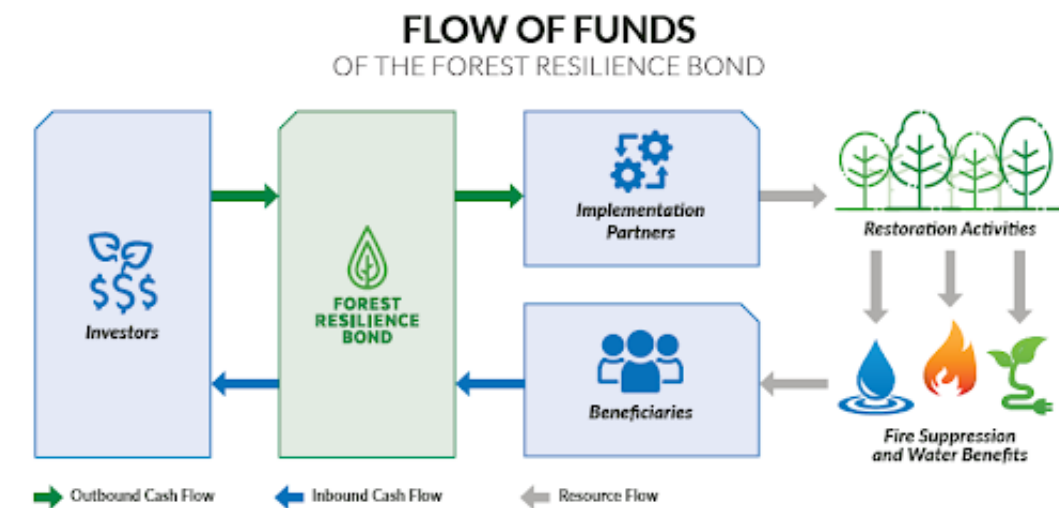
“ Our investment and partnership in the first FRB proved to be greatly successful in helping advance forest resilience work at a much faster pace and scale. ”

Willie Whittlesey
General Manager of Yuba Water

The Forest Resilience Bond (FRB) seeks to overcome the funding gap for forest restoration, not through increases in public or philanthropic sources, but by facilitating private capital in supporting public land management through the Forest Service.

Through the FRB, Blue Forest is bridging the gaps between investors, environmental interventions, and beneficiaries of enhanced and protected ecosystem services by developing measurement techniques, innovative contracting approaches, and financial structures that allow private capital to fund land management. These management activities have far-reaching benefits beyond mitigating wildfire risk: forest restoration activities can also enhance water supply, increase hydropower systems reliability, protect recreational areas and biodiversity, promote carbon sequestration, and safeguard air quality.

Blue Forest’s initial FRB, the Yuba I FRB, was implemented in 2018. The pilot project funds \$4 million of forest restoration (equating to 15,000 acres protected) along Tahoe National Forest’s North Yuba River. In 2021, Blue Forest, in coordination with the North Yuba Forest Partnership, scaled efforts on the Tahoe National Forest to produce the Yuba II FRB, a significantly larger FRB that finances \$25 million of restoration to protect 48,000 acres of forest. Beyond finance and economics, supporting partnerships and facilitating collaboration is integral to the work of Blue Forest. Ideal FRBs empower the vision for landscape scale resilience that is shared between forest collaborative working groups that include representation of public land managers, local community members, industry, and environmental conservation groups. Blue Forest is actively exploring and developing additional FRBs across California and the American West.



The Uneven Public Health Impacts of Wildfire Smoke

On trend with the growing number of massive wildfires, 2021 proved to be another catastrophic year. There were 58,000+ wildfires across the country, resulting in evacuations, deployment of countless emergency response teams and fire crews, and nearly 7 million acres burned. Over 2.6 million acres burned in California alone, far surpassing the prior 5-year average of 1.6 million acres per year, and four new fires ranked among the top twenty largest fires in the state's history.

2021 saw the continued extension of the fire window, with burns that were increasingly difficult to contain and that lasted for extensive periods. The Dixie Fire, burning across five different counties in California for four months, began remarkably early in the season (July). The Caldor Fire was notably long and brutal as well, beginning in August and burning for over two months. Even in the deep winter of Colorado, a fire broke out in December, evacuating over 30,000 residents outside the Denver area.

As wildfires increase in frequency and severity, population exposure to wildfire smoke grows in turn. Inhalation of particulate matter (PM) 2.5 microns or smaller is the main driver of adverse health impacts from wildfire smoke exposure. Exposure to wildfire smoke has been linked to excess deaths and illnesses from cardiovascular, cerebrovascular, and respiratory complications, as well as mental health impacts, decreased

birth weights, and increased susceptibility and lethality of COVID-19 infection. These impacts are not felt evenly.

The risk of and resiliency to wildfire events vary with social vulnerability, with a particular burden on those who lack health insurance, work outside, or experience homelessness. Communities of color live in areas more prone to wildfire and are disproportionately impacted by wildfire smoke. Children, the elderly, and those with pre-existing conditions are also more susceptible to adverse health impacts of wildfire smoke. By the same token, strategies to mitigate the health impacts of wildfire smoke exposure are not distributed equitably, and planning should be fine-tuned to the needs of the diverse communities impacted by wildfire. The most powerful way to reduce population exposure to wildfire smoke is to start at the source, by restoring overgrown forests and reducing wildfire risk. Forest restoration provides many other benefits as well, including increased recreational activities, carbon sequestration, and improved water quality.

-Dr. Benis Egoh, Assistant Professor at the University of California, Irvine



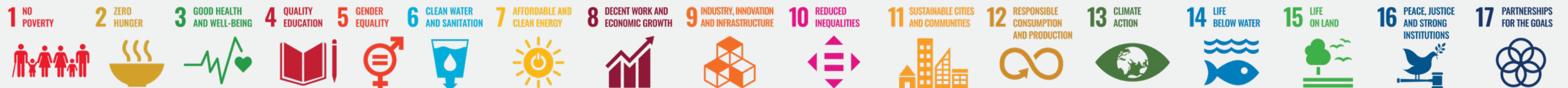
Dr. Benis Egoh is an Assistant Professor at the Department of Earth System Science, University of California, Irvine. Her research focuses on sustainability and the relationship between people and nature.

Measuring Impact











Impact Measurement & Management is the process of identifying desired impacts and monitoring progress each year. Blue Forest works iteratively to continually improve and revise this measurement approach as the FRB expands. Impact is largely defined through project outcomes – the environmental, economic, and social effects of project activities in the local ecosystems and communities in which FRB projects are implemented. To highlight the broad, multilayered impacts of the FRB in an accessible way for our community of partners, Blue Forest has chosen to align project outcomes impact reporting with the Sustainable Development Goals (SDGs).

The **Sustainable Development Goals (SDGs)** are 17 goals that outline how to achieve a better, brighter, more sustainable future for people and the planet. Announced by the United Nations in 2015 as part of their 2030 Agenda for Sustainable Development, these goals represent a call to action for all countries to end poverty and improve human well-being while tackling climate change and preserving our planet. The 17 goals are an international agenda by which individual countries can compare their progress and individual organizations can track their contributions towards these universal efforts.



Forest Resilience Bond Impact Summary

The eight SDG targets indicated below are most directly relevant to the Forest Resilience Bond and demonstrate how the FRB contributes to social, economic, and environmental goals. By using the SDG framework, Blue Forest aligns the impact of the FRB with the impact of those working around the world for a more sustainable future. Active forest management yields not only a reduction in severe wildfire risk but many other benefits, including the following:

SDG Goal	Related Outcomes	Forest Resilience Impact
 03 Good Health and Well-Being	<ul style="list-style-type: none"> » Reducing the risk and scale of wildfire smoke » Preventing smoke-related comorbidities » Reducing the emotional, physical and financial stress resulting from wildfires 	Proactive forest management can reduce wildfire smoke and associated public health risks. Studies show exposure to wildfire smoke causes respiratory and cardiac-related illnesses as well as other adverse health impacts. ⁴ Health impacts associated with prescribed fire smoke are less severe than from uncontrolled wildfire. ⁵
 06 Clean Water and Sanitation	<ul style="list-style-type: none"> » Protecting water infrastructure and water quality from catastrophic wildfire » Securing additional water supply through forest restoration 	Water originating from the Sierra Nevada mountain range constitutes 60% of California's consumptive water supply. When fires burn through forests, they contaminate both surface and groundwater as well as inhibit snowpack retention.
 07 Affordable & Clean Energy	<ul style="list-style-type: none"> » Generating renewable energy from biomass utilization » Augmenting existing hydropower in the watershed 	Source water supply from the Yuba I FRB is used to generate hydropower that helps power local communities with cleaner, more reliable, renewable, non-fossil-fuel emitting energy.
 8 Decent Work & Economic Growth	<ul style="list-style-type: none"> » Investing funds in ecosystem restoration » Creating jobs in rural communities 	Every \$1M dedicated to forest restoration in Blue Forest's FRB model creates 20 direct or indirect jobs. The Yuba I FRB has supported a total of 42 direct and indirect jobs that support local economies. As we scale to larger projects, employment from these local communities will also scale.
 11 Sustainable Cities & Communities	<ul style="list-style-type: none"> » Protecting people & infrastructure by reducing the risk of high severity wildfires 	The road work done as part of these projects reduce the adverse effects of wildfire by providing safe escape corridors through fire country. It also helps make these areas more easily navigable, allowing local communities to benefit from increased tourism and public access.
 13 Climate Action	<ul style="list-style-type: none"> » Stabilizing forest carbon stocks by reducing wildfire risk » Enhancing the carbon sequestration capacity of meadows and restored forests 	Fires in 2020 alone emitted 4x the amount of carbon dioxide as all other pollutants within the state - combined. The greenhouse gas emissions resulting from these fires were equivalent to driving 24.2 million cars for an entire year, ⁶ not far from the 26.1 million automobiles registered by the DMV in 2019. ⁷
 15 Life on Land	<ul style="list-style-type: none"> » Restoring forest ecosystems to a more natural density and condition » Protecting sensitive or endangered species » Promoting biodiversity through fortifying and restoring high priority ecosystems 	When these wild habitats are restored, a part of the national heritage is too. This work ensures that these national public lands remain places that future generations can continue to enjoy. The Yuba I FRB includes invasive species removal, meadow restoration, and aspen generation which all contribute to the critical role our forests serve to protect biodiversity.
 17 Partnerships for the Goals	<ul style="list-style-type: none"> » Partnering with organizations that share our vision to achieve these goals 	The FRB takes the crucial step of lowering the hurdle to participating in forest resilience efforts. By design, the FRB can only function through strong partnerships and collaboration. By knitting together several partners with aligned goals, the FRB promotes an essential shared vision for a climate-resilient future.

Beale Mountain Forestry & Robinson Enterprises on the 2021 Wildfire Season

The 2021 wildfire season proved to be the most grueling to date and yet, work on the ground had to be done in order to continue making progress on the Yuba I FRB. For contractors, the 2021 season was the worst they've seen, bringing their work to nearly a full stop in the months of August and September.

Over the past four years, Beale Mountain Forestry and Environmental Consulting has been subcontracted by the National Forest Foundation (NFF) to provide implementation oversight including quality control and regulation of fieldwork on the Yuba I FRB. Founded five years ago by Ann and Brett Anderson, Beale Mountain has worked closely with NFF and the Forest Service to work through many issues; has acted as a logging supervisor and timber sale administrator; and overseen general contractor Robinson Enterprises' day-to-day operation.

According to Ann, some of the challenges encountered last field season were mitigating hydrology issues and preventing impacts to waterways as well as crews running into many prehistoric archaeological sites which needed resource protection. But the biggest problem in 2021 was the fires. "We were shut down the majority of the year because of fire closures and had to work with the Forest Service to try to add additional equipment to let the contractor work and even offered to perform night operations in order to get acres treated. Even with these additional measures work was not permitted" she explained.

Based in Nevada City, CA, Robinson Enterprises has been in business for more than 75 years and offers a wide range of services including trucking and hauling, logging, mastication, land clearing, and general contracting. As the logging industry has evolved over the decades, however, their work has taken a turn toward environmental services, explained co-owner Joe Griggs.



Joe Griggs
Co-owner of Robinson Enterprises

Robinson crews will begin their fourth field season on the Yuba I FRB this summer. Their work over the past three years has consisted of mechanical thinning of mixed conifer forests, utilizing various logging systems, fuels reduction, meadow restoration, and more. According to Robinson Project Supervisor, Clint Adams, out of 22 working days in a month, crews were affected by either shortened working hours (ending the day at 1 p.m.) or a complete shutdown of the operation for 16 days in July, 20 days in August, and 21 days in September due to high fire danger making it "almost impossible to get work done throughout the year."

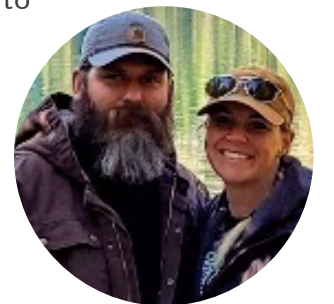
Despite these difficult conditions and challenges, the Yuba I FRB is still slated to be completed in 2022, as planned. Thanks to the persistence and hard work of these



contractors and the responsiveness of the NFF when it comes to these challenges, this project will be implemented at an accelerated rate as compared to conventional Forest Service timelines. "I would offer that the NFF has been very receptive to the multifaceted challenges we have faced. They've been flexible with the timing of the work and the changes we've had to make due to the market conditions of the timber industry," said Griggs.

As the 2022 field season nears, Ann and her husband, Brett Anderson, agree that working through this partnership has streamlined the process and helped facilitate work getting done faster. "It's been really exciting for Beale Mountain to be working with NFF and the Forest Service on these projects and seeing what

groups like Blue Forest and others in the North Yuba Forest Partnership are doing because it's so forward-thinking in its management and vision," said Anderson. "This is something that I have specialized in for the last eight years, even before Beale Mountain started, and it's really exciting to see that all the talking is now turning into action, and being a part of that is very rewarding for us," she said.



Brett & Ann Anderson
Founders of Beale Mountain Forestry and Environmental Consulting

Yuba Forest Resilience Bonds

Overview

Blue Forest has launched two FRB projects on the Tahoe National Forest in the North Yuba River Watershed - the Yuba I FRB, and the Yuba II FRB. After the launch of the Yuba I FRB, the North Yuba Forest Partnership was formed as a working forest collaborative to plan, analyze, finance, and implement forest restoration across 275,000 acres of the watershed. This location was specifically chosen to inaugurate the FRB as the Yuba River Watershed sustains high biodiversity values, proximity to communities, committed partnership opportunities, and risk of severe wildfire (see Figure 1).

Together, the Yuba I and Yuba II FRBs protect approximately 63,000 acres from severe wildfire, with a total investment of over \$30 million from project stakeholders. Forest health treatments implemented, underway, or planned through the FRB in the Yuba include general fuels reduction, Aspen and meadow restoration, underburning and prescribed fire, and biomass utilization. These treatments yield numerous ecosystem benefits to the Tahoe National Forest including restoring overly dense forests to a resilient state, encouraging a more natural fire return interval, and increasing water supply and carbon sequestration. The Yuba I FRB is in progress and expected to be finished in 2022, and the Yuba II FRB began the early stages of implementation in Fall 2021.

Land Acknowledgement: *The North Yuba Forest Partnership (of which Blue Forest is a founding member) recognizes that the North Yuba River watershed resides within the Ancestral and Traditional homelands of the Nisenan Tribe and includes shared boundaries with the Mountain Maidu, Konkow and Washoe Tribes. These Tribes exist today and retain their relationships with the forest. We commit to the continued inclusion of their voices in this project.*

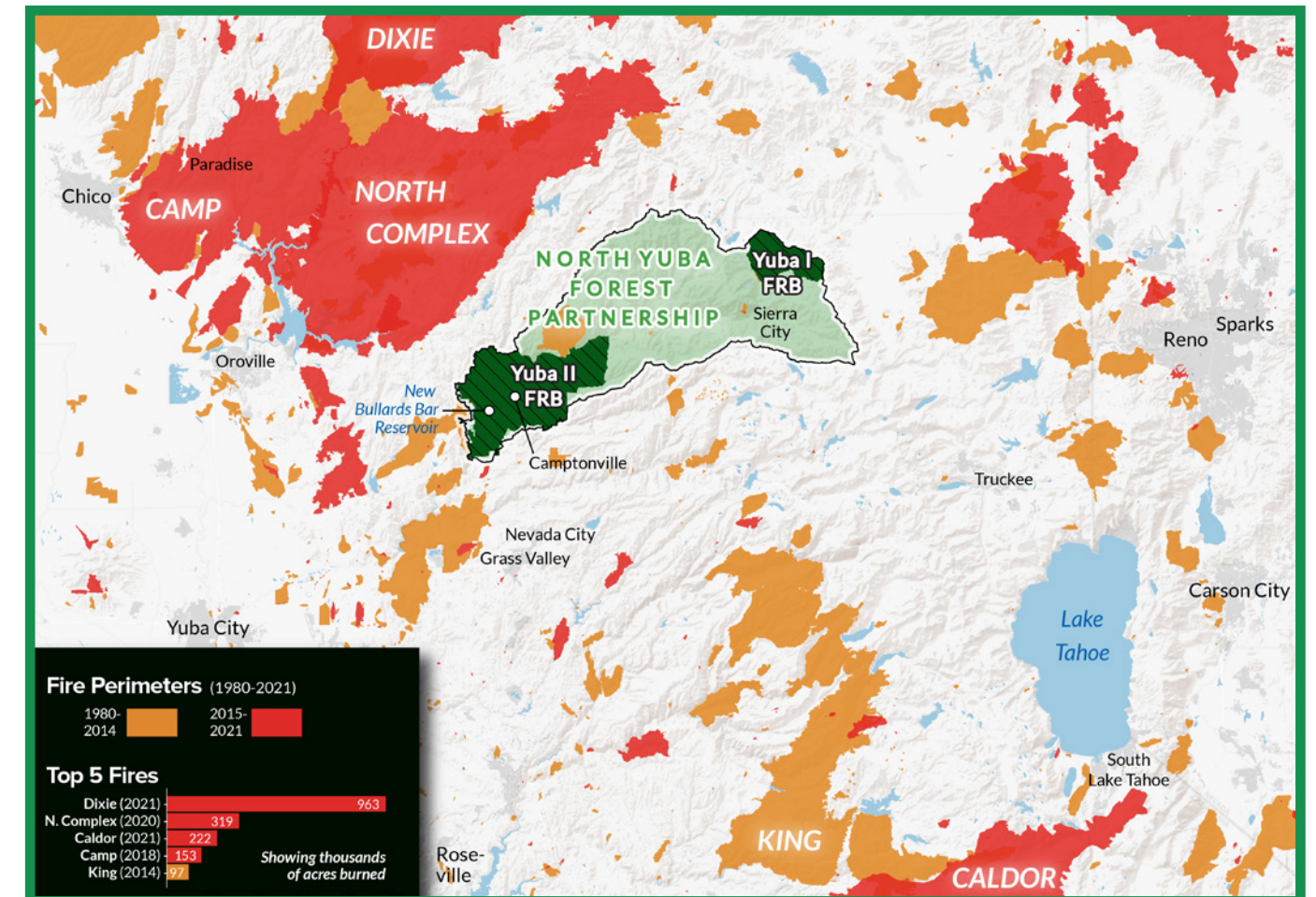


Figure 1. The Yuba Projects are in close proximity to historic wildfire events in the surrounding region (Northern California). The North Yuba Forest Partnership, a collaborative between nine federal, state, tribal, and non-governmental partners was established in 2019 to implement 275,000 acres of forest restoration across public and private lands in the Yuba River Watershed. Blue Forest's two active FRBs, the Yuba I FRB and the Yuba II FRB are within the North Yuba Forest Partnership area. The map demonstrates the proximity of the Yuba FRBs to recent and historical wildfire events including the Dixie, North Complex, Caldor, Camp, and King wildfires.

“ The Yuba FRBs help us finance prevention strategies to stave off the ever-present risk of catastrophic wildfire that damages national forests and our neighboring lands. Efforts like these are crucial as the California landscape faces record-breaking wildfire behavior. ”

Eli Ilano

Supervisor of Tahoe National Forest

The Yuba I Forest Resilience Bond

In 2019, Blue Forest implemented the Yuba I FRB, a pilot project in Tahoe National Forest's North Yuba River watershed. The Yuba I FRB provides \$4 million in financing from four investors for ecological restoration that will protect 14,545 acres of National Forest System land (through 4,849 acres treated). Three beneficiaries – the Forest Service, Yuba Water, and the state of California – provide funding and in-kind support at contracted rates to reimburse investors as restoration activities are carried out by the National Forest Foundation, the project's primary implementation partner.

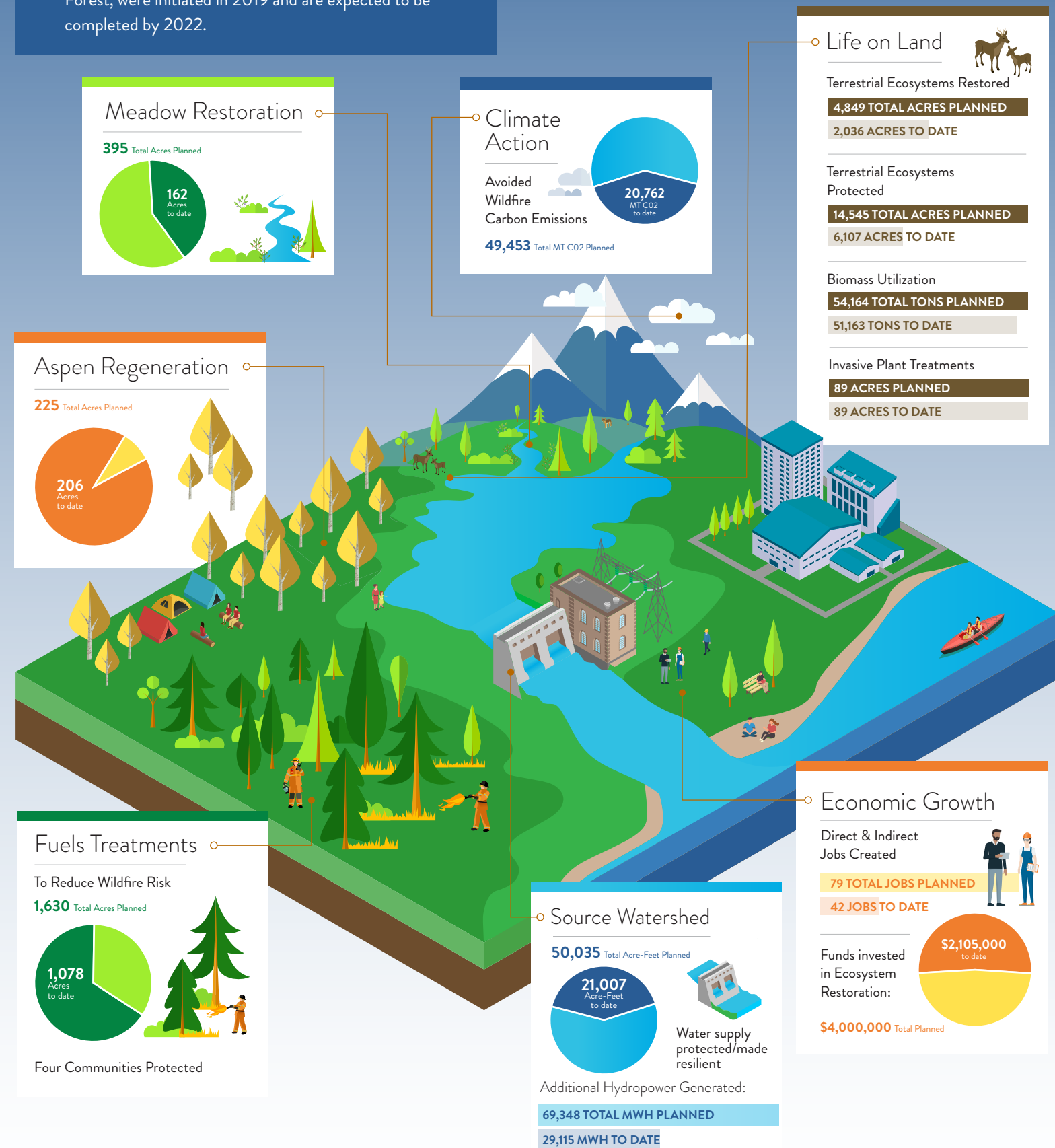
After three completed field seasons of restoration work, continued progress is being made on funds deployed and acres treated. Investors have been repaid according to contracts, and The North Yuba Forest Partnership, a group of project partners and stakeholders, has formed to expand this restoration project, using the FRB, to the rest of the watershed. Expected benefits of this project include the protection of 50,000 acre-feet of water supply, the generation of 70,000 Megawatt hours of hydropower, the avoidance of 50,000 metric tons of CO2 emissions from wildfire, the creation of 79 jobs in local rural communities (23 direct, 34 indirect, 22 induced jobs), and providing over \$8 million of value to the Forest Service, State of California, and Yuba Water. Additional benefits that reduce wildfire risk include meadow restoration, fuels treatment, and Aspen regeneration.

YUBA FOREST RESILIENCE BOND

2021 Project Impact Update

The National Forest Foundation manages implementation of Yuba Project activities, which yield a host of environmental, social and economic benefits. Forest restoration activities, planned by Tahoe National Forest, were initiated in 2019 and are expected to be completed by 2022.

\$2,105,000 of \$4,000,000 Funds Invested In Ecosystem Restoration



Yuba I Forest Resilience Bond Outcomes

This chart details project outcomes achieved under the eight relevant Sustainable Development Goals. Project outcomes have a project-wide “Planned Total” that will be achieved upon completion of full FRB activities (and the enhanced ecosystem services that will continue into the future) as well as metrics that detail progress made over the 2021 work season. Cumulative totals for each outcome are listed chronologically, as well as “% Complete” which demonstrates the percent of work cumulatively completed by 2021 as compared to the total work planned for the entire project.

Due to high-risk wildfire conditions on Tahoe National Forest in 2021, operation days were limited and restoration work was less than expected. This delay was in part due to comprehensive Forest Service operating restrictions enforced to avoid fire risks, which applied to every section of the forest. Next season, the National Forest Foundation and Blue Forest are planning to install localized weather stations and provide extra water tankers on-site to increase the accuracy of fire risk assessments and increase the efficiency of restoration efforts. These efforts will allow 2022 to remain the fourth and final field season of the Yuba I FRB, despite delays. This timeline is significantly accelerated as compared to conventional Forest Service restoration efforts.

Two key metrics in the Cumulative Yuba I FRB Impacts table are **2,036 acres of ecosystems restored** and **6,107 acres of ecosystems protected** (42% complete); these metrics represent the core of Blue Forest’s work and the current status of the Yuba I FRB. Other metrics further characterize restoration and protection activities and the progress partners have made. In 2021, invasive plant treatments were completed (89 acres total), and meadow restoration and prescribed fire treatments made headway (162 acres and 501 acres total respectively). Significant prescribed fire treatments remain that will be completed with the appropriate weather parameters and staff capacity in the Spring or Fall of 2022.

Cumulative Yuba I FRB Impacts 2019-2021							
SDG Target	Project Outcome	Unit	2019	2020	2021	Planned Total	% Completed
6	Clean Water & Sanitation						
	Water supply protected/made resilient	Acre-feet	7,398	13,662	21,007	50,035	42%
7	Affordable & Clean Energy						
	Biomass Utilization	Tons	13,750	42,581	51,163	54,164	94%
	Renewable Energy Generated by Biomass	MWh	3,998	3,998	12,580	15,750	80%
	Hydropower Protected	MWh	10,254	18,935	29,115	69,348	42%
8	Decent Work & Economic Growth						
	Direct & Indirect Jobs Created	#	17	25	42	79	53%
	Total Funds Invested in Ecosystem Restoration	\$	\$875,000	\$1,275,000	\$2,105,000	\$4,000,000	53%
11	Sustainable Cities & Communities						
	Road Reconstruction	Miles	4	4	4	5	82%
	Fire Control Lines	Miles	25	25	25	25	100%
	Communities Involved in Resilience Bonds	#	4	4	4	4	100%
13	Climate Action						
	Avoided Wildfire Carbon Emissions	MT CO2e	7,312	13,503	20,762	49,453	42%
15	Life on Land						
	Fuels Reduction	Acres	625	1,078	1,078	1,630	66%
	Prescribed Fire	Acres	0	0	501	2,510	20%
	Aspen Regeneration	Acres	92	206	206	225	92%
	Meadow Restoration	Acres	0	0	162	395	41%
	Invasive Plant Treatments	Acres	0	40	89	89	100%
	Terrestrial Ecosystems Restored	Acres	717	1,324	2,036	4,849	42%
	Terrestrial Ecosystems Protected	Acres	2,151	3,971	6,107	14,545	42%
17	Partnerships for the Goals						
	Formal Blue Forest FRB Partners	#	18	18	18	18	100%



Addressing the Biomass Utilization Challenge

One of the biggest challenges with implementing fuels reduction is managing the removal of the small-diameter trees, branches, tops of trees, and other woody biomass. Most often, due to the lack of biomass processing infrastructure and/or the high costs associated with transporting the materials offsite, the value of these materials is not realized. As a result, the cheapest and most common way to discard this “wood waste,” is to pile and burn it in the forest. Although pile burning reduces the risk of severe wildfire, it leads to smoke exposure and carbon emissions. To complicate matters, pile burning is constrained to windows of appropriate weather parameters, sufficient staff capacity, and adequate soil conditions (similar to prescribed burns). These limitations often lead to stagnation, with woodpiles sitting around for years on end, extending the life of excess fuels on the ground.

The National Forest Foundation and Blue Forest decided to pursue an alternative to pile burning in the Yuba I FRB. In 2019 and 2021, “wood waste” from fuels reduction was transported to woody biomass electrical generation facilities nearby - Loylton Biomass in 2019 and Honey Lake Power in 2021. Instead of generating wildfire smoke and carbon emissions, this alternative generates renewable energy, a benefit made possible by the financial flexibility provided by the Forest Resilience Bond. This initiative is highlighted in the Cumulative Yuba I FRB Impacts 2019-2021 chart displaying a cumulative total of 12,580 MWh of renewable energy generated by biomass as of 2021. Blue Forest continues to work to support greater investment in the infrastructure processing this biomass, including the development of a biochar carbon offset protocol through the [Climate Action Reserve](#) in 2021.

Launching the Yuba II Forest Resilience Bond

Alongside the North Yuba Forest Partnership (NYFP), Blue Forest recently announced a new scaled FRB on the Tahoe National Forest, the Yuba II FRB (see Figure 2). The collaborative efforts of the Yuba I FRB led to the formation of the NYFP in 2019. The collective includes nine federal, state, tribal, and non-governmental partners focused on forest restoration across 275,000 acres of public and private lands in California. The Partnership plans to use the Forest Resilience Bond to finance over \$100 million of unfunded restoration work across the North Yuba River watershed.

This new scaled FRB finances \$25 million of restoration to protect 48,000 acres (through 28,000 acres of treatment) with funding contributions from utilities, corporations, and state agencies. The Yuba II FRB will reduce the risk of catastrophic wildfire to both forests and nearby communities in the Yuba River watershed, and lead to additional benefits as stated in the Yuba II FRB Plan.

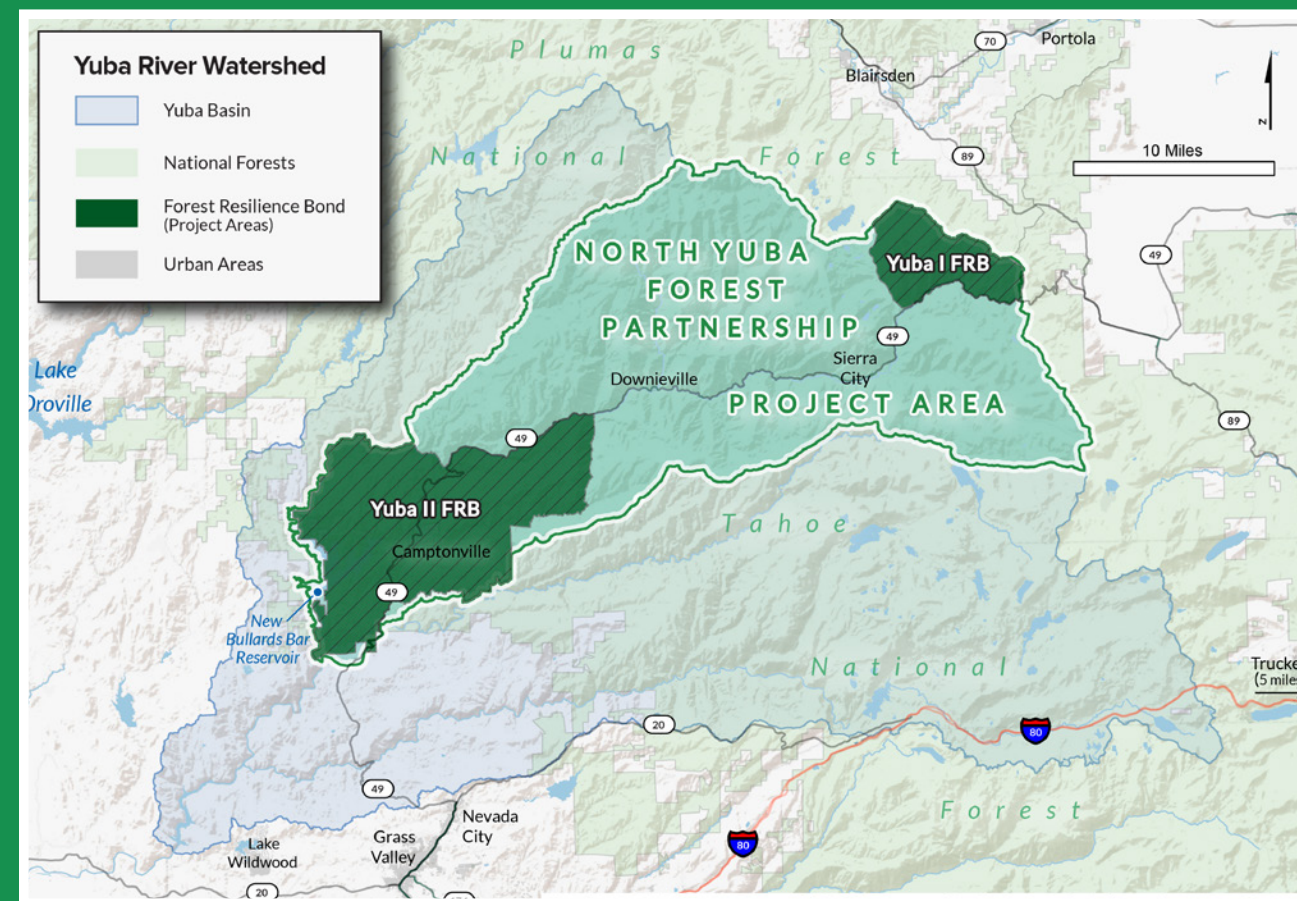


Figure 2. The Yuba I FRB and the Yuba II FRB reside in the Yuba River Watershed of the Tahoe National Forest in California. The Yuba II FRB finances \$25 million of restoration efforts to protect 48,000 acres (through 28,000 acres of treatment).

Yuba II FRB Plan	
Implementation Activities	
Fire Risk Reduction	<ul style="list-style-type: none"> • Reduce hazardous fuels by mechanical and hand thinning • Reintroduce prescribed fire to the landscape
Post-Fire Response	<ul style="list-style-type: none"> • Post-fire restoration
Ecosystem Restoration	<ul style="list-style-type: none"> • Improve forest health and promote hardwood regeneration • Accelerate the development of mature forest habitat • Restore and protect acres of habitat for the California Spotted Owl by building new nest boxes • Manage priority invasive plants
Community Access	<ul style="list-style-type: none"> • Provide non-motorized, trail-based recreational opportunities
Project Outcomes	
Ecosystems Protected	<ul style="list-style-type: none"> • Reduce the fire risk for local communities across public and private ownership • Protect habitat and nesting territory for the Bald Eagle and California Spotted Owl • Improve forest health and promote native species
Community Impacts	<ul style="list-style-type: none"> • Create 200+ jobs in the local community • Reduce risk of GHG emissions from wildfire smoke; air quality protection • Protect water quality and enhance water quantity for Yuba Water - providing hydroelectric power, drinking water, water for agriculture, and flood control • Reduce risk of wildfire and invest in rural economic development for four local communities • Provide 20+ miles of recreational trails for public use

In the fall of 2021, preliminary work on the Yuba II FRB began, including hand thinning and other activities to support forest health. The Yuba II FRB is estimated to take 7-10 years to complete, and successful implementation is subject to the operational bounds of appropriate weather parameters, sufficient Forest Service/contractor staff capacity, and adequate soil conditions.

The Yuba FRBs accelerate the pace and scale of Forest Service restoration work. As part of a Shared Steward Agreement, the state of California in partnership with the Forest Service aims to restore one million acres/year by 2025 to meet wildfire risk reduction goals.⁸ As of 2021, the partnership is hundreds of thousands of acres behind. Blue Forest’s innovative FRBs help California (and eventually others) meet their goals and accelerate treatments through financing, cost-sharing, and collaboration with a diverse group of stakeholders.

The Forest Resilience Bond Development Team

The development and implementation of the FRB have relied on the hard work and collaboration of many stakeholders.



Blue Forest

Blue Forest is a mission-driven non-profit project development firm focused solely on leading the FRB development process. With expertise in hydrology, finance, philanthropy, engineering, forestry, and government, the Blue Forest team coordinates with partners to manage all aspects of FRB development.



Forest Service

The Forest Service is a government agency within the U.S. Department of Agriculture with a mission to “sustain the health, diversity, and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations.” The agency manages 193 million acres of national forests and grasslands across the country and is a key partner with Blue Forest in developing and implementing FRBs.

The USDA Forest Service is an equal opportunity provider, employer, and lender.



World Resources Institute

The World Resources Institute (WRI) is a global non-profit research organization that seeks to create equity and prosperity through sustainable natural resources management. WRI brings a diverse set of decision-making tools to the FRB that help support engagement and adoption of the FRB among stakeholders.



Cultivating an Ecosystem of Collaboration

The Forest Service aims to maintain healthy, diverse, and productive national forests and grasslands across its 193 million acres of management. Due to funding constraints, the Forest Service has a backlog of forest restoration work needed to maintain and promote resilient forests across the country - approximately 90 million acres. To diminish the backlog and implement projects at the pace and scale required to address fire risk across the Western US, the Forest Service's National Partnership Office (NPO) collaborates with partners like Blue Forest that bring innovative finance approaches to bear on agency challenges.

The NPO & Blue Forest partnership launched with the recognition that outside-the-box thinking and non-traditional partnership would be critical ingredients in addressing massive unfunded needs across the National Forest System. "Through the initial Yuba FRB on the Tahoe National Forest, Blue Forest and the Forest Service have demonstrated proof of concept for innovative conservation finance mechanisms such as the Forest Resilience Bond (FRB)," said NPO Conservation Finance Program Manager, Nathalie Woolworth. The successful progress on Blue Forest's pilot FRB, the Yuba I FRB, has led to the creation of the Yuba II FRB. In addition to the exciting implementation of multiple FRBs, this partnership has also resulted in the North Yuba River Partnership, a collaborative that transcends FRB work.

Over the next three years, NPO plans to continue providing financial resources and technical

assistance to support FRB development and implementation in National Forests facing a high risk of catastrophic wildfire across the West. To reinforce their commitments, NPO entered into a Challenge Cost Share Agreement with Blue Forest in September 2021 that formalizes the public-private partnership, funds project development work, and guarantees ongoing conservation finance efforts. For the second year in a row, NPO and its funding partner the US Endowment for Forestry and Communities awarded Blue Forest funding through the [Innovative Finance for National Forests Program](#), this time to study the connection between forest management, wildfire risk, and public health impacts from wildfire smoke.

Long term, Woolworth aims to "cultivate an ecosystem across the Forest Service that allows conservation finance mechanisms like the FRB to thrive." Specifically, by educating agency personnel on how to scope and develop conservation finance partnerships, increasing the transparency and accessibility of internal processes for partners, securing financial resources and technical assistance resources to support projects, and proposing policy changes that support the scaling of forest resilience projects.



Nathalie Woolworth
NPO Conservation Finance
Program Manager



Pioneering Corporate Support for Water Resilience and Forest Health

In 2021, Blue Forest and partners, World Resources Institute (WRI), National Forest Foundation, the Forest Service, Yuba Water, and the North Yuba Forest Partnership closed on a second Forest Resilience Bond (FRB). The Yuba II FRB on the Tahoe National Forest will finance \$25 million in forest resilience and post-fire restoration projects in California's Sierra Nevada mountains to restore 48,000 forested acres, protect nearby communities, and enhance water security.

This second FRB on the Tahoe NF not only protects more acres but also expands the pool of funders by introducing corporate support into the FRB funding model. Garnering corporate support to leverage utility and state funding was one of the primary goals of a recent grant from the Innovative Finance for National Forests program to WRI, Bonneville Environmental Foundation (BEF), American Water Works Association, and Blue Forest.

Nature-based solutions offer some of the most catalytic, multi-benefit outcomes available. For this reason, BEF is working with Blue Forest and the WRI to bring businesses into conservation finance models that significantly scale up water resilience.

The partnership came about in 2021 through mutual collaboration from both Blue Forest and BEF with WRI. "We have both collaborated extensively with the World Resources Institute on expanding projects and the diversity of funders participating in projects. WRI helped

connect us to Blue Forest to begin exploring the best projects and current opportunities to achieve broad and durable water resilience benefits," explained BEF CEO, Todd Reeve.

The first of these corporate partners opened the window of opportunity for this type of financial support last year on the Yuba II FRB. Danone, a longtime partner of BEF, has worked collaboratively for over a decade to help support and invest in high-impact water solutions and water projects. BEF helped Danone understand the unique impact potential of the Yuba II FRB and evaluate the diverse co-benefits from fire resilience and community protection to enhancement of downstream water supply. As a result of that proactive engagement, Silk, a Danone brand, was eager and willing to participate in this project as an example of how to expand that company's impact and generate benefits from water to habitat to fire resilience in California and headwaters in the Yuba.

Corporations are increasingly concerned with wildfires and drought and the associated water-related risks to their supply chains, facilities, and bottom lines. "Silk's early display of leadership by funding the Yuba II FRB will help restore forests and advance water replenishment," said Todd Gartner, Director of Cities4Forests and WRI's Natural Infrastructure Initiative. "This sets the stage for other companies, whether food and beverage, consumer goods, or technology, to move beyond basic water-related target setting towards collective action solutions that restore nature and protect human health."



*Todd Reeve,
CEO of Bonneville
Environmental Foundation*



*Todd Gartner,
Director of Cities4Forests and WRI's
Natural Infrastructure Initiative*



The Yuba FRBs demonstrate the broader impacts of the Forest Resilience Bond (FRB) model. More specifically, the FRB enhances financial flexibility, forges new and stronger partnerships, reduces the administrative burden of project management for stakeholders, shifts risk away from public agencies and utilities, and incorporates monitoring of ecosystem benefits into project implementation.

RESEARCH PARTNERS

Researchers and academics are crucial to the quantification and valuation of forest restoration benefits over the life of the FRB. Partners include the Sierra Nevada Research Institute at the University of California Merced and the Natural Capital Project.



PRO BONO LEGAL PARTNERS

A core element of the FRB is contracting with beneficiaries and other stakeholders. The development team is fortunate to receive pro bono legal support from Orrick, Herrington & Sutcliffe LLP, and Brownstein Hyatt Farber Schreck, LLP.



YUBA I AND YUBA II FRB INVESTORS

Our first FRB would not have been possible without the generous and trusting organizations that took an investment risk on a new manager and an innovative structure. Yuba I FRB investors are CSAA Insurance Group, Calvert Impact Capital, the Gordon and Betty Moore Foundation, and the Rockefeller Foundation. Yuba II FRB investors are CSAA Insurance Group, the Gordon and Betty Moore Foundation, the Inherent Foundation, Hall Capital, ImpactAssets, and RSF Social Finance.



BLUE FOREST FUNDERS

The development of the FRB relies on the generous support of a number of public and private funders including the Bella Vista Foundation, the Caterpillar Foundation, the Doris Duke Charitable Foundation, the Great Island Foundation, Impact Assets, the J.M. Kaplan Fund, the Rockefeller Foundation, and the Weyerhaeuser Family Foundation. Additional support has been provided by the Forest Service Wood Innovation Grant program and Innovative Finance for National Forests Grants, and the CA Wildlife Conservation Board Grant Program.



FRB PROJECT PARTNERS

The Yuba FRBs would not have been possible without the pioneering organizations who supported this innovative idea. Project partners included Sierra Nevada Conservancy, Tahoe National Forest, Yuba Water, the National Forest Foundation, the US Endowment for Forestry and Communities, Robinson Enterprises, Beale Mountain Forestry and Environmental Consulting, Bonneville Environmental Foundation, and the North Yuba Forest Partnership.



Impact Assets

The Forest Resilience Bond works with various types of investors who are committed not only to financial returns but also to forest health and climate resilience. ImpactAssets (IA) is a new market-rate investor in the Yuba II FRB. They are an impact investment platform and donor advised fund committed to “connecting people, planet, and action” by offering meaningful investment opportunities.

After hearing about the Yuba I FRB, Siobhan King, Portfolio Manager at ImpactAssets, reached out to Blue Forest, hoping to participate in the next FRB opportunity. Her original interest in Blue Forest stemmed from the fact that “Blue Forest had taken the urgent and complicated funding challenge of addressing wildfire, and created a unique solution that brings stakeholders together to accelerate forest restoration timelines.” This is well-aligned with the IA climate commitment to scale high-potential climate solutions.

Climate-focused investors at IA were eager to participate in this opportunity to unlock and expedite new funding for forest management projects while earning a return. The revolving nature of the Yuba II FRB - by which funds are drawn from investors, used to pay contractors for forest restoration work completed, and repaid through beneficiaries - was another draw for ImpactAssets. “We value the amplification power created when FRB funds are repaid and can be reinvested, leveraging our impact dollars further,” said King.

ImpactAssets is eager to see the Forest Resilience Bond model grow. As an investor, King sees the next stage of growth for the FRB as a financial structuring expansion. “We hope to see the individual FRBs mature into a diversified pool to simplify the fundraising process and reduce the friction to scaling impact,” she said. Given the positive feedback from ImpactAssets and other investors on the initial two FRB projects, a stated desire from these investors for additional capacity and a simpler fundraising process, and an Innovative Finance grant to support this work from the Rockefeller Foundation, Blue Forest has begun to explore the possibility of expanding the FRB from project-specific financing to an aggregated vehicle accommodating multiple projects. While still in the early stages, we believe this represents the next stage of growth and impact for Blue Forest.

The assistance and advice of people like King and other investors have been invaluable to the growth and momentum of Blue Forest. In early 2022, ImpactAssets named Blue Forest to the [IA50 List of 2022 Emerging Impact Managers](#), the industry list of leading impact investment fund managers. Their leadership, advice, and encouragement empower our team to scale the FRB to new locations and project types and to innovate new financial mechanisms.



Siobhan King
Portfolio Manager at Impact Assets

The Moore Foundation

The Gordon and Betty Moore Foundation has been one of the largest private funders of environmental conservation around the globe for the past two decades. It was also one of the first philanthropic organizations to support Blue Forest, providing both grant funding and program-related investment, now in multiple projects. From our early days to the FRB’s current expansion, the Moore Foundation has and continues to support Blue Forest’s mission.

Despite the Forest Resilience Bond being such a novel and innovative concept, Dan Winterson, who manages the Bay Area Conservation Program at the Moore Foundation, was willing to take a chance on a conservation finance startup four years ago.

“You don’t see as many successful startups in conservation as you do in many other fields,” said Winterson. “Environmental work tends to be dominated by public agencies and mature NGOs with established fundraising networks. You have to find investors and funders who are willing to take a chance on an unproven team and concept and who can see the significant potential of this model.”

The Moore Foundation was one of them. Fast forward four years, the FRB has not only proved to be a successful model for increasing the pace and scale of forest restoration but also a good investment for the Foundation. But just as the FRB has grown, so has the problem it was designed to solve.

“Recent wildfire seasons have underscored the need to invest in forest restoration at a much greater level,” states Winterson. “Blue Forest and its FRB have grown alongside that threat, listening to feedback and continually refining its business model while remaining true to its ultimate impact goals.”

“We are happy to once again be able to support Blue Forest and invest in a new and larger Yuba II Project on the Tahoe National Forest. The effective financial structure and multi-stakeholder partnership that lie at the core of the FRB also mirror our program’s approach and priorities,” said Winterson. “This effort will have a real, significant impact on both water resources and wildfire risk at a significant scale.”



Dan Winterson
Program Officer at the Moore Foundation

FRB MODEL EXPANSION

With additional staff capacity and a growing network of collaborators, Blue Forest will continue to scale the FRB in the coming years. To support the expansion of the FRB and affirm their confidence in Blue Forest, the Forest Service, National Partnership Office entered a Challenge Cost Share Agreement with Blue Forest in September 2021.

Blue Forest is in the process of expanding FRB projects to the Pacific Northwest Region as well as other states (see Figure 3). In addition, the team is exploring applying the FRB model to support other ecological resilience interventions (non-forest and non-wildfire restoration applications), including riparian restoration applications.

A FUTURE RESILIENCE FUND

Multiple FRB investors have requested additional and larger investment opportunities in forest resilience. Responding to this feedback, Blue Forest pursued research into a potential resilience fund through funding from the Rockefeller Foundation's Zero Gap Fund. After conducting due diligence, Blue Forest will design the next generation of the FRB that operates as a fund structure instead of a project-specific financing vehicle (while continuing to build the pipeline of investable FRB projects). This new fund structure will allow Blue Forest to raise and accept capital on a rolling basis, deploy capital more quickly, accept new and larger types of investor participation, and accommodate the varying timelines of multiple FRBs. These elements will be central to Blue Forest's long-term success and vision of catalyzing and accelerating ecosystem restoration projects across the United States.

BLUE FOREST'S TEAM EXPANSION

To balance our continued expansion, Blue Forest will add significant staff capacity and expertise in investments and project development in the coming year. As an organization at the intersection of forestry and finance, two historically White and male-dominated spaces, Blue Forest views our hiring as an opportunity to expand and support talent development for people from historically underserved and underrepresented communities. To keep abreast of job opportunities, subscribe to our newsletter or follow us on [LinkedIn](#).



Figure 3. In addition to Blue Forest's two active 'implementation stage' FRBs in Tahoe National Forest, the team is in the exploration and design phase for several other FRBs across the United States. FRBs take 2+ years to develop and not all projects in exploration will come to fruition.

“ Public-private partnership models like the FRB leverage private investment for the public good and are integral to the paradigm shift needed to address the risk of catastrophic wildfire across the West. Yuba II demonstrates that the FRB can be scaled to support the Forest Service's goal to treat 20 million acres of National Forest System land over the next decade to mitigate the risk of wildfire in the West. ”

Meryl Harrell

USDA Deputy Under Secretary for Natural Resources and Environment

Acknowledgements

Blue Forest is a non-profit organization committed to creating sustainable financial solutions to pressing environmental challenges.

Blue Forest Finance, a California nonprofit, was founded in 2015 to develop and manage debt financing for natural infrastructure projects on Forest Service managed lands to address the growing threat of wildfire in the Western US. Blue Forest's signature financial product, the Forest Resilience Bond (FRB), was developed in partnership with the World Resources Institute, Forest Service, and the National Forest Foundation. Blue Forest acts as both FRB project sponsor and investment manager.

The FRB overcomes the funding gap for forest restoration by allowing private capital to play a role in supporting public forest restoration. The unique contracting structure of the FRB allows both private investment on public lands and cost-sharing among entities who benefit from the completed forest restoration work. The FRB is a sustainable and replicable solution to help scale forest restoration across millions of acres - reducing wildfire risk and impeding the spiraling effects of climate change on American forests.

To learn more about Blue Forest:

Visit our [webpage](#) or check out this [video](#) highlighting the Forest Resilience Bond.

For comments, questions, or suggestions on the 2021 Impact Report, send us a note at connect@blueforest.org.

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