



The Forest Resilience Bond: Structural Design and Contribution to Water Management in Collaborative Forest Restoration Partnerships

U.S. EPA Water Infrastructure and Resiliency Finance Center
March 2021

Background

In the face of urgent forest management challenges, the U.S. Forest Service (USFS, Forest Service) has been investing in new approaches to land management. Catastrophic wildfire, aggravated by their increasing size and severity, the growing length of fire seasons, the onslaught of invasive species, the increasing incidence of drought, and epidemics of forest insects and disease increase demand for these investments. The Forest Service has identified shared stewardship as the most effective approach to wildfire management. Working closely with states, USFS's goal is to expand the scale of coordinated planning among stakeholders and across political and ownership boundaries.¹ The Forest Service's coordinated forest management efforts reflect the challenge presented by the incidence, velocity, and scale of wildfire growth in the second decade of the 21st Century. Congress has played an active role in redefining the authority and the mission of the USFS in the development and implementation of new collaborative forest management approaches to meet increasing challenges. Congress's efforts included the 2009 Forest Landscape Restoration Act, which established the Collaborative Forest Landscape Restoration Program (CFLRP). The purpose of the Act was to encourage the collaborative, science-based restoration of ecosystems in priority forest landscapes. CFLRP was established to serve the Act's public policy objectives by institutionalizing collaborative forest restoration efforts. Congress provided CFLRP funding to support a 10-year restoration strategy on multi-ownership forest parcels in excess of 50,000 acres. Between 2010 and 2018, CFLRP has established 23 collaborative projects to reduce fire risk, improve forest conditions, and protect municipal watersheds.² As a result, more than \$90 million in partner investments were secured for work on National Forest System lands and another \$207 million were secured for investments on state, private, and other federal lands. The 2014 Farm Bill expanded collaborative authority by formally establishing the national scope of the Good Neighbor Authority (GNA), initiated as a pilot in 2001. The GNA was designed to expand federal capacity to implement and plan restoration work on federal lands by facilitating partnerships with state agencies. In 2018, the USFS reported that 163 GNA agreements had been signed in 25

¹ "Toward Shared Stewardship Across Landscapes: An Outcome Based Investment Strategy" US Forest Service, 2018
https://nrca.usda.gov/wps/PA_NRCSConsumption/download?cid=nrca1463885&ext=pdf

² <https://www.fs.fed.us/restoration/CFLRP/>

states. More recently, the 2018 Consolidated Appropriations Act provided authority to update internal processes, including a streamlined federal environmental review process that is required by the National Environmental Policy Act (NEPA), to increase efficiency. The Act directed the USFS to advise as to how it would leverage the new authorities. USFS responded with the development of its Shared Stewardship Strategy, which is predicated on an outcome-based investment approach that relies on larger scale partnerships enabled by the improved USFS processes. The report clearly identified the challenge and the response in stating that:

“(T)he Forest Service and our partners have limited budgetary and other resources; even pooled, these resources cannot begin to treat all the landscapes in need. In an era of megafires that sweep across landscapes in multiple ownerships, no single entity can meet the challenge alone at the scale needed to reduce fire risk across broad landscapes. The belief that individual landowners and land managers can and should shoulder all responsibility for disturbance-related risks within their own jurisdictions is outdated. The risk is at scales that are simply too great.

Clearly, targeted investments are needed at the scale of shared landscapes, including partner contributions of resources. We need shared approaches at the scale of the challenges we face within the wildland fire environment, using shared resources for the right kinds of investments in the right places. We can improve the wildland fire system by joining with partners and stakeholders to make smart choices about where we work—shared decisions that are both strategic and effective—investments that can truly make a difference at an all-lands scale.”

- *From “Toward Shared Stewardship Across Landscapes: An Outcome-Based Investment Strategy,” U.S. Forest Service, 2018*

Solving resource challenges is core to the success of nationally scaled forest management partnerships. With the Forest Service’s vision for shared stewardship in mind, the USFS National Partnership Office initiated a grant program to support the implementation of innovative finance models that leverage private capital needed to boost investment in National Forest System resilience and that of surrounding lands. The Forest Resilience Bond finance model is one such innovative finance initiative, supported in part by the National Partnership Office. The Yuba Project Forest Resilience Bond, the first application of this financing model, is the focus of this report.^{3, 4}

³ USFS Good Neighbor Authority, <https://www.fs.usda.gov/managing-land/farm-bill/gna>

⁴ USFS Shared Partnership Strategy, <https://www.fs.usda.gov/sites/default/files/toward-shared-stewardship.pdf>

The Yuba Project Forest Resilience Bond: An Overview

The inaugural Forest Resilience Bond (FRB) financing was undertaken in late 2018 to provide up to \$4 million over a 5-year period to fund a portion of a forest restoration project on the Tahoe National Forest in California's North Yuba River watershed (the Yuba Project). The project protects and restores 15,000 acres of forest from catastrophic wildfire while providing additional water related and rural community co-benefits. This financing approach could lead the way for wider collaborative investment initiatives that would accelerate efforts to meet forest restoration needs and reduce severe forest fire risk to local populations, local economies, and public water supplies. The FRB is a first of-its-kind financing secured by a contractual payment stream from a third-party water utility agency, the Yuba Water Agency (Yuba Water), and grant awards provided by the State of California's Department of Forestry and Fire Protection (CAL FIRE). One of the main purposes of the Yuba Project is to invest in critical forest fire risk mitigation to reduce the incidence and intensity of highly destructive crown fires.⁵ The benefits are also expected to reach beyond the protection of forest resources as the work also protects water quality while also enhancing water flows for downstream water supply and habitat needs.

This collaboration – among the USFS, the National Forest Foundation (NFF), the state of California, Yuba Water, and investors – is facilitated through the FRB Yuba Project I LLC (LLC). The LLC operates as a Special Purpose Vehicle (SPV) and serves as the debt issuer. The LLC mitigates the financial risks of all parties to the project to the greatest extent possible. Blue Forest Conservation (Blue Forest), a 501 (c)(3) non-profit, is the project investment developer and the project sponsor. The parties to the project were driven to engage in the Yuba Project by the opportunity to pilot a funding approach that could attract private capital to accelerate and scale forest restoration efforts beyond what public funding alone can support.

Yuba Water recognized the ecosystem service benefits resulting from a successful forest restoration. Yuba Water also recognized that making a contractual payment obligation allows the project sponsor to accelerate the project timeframe by securitizing investor financing, in part, with a pledge of Yuba Water contract revenues.

⁵ 2020 was a devastating fire season. Through September, California had experienced five of its six largest fires in its history burning twice the acreage that had burned in 2018. (Governor Newsom September 28, 2020 letter to President Trump, <https://www.gov.ca.gov/wp-content/uploads/2020/09/9.28.20-Presidential-Major-Disaster-Request.pdf>.) In the ten years prior to 2020, California had seen 5 of the 10 largest fires and 7 of the 10 most destructive fires in the United States, in part attributable to lack of timely investment in forest restoration. <https://www.theatlantic.com/science/archive/2019/07/climate-change-500-percent-increase-california-wildfires/594016/>

In addition, Yuba Water committed to promoting a multi-party collaboration that could expand forest restoration investment for the entire watershed.

The North Yuba Forest Partnership was formed one year after the closing of the Yuba Project FRB financing. The Partnership is comprised of local and national NGOs as well as federal, state, and tribal representation. The Partnership is has committed to expanding forest restoration efforts to an additional 275,000 acres within the North Yuba River watershed.⁶ The parties expect a follow-on FRB financing to support this work as well.⁷ Forest restoration collaboratives, such as this Partnership, have become a central approach to addressing difficult challenges in funding and managing forest health and resiliency in U.S. public forests. A forest collaborative is a partnership among federal, state, and/or local parties with a common interest in protecting and restoring forest lands. The parties may not have a direct economic interest but directly benefit from public goods associated with these lands and their productive management. Examples of such public goods include protection of habitat, (including environmental flows critical to downstream fisheries), water quality, water supply, and public recreation. Air quality benefits also result from healthy forests that are actively managed to reduce fire intensity and severity. Crown fires that damaged or threatened their public water supplies catalyzed previous collaboratives that have involved municipal agencies or municipal departments responsible for safe delivery of water supplies.

The FRB represents a new direction for collaborative forest management, as the debts and revenues pledged for repayment are provided by different parties. The SPV issued the debt, making project funding immediately available, while ecosystem services beneficiaries, such as Yuba Water and the State of California acting through CAL FIRE, provided the revenue streams over time. The Yuba Water revenue pledge increased the pace and scale of the forest restoration investment that could immediately be undertaken.

If the collaborative model can improve project scale and create repetitive pathways for private capital investment, the pace of restoration work can be accelerated to address the national forest restoration

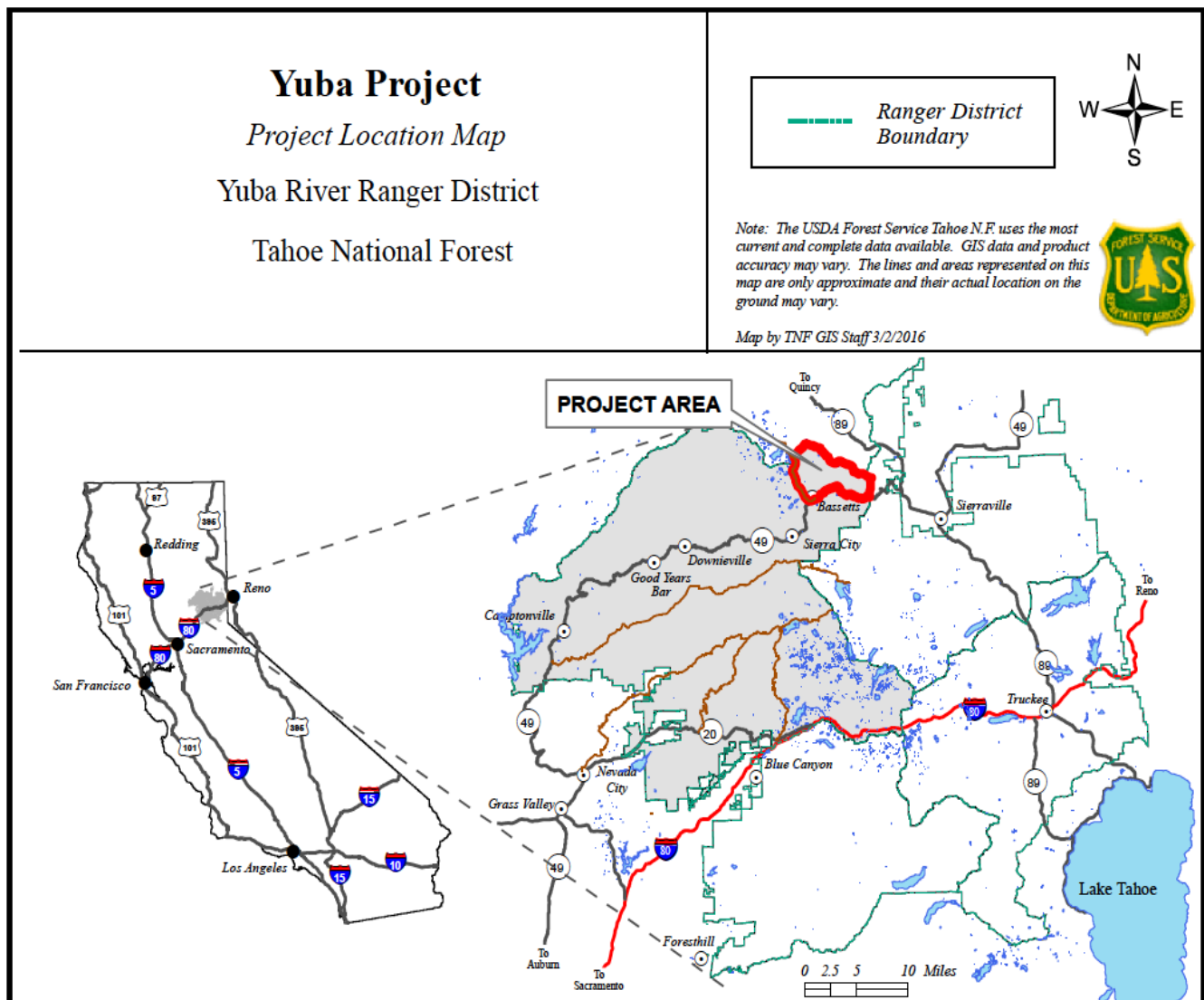
⁶ For additional information, see <https://yubariver.org/n-yuba-forest-partnership/>

⁷ On February 17, 2021, Yuba Water approved a new funding commitment that will support a second FRB financing, proceeds of which will support North Yuba River Partnership projects. <https://www.acwa.com/news/yuba-water-commits-6-5-million-to-improving-forest-health-in-yuba-river-watershed/>

The Forest Resilience Bond: Structural Design and Contribution to Water Management in Collaborative Forest Restoration Partnerships

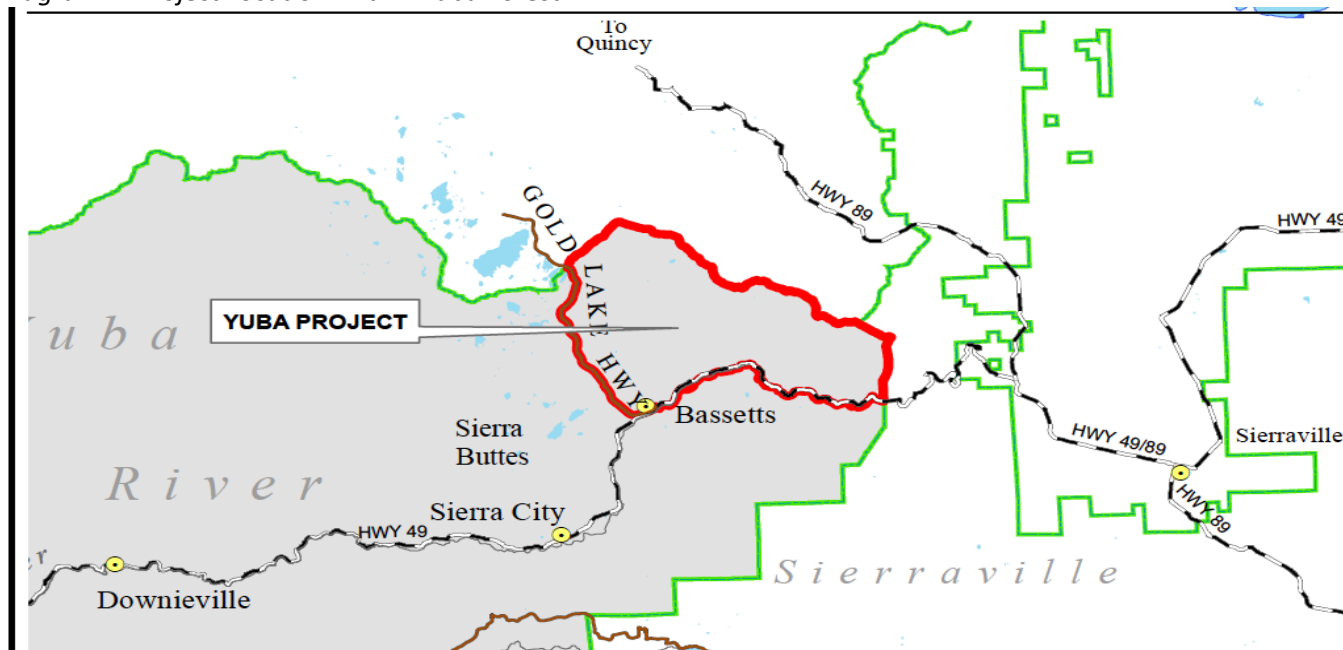
investment gap, improve forest management conditions, reduce wildfire risk, and protect water resources. Additionally, the Yuba Project is expected to produce approximately 35,000 green tons of biomass for processing at the nearby Loyalton Biomass facility. Increased forest restoration activity could prompt multiplier effect investment in rural communities with the promise of more stable supplies of biomass for energy production and timber products.⁸

Diagram 1: Yuba Forest Location



⁸ Woolworth, Nathalie and Knight, Zach "Forest Finance Unlocks Opportunities for Rural Communities," Community Development Innovation Review, Federal Reserve Bank of San Francisco, October 2019

Diagram 2: Project Location Within Yuba Forest



The Tahoe National Forest Yuba Project Partnership

Development of the Third-Party Financing Mechanism

The forest restoration investment gap presents a challenge to all stakeholders invested in the public goods derived from forest health (e.g., ecosystem services, such as clean air, protected source water, and sustainable rural jobs). In recent years the federal government, in collaboration with state and local governments and non-governmental partners, has promoted and developed collaborative partnerships to pool public and private resources as a solution.

The development of the FRB financing mechanism using the FRB Yuba Project I LLC SPV was in direct response to a collaborative stakeholder engagement that focused on the forest investment challenge. In 2015, private foundations supported the initial development of the Forest Resilience Bond concept. The result was “Forest Resilience Bond: Fighting Fire with Finance,” a report that established the basis, parameters, and process by which a market could be developed for public-private capital investment in forest restoration.⁹ The sponsors

⁹ <http://www.carpediemwest.org/wp-content/uploads/Forest-Resilience-Bond-Report.pdf>

included the Rockefeller Foundation and the Gordon and Betty Moore Foundation with pro bono contributions from the legal firms, Orrick, Herrington, and Sutcliffe LLP and Brown Hyatt Farber Schreck, LLP. The FRB developers (Blue Forest, Encourage Capital, and the World Resources Institute) worked closely with the USFS Region 5 Office (State of California) and the USFS Washington Office (National Headquarters). Integrally related to this support was the Morgan Stanley Sustainable Investing Challenge selection of Blue Forest Conservation as one of its 2015 winners for pioneering the Forest Resilience Bond concept.¹⁰

As designed, the core value of the FRB financing model is its capacity to harness private capital to complement existing public funding available for investment on public lands. The FRB attracts and positions private capital to drive needed collaborative forest restoration partnerships. According to the work done by Blue Forest, an FRB centric partnership engagement is an eight-step process:

1. **Beneficiaries identify a project in need of funding** – the FRB sponsor works with USFS, utilities, forest collaboratives, and other stakeholders to identify a high priority project;
2. **Metrics are determined to measure successful outcomes** – sponsor works with scientific community, the World Resources Institute, and beneficiaries to define target outcomes and measurements for project activities;
3. **Beneficiaries enter into contracts** – USFS, implementation partners¹¹, utilities, state and local governments, and other beneficiaries' contract for services and pledge revenues to secure Forest Resilience Bonds;

Forest Resilience as a Public Good and the Cost Benefit Analysis

In economics terminology the resiliency of forests is a national public good. Market forces do not control a public good's supply and demand, so a benefit cost analysis must be performed. A resilient forest is less prone to catastrophic wildfires, a better source of water supply, and a stronger base for ecosystem diversity and preservation. In a natural environment, a forest achieves a self-sustaining level of resilience, but fire suppression protocols and growth in residential and concomitant powerlines have lowered resilience. There are two practical choices to address this: passively accept the expected losses or actively perform restoration work.

Some estimates put the cost of wildfires in California in 2018 as high as \$400 billion, including direct insured losses, cost of actual firefighting and clean-up, indirect consequences (e.g., bankruptcy of PG&E), etc. Even if only 25% of this cost could have been avoided by having performed restoration work that reduced fire intensity, the benefit of increased resiliency would have been \$100 billion in 2018 alone. This does not include less visible benefits to the watershed, ecosystem diversity, etc.

On the cost side, forest maintenance costs roughly \$1,000 per acre. The work will restore covered acres to a near-natural level of resiliency for a period of about five years. Assuming that a wildfire could occur anywhere in California, the cost of restoring all 33 million acres of forested land in the state would be about \$33 billion – nearly \$70 billion less than the cost of potential benefit in wildfire cost reduction in 2018 alone. Hence, the economically rational choice is to actively perform restoration work.

¹⁰ <https://www.morganstanley.com/ideas/morgan-stanley-sustainability-challenge-blue-forest-fighting-fire>

¹¹ These partners consist of non-governmental organizations (NGOs) and state or local government agencies familiar with USFS policies that can take on contracting and planning responsibilities. See: <https://www.adaptationclearinghouse.org/resources/forest-resilience-bond-fighting-fire-with-finance.html>

4. **Investors provide upfront capital** – development team working through a special purpose vehicle (SPV) identify and raise funds from investors;
5. **Implementation partners conduct restoration work** – USFS directs and monitors restoration work on National Forests through an implementation partner;
6. **Third party verifiers measure success** – outcomes measured based on beneficiary’s public goods enhancement targets and contracts;
7. **Beneficiaries make payments, based on measured performance or on a cost-share basis;**
8. **SPV repays investors.**

Based on these development steps, Blue Forest negotiated the first forest restoration collaborative partnership engagement to successfully leverage private investment capital. The initial undertaking was designed to provide proof of concept for the benefit of the wider stakeholder audience. The transaction that emerged from discussions with prospective beneficiaries resulted in a project undertaking based solely on resource commitments made by the state, Yuba Water, and USFS as described herein. The contractual terms negotiated followed the guiding principles laid out in the research paper. The core principles from Blue Forest, Encourage Capital, and the World Resources Institute’s work were:

- Balancing beneficiary selection (*i.e.*, ecosystem service payors) by including multiple groups while recognizing that each additional beneficiary adds complexity;
- Working with beneficiaries to define success and, where applicable, measure and monitor outcomes;
- Balancing precise measurement requirements with cost-benefit realities that increased precision costs more to obtain;
- Ensuring contracting flexibility that includes collaboration and iteration in developing mutually beneficial terms that result in a return on investment for all beneficiaries;
- Leveraging concessionary capital to support project economics at the initial stage of market development; and
- Striving for economies of scale within and across transactions.

The Yuba Project Partners

The Lead Partner - Blue Forest's role as lead partner and transaction developer was crucial to getting the Yuba Project implemented. Their role started with their following the eight-step process and the guiding principles, outlined above. Blue Forest assembled a group of committed parties to support the pilot undertaking the development of the funding concept that could add value to forest collaborative engagements. The next series of steps involved creating interest in the development of a public-private capital investment interface; leading the negotiations with the involved parties; developing an impartial, quantifiable measure of value with the assistance of Stanford University and the University of California, Merced; and developing a transferable knowledge base on agreement execution. The core element of the partnership and financial architecture was Blue Forest's creation of a SPV to manage the flow of funds that would move between investors and the project beneficiaries. This was critical as the SPV, acting as a bankruptcy remote single purpose entity¹² to provide a sound foundation for securing third-party investment and assuring all parties that fund flows, could not be tainted by a multi-purpose intermediary's financial deterioration. In addition, Blue Forest created cost benefits for its partners by absorbing financial management responsibilities, managing stakeholder communication, contract development, the financing, and partner coordination efforts. For these services, Blue Forest was paid from grant funds.

Beneficiaries and Payors - Yuba Water is a local government agency created in 1959 by the Yuba County Water Agency Act (Chapter 84 of California Water Code) to control and conserve flood and stormwater for beneficial purposes within Yuba County. The Board of Directors of Yuba Water consists of the five members from the Board of Supervisors of the County, and two at-large members representing two different areas of the territory served by Yuba Water. The jurisdictional territory of Yuba Water includes the area within the County, as well as entities adjacent to the County that are Yuba Water's customers. Yuba Water, in addition to its other powers, has the express authority to develop hydroelectric power to the extent such power can be developed in connection with the construction and operation of its projects. Yuba Water sells water to eight different water districts, irrigation districts, and/or water companies located in the County, the State of California (for its CALFED¹³ Bay-Delta Program Environmental Water Account), and to the California Department of Water

¹² For more information on the bankruptcy remote nature of special purpose vehicles: <https://library.wilmingtontrust.com/z-featureditems/featured-2/the-use-of-spvs-in-asset-securitizations>

¹³ CALFED began as a cooperative state-federal planning effort between water, environmental, state and federal officials involved in the 1994 Bay-Delta Accord.

Resources. Yuba Water is also responsible for the operation of the Yuba River Development Project, which includes the New Bullards Bar Dam and reservoir, and hydroelectric facilities capable of generating more than 400 megawatts of electricity. Yuba Water also operates various groundwater, fisheries monitoring, and other programs.¹⁴ Yuba Water's reservoirs, which contain more than one million-acre feet of storage capacity, are closely connected to the health of its watersheds. A large portion of its upper watershed is located in the Tahoe National Forest.¹⁵

CAL FIRE is a state agency under the California Natural Resources Agency. CAL FIRE is responsible for fire protection and prevention across all State Responsibility Area (SRA) lands. CAL FIRE manages and administers the California Climate Investment (CCI) Program, a forest health and research grant program funded by the California Greenhouse Gas Reduction Fund. CCI is the Yuba Project grant funding source.¹⁶

The Land Manager – The U.S. Forest Service is an agency of the [U.S. Department of Agriculture](#) that administers the nation's 154 [national forests](#) and 20 [national grasslands](#). USFS manages the National Forest System representing 193 million acres (780,000 km²) or 31 percent of federal lands. USFS estimates that about one-third or 58 million of these acres are at high or very high risk of severe wildfire. The remainder of federally owned lands fall under the jurisdiction of the Department of the Interior and Department of Defense. USFS's mission is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations.¹⁷

The Implementation Partner – The National Forest Foundation (NFF) was created by Congress in 1992 to be the official non-profit partner of USFS. Its mission is to engage Americans in community-based national programs that promote the health and public enjoyment of the national forests. The foundation receives funding from Congress and solicits additional funds from the private sector. USFS is prohibited by law from soliciting outside funding, but the foundation has been expressly designated by Congress to fulfill that function. The federal community forest partnership strategy, reaffirmed in EO 13855,¹⁸ is rooted in the creation of USFS.

¹⁴ From the Yuba Levee Financing Authority Official Statement, dated December 13, 2016. <https://emma.msrb.org/ER1004345-ER786075-ER1187348.pdf>

¹⁵ <http://www.yubawater.org>

¹⁶ <http://fire.ca.gov/grants>

¹⁷ <https://www.fs.usda.gov/sites/default/files/fy-2017-fs-budget-overview.pdf>

¹⁸ <https://www.federalregister.gov/documents/2019/01/07/2019-00014/promoting-active-management-of-americas-forests-rangelands-and-other-federal-lands-to-improve>

The Forest Resilience Bond Investors

Blue Forest succeeded in recruiting the four initial Forest Resilience Bond investors. The investors represented diverse interests. As investors both Calvert Impact Capital and CSAA Insurance Group (CSAA) sought a market return on investment. For Calvert, as an impact investor, the FRB investment vehicle provided a sufficient social-market return. As a pilot, it offered promise as an impact investment product with the potential to scale. CSAA's motivation was its social and environmental value in piloting a solution to counteract underinvestment in forest restoration. CSAA also, importantly, recognizes that private capital investment in forest restoration could reduce insurance liability risks to its property and casualty insured product lines over time.^{19,20}

The Rockefeller Foundation and the Gordon and Betty Moore Foundation provided financing to the partnership as a concessional investment.²¹ In both cases, the loan came from their Program-Related Investment group in which below market rate loans qualify as a charitable distribution under tax law – an efficient approach to provide financing to environmental and social impact ventures. Their focus was in supporting innovative models that have promise to scale and thrive in a market environment without ongoing foundation support. They look to market investors to become the sustainable capital source in future transactions.²²

The complete list of Yuba Project Participants, their roles in the transaction, and their objectives are summarized in Table 1.

¹⁹ Interview with Linc Walworth, VP Investments, CSAA Insurance Group, July 1, 2019.

²⁰ The Forest Resilience Bond was vetted and approved for investment by the California Department of Insurance's California Organized Investment Network ("COIN"). COIN mission is "to guide insurers on making safe and sound investments that yield environmental benefits throughout California and/or social benefits within the State's underserved communities."
<http://www.insurance.ca.gov/0250-insurers/0700-coin/35-Investment-Programs/>

²¹ Concessional investment in this arena is foundation capital willing to accept below-market rates of return in exchange for the promotion of investment models that have the potential to scale societal or environmental benefits.

²² Interviews with Dan Winterson, Program Director, Bay Area Conservation, The Moore Foundation, July 2, 2019 and Caleb Ballou, Associate Principal, Innovative Finance, The Rockefeller Foundation, July 10, 2019.

The Forest Resilience Bond: Structural Design and Contribution to Water Management in Collaborative Forest Restoration Partnerships

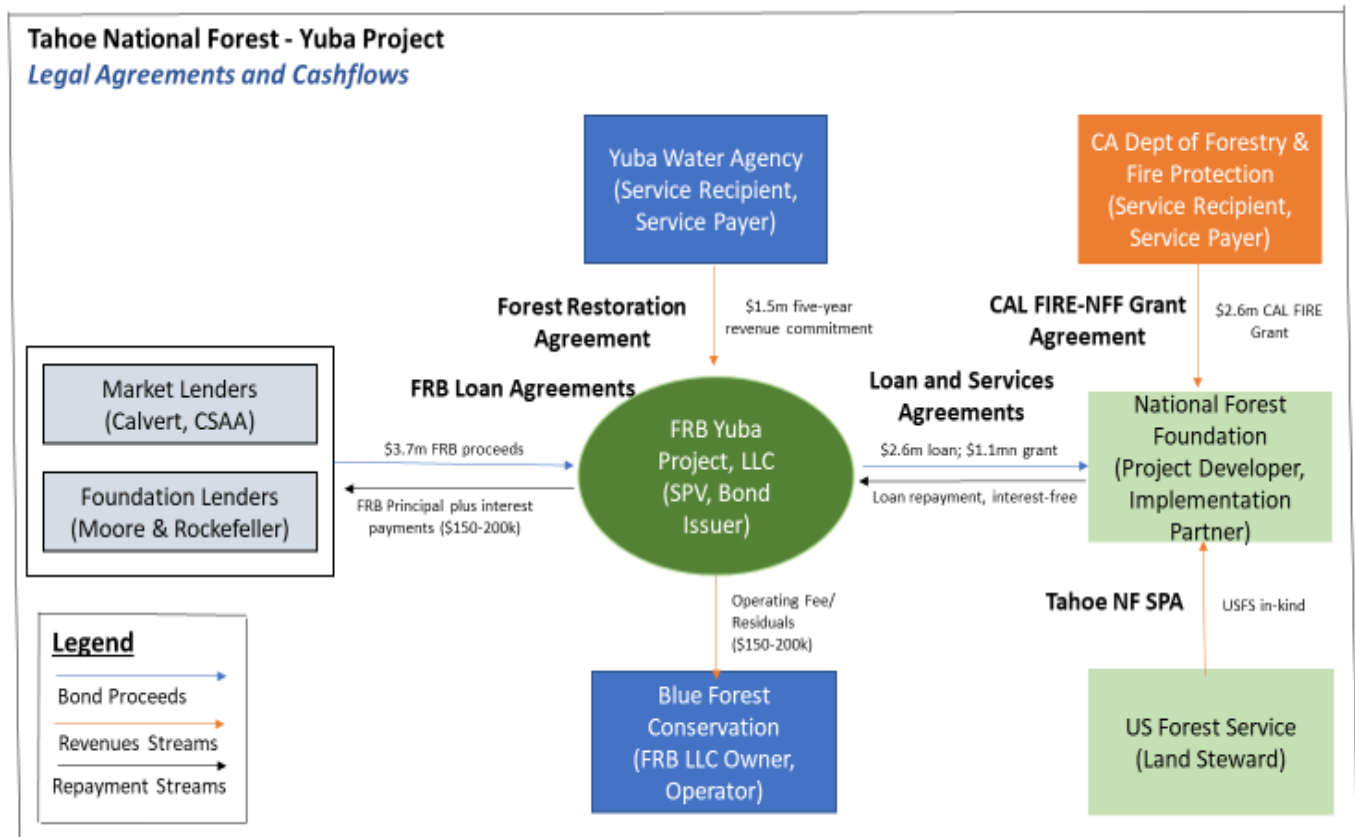
Table 1: Transaction Participants

PARTY	ROLE	OBJECTIVES
Development & Execution		
Blue Forest Conservation	Project developer	Non-profit, transaction development
The World Resources Institute	Project developer	Non-profit, model developer, economic analyses
Encourage Capital	Investment manager/advisor	Impact investor
Rockefeller Foundation	Funder	Promotion of market-financing mechanism, innovative finance, environmental
Moore Foundation	Funder	Conservation finance market development, CA conservation goals
Stanford University Water in the West	Academic institution	Environmental benefit analysis
UC Merced Sierra Nevada Research Institute	Academic institution	Environmental benefit analysis
Orrick, Herrington & Sutcliffe	Law firm providing <i>pro bono</i> services, corporate law	Public service
Brownstein Hyatt Farber Schreck, LLP	Law firm providing <i>pro bono</i> services, environmental law	Public service
Beneficiaries /Funding Providers		
Yuba Water Agency	Water and electric utility	Public service provider
CAL FIRE	State grant entity	Environmental, sustainable forest management
USFS, Tahoe National Forest	Land manager	Sustainable forest management
Land Manager and Implementation Partner		
USFS	Land manager	Sustainable Forest Management
NFF	U.S. Forest Service congressionally chartered foundation partner, Implementation Partner	Funding/contract vehicle for USFS
FRB Investors		
Calvert Impact Capital	Lender (impact investment firm)	Market return impact investor
AAA Insurance of California	Lender (insurance company)	Market return investor
Rockefeller Foundation	Lender (foundation)	Program-related investment, concession investor
Gordon and Betty Moore Foundation	Lender (foundation)	Program-related investment, concession investor

The Yuba Project Partnership Legal Framework and Fund Flows

The Yuba Project partnership arrangement is built on a series of contractual agreements among six operating entities and four investment providers. USFS and the NFF, as the implementation partner, are the core pillars around which the Yuba Project is built. The SPV is the interfacing entity through which the contractual relationship among the parties are established and private capital investment is made available for the project. A comprehensive look at the legal contracts, interaction of project sources and uses, dedicated revenue streams, and payment obligations that support the Yuba Project are outlined in Diagram 3.

Diagram 3: Legal Agreements and Cash Flows



Legal Agreements Supporting the Transaction

In order to undertake the project work, the Yuba Project required two standing agreements between the USFS and the NFF. The primary controlling agreement is the Master Stewardship Agreement (MSA) entered into with the USFS Pacific Southwest Region, Regional Office. The MSA covers all national forest lands and surrounding areas within USFS Region 5 (California is EPA's Region 10). The second agreement is the Tahoe National Forest MSA Supplemental Project Agreement (SPA). Both agreements were already in place prior to establishment of a Forest Resilience Bond.

The MSA establishes the respective responsibilities of the USFS and NFF with respect to project collaborations in the USFS Pacific Southwest Region. Under the MSA the USFS responsibilities include:

- Designating the Regional Forester to approve all stewardship project proposals;
- Ensuring all necessary NEPA requirements are completed prior to project implementation;
- Coordinating with NFF to develop SPAs under the MSA; and
- Completing all project design, layout, and preparation for SPAs that are not conducted by NFF and is required for stewardship projects.

NFF responsibilities include:

- Maintaining the institutional, managerial, and financial capabilities to ensure proper planning, management, and completion of projects, including funds sufficient to pay for the non-federal share of project costs, as applicable;
- Coordinating with USFS to develop SPAs;
- Coordinating with involved agencies and organizations in planning and implementing project work;
- Exploring opportunities for additional support from other parties for projects; and
- Providing qualified personnel and contractors to implement SPA tasks.

The SPA includes a financial plan that identifies the project contributions that will be made by each of the parties. It also incorporates a Statement of Work (SOW) that must be developed by the parties and reflects the project scope approved by the corresponding NEPA documentation.

For the Yuba Project, the SPA financial plan identifies the funding sources, project scope, and costs. The funding sources and uses identified are the State of California's Climate Investment grant program administered by CAL FIRE, the FRB payment commitment (secured by the agreement entered into between the FRB and Yuba Water), and non-cash contributions from USFS. These payment streams are integral to the SPA Financial Plan. The agreements that collectively assure the availability of these payment streams are the Grant Agreement between CAL FIRE and NFF, the Loan and Services Agreements entered between the FRB and NFF, and the Forest Restoration Project Agreement between the FRB and Yuba Water. The Supplemental Project Agreement between USFS and NFF commits, with conditions, the USFS to in-kind contributions (*e.g.*, land, staff-hours, materials, etc.). Each of these agreements are highlighted in the subsequent section.

The CAL FIRE – NFF Grant Agreement – CAL FIRE provided \$2.6 million in a reimbursable grant award to NFF for the Yuba Project. The Yuba Project is one of several projects covered by the CAL FIRE-NFF Grant Agreement. The terms of the agreement establish stipulations that brings an element of state control to the projects covered including:

- Project work started earlier than agreement execution is not eligible;
- State review and approval of budget specifications and project description;
- All data/information developed must be made available for public use;
- Project changes require state approval;
- Project SOW complies with applicable local, state, and federal laws/regulations including state and federal environmental laws; and
- All project payment invoices approved by the state.

Each party may terminate upon 30 days written notice. Among the Agreement's provisions that can impact covered projects and present risk to third party investors is the Budgetary Contingency Clause establishing the state's right to reduce funding or terminate the Agreement if the state legislature reduces or eliminates funding for the program. In the event of termination, NFF must take steps to minimize further costs to the state and the state must remain responsible for all reasonable and non-cancelable obligations incurred by NFF. In addition, the Agreement may be terminated by the state for cause if the grantee fails to comply with its terms. Such failure could result in the suspension of all state obligations, at the discretion of the state. The state may set

aside any amount required to settle “any irrevocable obligations properly incurred.” Final grant payment is not made until the state determines that the Project conforms substantially to the terms of the Agreement.

The FRB Yuba Project I, LLC – NFF Loan and Services and Grant and Services Agreements – The Loan and Services Agreement establishes the terms for a \$2.6 million non-recourse loan from the FRB to NFF. This means the loan is not secured by the general credit of NFF. The loan amount matches the \$2.6 million reimbursable CAL FIRE Grant. Loan terms set the interest rate at zero percent, establishes a maturity date of November 1, 2023 and limits repayment to proceeds received from the CAL FIRE grant. Loan draw availability matches the FRB-Lender agreements. In addition to the Loan Agreement, a Grant and Services Agreement provides for additional project funding of approximately \$1.1 million. The \$2.6 million loan and the \$1.1 million grant comprise the core funding for the project. USFS in-kind contributions account for the balance of project costs.

Although the loan is non-recourse to NFF there is not an assignment provision that would direct CAL FIRE grant proceeds to be paid directly to insulate the FRB, as creditor, from other NFF creditor claims, including bankruptcy. To limit the FRB’s financial exposure to NFF, the Loan and Services Agreement imposes limitations on NFF indebtedness, requires that NFF ensure that grant proceeds are not subject to encumbrances or other security interests of creditors and establishes a requirement that CAL FIRE grant proceeds be reimbursed within five business days of receipt. The indebtedness limitation restricts NFF to debts incurred (a \$1 million bank line of credit) and future obligations that are secured by mortgages or are subordinate or *pari passu* with the loan (*i.e.*, other unsecured collaborative partnership loan obligations).

The Loan and Grant Agreements incorporate the scope of work, types of treatments to be undertaken, and reference the specific NEPA Record of Decision for the Yuba Project, linking investments to project-level outcomes. By creating project specific SPVs that can reference NEPA decisions and cooperative agreement work plans, Blue Forest has found that the FRB creates transparency and accountability for utility beneficiaries, investors, and all project stakeholders.

The FRB Yuba Project LLC – Yuba Water Agency Forest Restoration Agreement – This agreement contractually engages the Yuba Water Agency to support the Yuba Project by committing to annual payments of \$300,000 installments over a five-year period to support the FRB-NFF project collaboration. Annual payments are payable November 1, 2019 through November 1, 2023. There are two major conditions that, if triggered, could result in a reduced payment obligation or termination. First, is Yuba Water’s right, with at least 30 days’ notice, to defer

up to 50 percent of its annual payment obligation (the “Deferred Amount”) if revenues for the prior fiscal year were below 65 percent of expected revenues. Deferred Amounts are subject to a 4 percent annual interest charge and are payable on the next payment date. This deferral right expires on the fourth annual payment date and does not apply to the final payment due on November 1, 2023. The second condition is a Termination Event defined as (a) a bankruptcy or insolvency of either party, (b) by mutual written consent of the parties, (c) a Yuba Water termination for cause, (d) termination rights exercised by the FRB “in the event that a major fire or a large-scale tree mortality event occurs... that the USFS determines would substantially hinder or imperil...” the Project, or (e) a Force Majeure Event. If the FRB exercises its termination rights based on a USFS determination, Yuba Water is obligated to pay the FRB “an amount equal to the full payment due for the year plus any portion of amounts due from prior years including any Deferred Amounts.” Either party may also terminate if a Force Majeure Event, which includes fires, continues in excess of six months. Agency termination for cause includes defined violations of the Agreement, insolvency, or a bankruptcy that has not been dismissed. If exercised for cause, Yuba Water remains obligated for a *pro rata* portion of the annual payment due based on costs of restoration services performed versus budgeted for the year, plus any prior amount due, including any Deferred Amounts.

In committing to its pledge of revenue to the Project, Yuba Water determined that its pledge was consistent with its authorized statutory powers to fund projects that protect water quality and enhance water supplies. The payment obligation is unsecured, which places it in a junior position to any outstanding debt-related payment obligations.

Lender Agreements between the FRB and Debt Holders – The proceeds of the debt issued to institutional investors pursuant to the terms of a consolidated lender agreement between the investors and the FRB provided the project funding. Although investors are represented by two classes of buyers, market return investment funds and not-for-profit foundations, the agreements are identical as to legal protections and the rights of the respective parties. They differ with respect to interest rate and commitment fees. The market rate investors, Calvert Impact Capital and CSAA Insurance Group, receive a 4 percent interest rate. The two foundations, The Moore Foundation and The Rockefeller Foundation, receive a 1 percent interest rate.

The loan is structured as a delayed draw term loan, which lets a borrower withdraw amounts of a total pre-approved loan amount. As a drawable loan, the loan allows up to eight withdrawals and a draw minimum of

\$100,000 or \$25,000/lender. Interest is payable only on amounts drawn. Market rate lenders also receive a commitment fee payable on committed, but undrawn, capital. The commitment fee payable to the market rate investors on undrawn balances is 50 basis points per annum. With the one exception related to an initial draw (the draw on the Moore Foundation loan was in full at the outset), all draws are required to be *pro rata* among investors. The FRB has an annual right to reduce lender commitments on a *pro rata* basis. Should the FRB exercise this right and the initial draw lender's outstanding loan balance exceed that of the other lenders the FRB must prepay the initial draw lender to meet the *pro rata* requirement. Before each draw can be made for the purpose of paying project contractors, the FRB is required to make proper representations and warranties that NFF is in full compliance with the CAL FIRE Grant Agreement. These representations and warranties mirror those found in the FRB-NFF Loan and Grant Agreements. This is a protection that minimizes lender's exposure to repayment risk.

In addition to the mandatory prepayment requirement related to the *pro rata* draw requirement, there is a mandatory prepayment requirement related to quarter ending FRB cash balances. A quarter ending cash balance in excess of \$250,000 requires the FRB to make a mandatory prepayment plus accrued interest on the amount prepaid to the investors. The FRB also has an optional prepay option without any prepayment penalty.

Investors made loan commitments for \$4 million. The expected *pro rata* draw is \$3.7 million. Interest payments to investors are made quarterly. The loan matures December 1, 2023. At closing, it was determined that should the Sierra Nevada Conservancy (SNC), a California state agency under the Natural Resources Agency, commit grant dollars to the project, the full amount of the loan would be expected to be drawn. This would require SNC to enter into a grant agreement with NFF for a grant of up to \$300,000. This grant was ultimately awarded to another project partner and the lender capacity was reduced in 2020.

The agreements highlighted above provide a synopsis of the sources and uses of funds that support the Yuba Project as well as the contracted revenue streams that support operating expenses and timely repayment of the debt drawn. These funding relationships are summarized in the tables that follow:

Table 2. Yuba Project Sources and Uses (Based on Commitments)

SOURCES		USES	
Forest Resilience Bond	\$4.0 million	National Forest Foundation	\$4.0 million
USFS Tahoe National Forest	\$0.6 million*	Tahoe National Forest	\$0.6 million
Total	\$4.6 million		\$4.6 million

*in-kind forest contribution

Table 3. Revenue Streams and Payment Obligations

CONTRACTED REVENUE STREAMS		FRB PAYMENT OBLIGATIONS	
CAL FIRE Grant	\$2.6 million	Forest Resilience Bonds	\$3.7 million
Yuba Water Agency	\$1.5 million	Forest Resilience Bond Interest	\$0.15-.2 million
		Blue Forest Opex	\$0.15-.2 million
Total	\$4.1 million		\$4.1 million

Cashflows Prescribed by Legal Agreements Contingent on Risk Factors

The cashflows presented in Table 2 and Table 3 above assume normal project operations and performance obligations of the involved parties. However, there are risks to normal operations and funding commitments that can interrupt, alter, or terminate these cashflows. Risks, though interrelated, fall along the following lines: credit, appropriation, and project delivery.

Credit risk – arises with respect to the lenders, YCWA and NFF. Lenders contractually deliver funding under draw rules promulgated by loan agreements with the FRB, the Yuba Project LLC, and YCWA pursuant to its negotiated terms with the FRB. The credit quality of the participants mostly mitigates the lender funding risk.

Yuba Water is a small municipal water and electric utility with no publicly issued debt outstanding. The Agency’s water revenue is currently pledged to a Yuba Levee Financing Authority, a joint power agency (JPA) payment obligation that is rated AA by Standard & Poor’s (S&P).²³ Yuba Water’s contractual obligation to the FRB is an unsecured claim on surplus revenues that is subordinate to its JPA payment obligation. The Agency’s credit

²³ See Official Statement, dated December 13, 2016. <https://emma.msrb.org/ER1004345-ER786075-ER1187348.pdf>

strength and ability to support its FRB payment obligation is bolstered by the Agency's electric and power revenues generated by hydroelectric generating facilities with nameplate capacity of more than 400 megawatts, including the recently acquired 12-megawatt Narrows 1 facility. The hydropower revenues are not pledged to the JPA bond but account for more than 80 percent of Agency revenue.

Funding defaults by any one of the Lenders or payment defaults by Yuba Water could impair project completion and FRB debt holder repayment.

NFF presents credit risk to the Lenders due to the CAL FIRE prohibition on assignment of grant payments to the FRB for the purpose of securing the financing. Should NFF ever be in a creditor receivership status these grant payments could be at risk to the claims of other creditors. This risk is mitigated by the five-day payment requirement included in the FRB-NFF Loan and Services Agreement.

Appropriation risk – arises from the timing of payments based on legislative appropriations to the State's Forest Health Climate Investment Grants Program (CCI grants allocated through CAL FIRE) under the terms of its Grant Agreement with NFF. FRB lending is, in part, secured by grant payments. The Lender Agreements are subject to the Grant Agreement being in place. The Agreement's standard budget contingency language stipulates that funding availability can be impaired by reduction in state funding to the grant program and that appropriation reductions could cause the CAL FIRE-NFF grant to be reduced or cancelled. This risk has been fully mitigated by state legislative action to make the appropriation and state action to award the grant under the Agreement.²⁴

Project risk – arises with respect to execution and funding sufficiency. Under the collective agreements, each of the parties that have obligated to make financial commitments have termination rights that may be invoked if the other party is not meeting their obligations, including the project scope of work. The agreements further establish contingencies that protect the respective financial interests of the parties in the event of project execution failure. The CAL FIRE Grant Agreement establishes that if the state exercises its termination rights it must provide for irrevocable obligations made by NFF prior to CAL FIRE invoking its termination rights. This assures that loan and grant dollars provided by the FRB under the Loan and Services and Grant Agreements

²⁴ The CAL FIRE-NFF Grant Agreement funded multiple NFF projects, including the \$2.6 million allocated to the Yuba Project, from SFY 2017-18 legislative appropriations of over \$1.5 billion in Greenhouse Gas Reduction Fund revenues, including \$293 million to CAL-FIRE. https://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/auctionproceeds/detail_appropriation_10_15_2019.pdf?_ga=2.98432411.521087263.1594915644-1032838357.1587405464

The Forest Resilience Bond: Structural Design and Contribution to Water Management in Collaborative Forest Restoration Partnerships

remain covered by state commitments. Likewise, an Agency termination for cause, which may be project related, requires the Agency to continue to provide payment, *pro rata*, based on work completed through the termination date, including any Deferred Amounts owed.

The table below provides a breakdown of the major financial risk allocations among the parties:

Table 4. Risk Allocation Among Parties

RISK CATEGORY	RISK ALLOCATION	DESCRIPTION
Project Completion Risk	CAL FIRE/Yuba Water	Payments are structured to occur at the end of the work season (May-Oct/Nov) when seasonal work in process can be measured. Termination of the FRB-Yuba Water Forest Restoration Agreement for cause may include failure of the FRB to enforce contract performance against NFF or misallocation of Agency payments. Termination requires <i>pro rata</i> payment requirement.
Project Performance Risk	Yuba Water	Payment obligation is not contingent on delivery of expected project benefits. The FRB has made no representations or warranties with respect to project outcomes and has no obligation or liability to the Agency in regard to Services having a particular level of results. Yuba Water was offered a performance-based contract.
Yuba Water Credit/Payment Risk	FRB Lenders	The payment obligation from the Agency is unsecured and paid from net revenues after operating expenses and secured obligations. The Agency can defer 50% of annual payment if Agency revenues (water and electric) drop to less than 65% of budgeted. Deferred Amounts will be interest-bearing to match liabilities related to deferral of the FRB Yuba Project LLC loan principal payments.
Yuba Water Payment Default	FRB Lenders	The FRB has right at law or in equity to pursue payment. Forest Restoration Project Agreement imposes 6% default rate on Yuba Water.
Appropriation Risk - NFF fails to apply CAL FIRE Grant to reimburse Lenders	FRB Lenders	Grant proceeds cannot be assigned by NFF to the FRB for benefit of the Lenders. CAL FIRE prohibition on assignment of grant proceeds to other parties. NFF works under a 5-day cash flow sweep to send dollars to investors. FRB-NFF Loan Agreement grants the FRB recourse thru rights in law and equity.
Cal Fire Grant non-payment to NFF	FRB Lenders	Mitigated by the FRB loan draw timing and Yuba Water payment obligation.

Force Majeure Events	Yuba Water	Agency retains a limited obligation to pay if services cannot be performed. Force Majeures lasting more than six months is an event of termination subject to YCWA payment obligations through the end of the year plus any Deferred Amounts owed due to prior revenue shortfalls (see Yuba Water Credit/Payment Risk, above).
FRB Lender Funding Default	FRB	FRB Lenders' failure to fund draw requests reduces/eliminates the FRB capacity to accelerate and/or meet funding commitments to the Project. CAL FIRE and Yuba Water payment obligation offsets substitute Yuba Water credit and CAL FIRE appropriation risk for lender credit risk.

Collaborative Forest Restoration Partnerships: Piloting New Models

One response to a persistent undersupply of a public good is for those stakeholders or communities with a particularly high demand for the good to form a collaboration that seeks to directly provide a better local supply. The USFS itself strongly encourages cross-boundary collaborative planning and management through its Collaborative Forest Landscape Restoration Program (CFLRP) and Shared Stewardship strategy. This final section of the report discusses how the FRB and the pilot project on the Tahoe National Forest could inform the design of next generation forest collaborative partnership models.

Prior Municipal-USFS Collaborative Models

The Forest Service has experience piloting collaborative models in response to downstream impacts from severe crown fire events, such as the Buffalo Creek and Hayman fires in Colorado (see Denver Water inset) and the Schultz fire in

Denver Water's Forest to Faucet Partnership

After the Hayman and Buffalo Creek Fires, Denver Water spent over \$40 million repairing the Strontia Springs reservoir. In 2010, Denver Water signed a \$33 million deal with USFS (\$16.5 million each) and expanded that agreement to include the Colorado State Forest Service and the Natural Resources Conservation Service in 2017 for five more years. USFS will conduct forest health restoration treatments on more than 38,000 acres of National Forest lands in northern Colorado and the goals include reducing wildfire risk, restoring areas recovering from past wildfires, and minimizing erosion. This is viewed as a "proactive step to invest in the future, by keeping our watershed healthy rather than paying for impacts from a catastrophic crown fire in the future." In June of 2018, a wildfire broke out in Silverthorne, Colorado. With red flag drought conditions, a wildfire in the area would have caused \$913 million in damages from the loss of homes and infrastructure. Instead, firefighters were able to aggressively combat the flames from fuel breaks implemented through From Forests to Faucets funding. No homes were lost from the wildfire.

Flagstaff, Arizona (see Flagstaff inset).²⁵ Both Denver Water and the City of Flagstaff entered into cost-sharing partnership agreements with USFS in the wake of catastrophic fires that damaged watersheds and threatened the future integrity of public water supplies. Both municipalities chose to take action to remediate damage and invest in mitigation to avoid the far greater costs of unmitigated fire risk. Denver Water financed its forest restoration investment with net system cashflow after providing for annual operating and maintenance costs and annual debt service obligations. The City of Flagstaff took the additional step of funding their shared costs with the issuance of general obligation bonds, secured by the full faith and credit pledge of its general tax base.²⁶

How the FRB Yuba Project Pilot Differed from Initial Concept

The initial intent and expectation of Blue Forest and its development partners was that the FRB investment model would be tethered to performance benchmarks. Performance measures were to be the basis for returns on investment that would either supplant traditional payment streams tied directly to a borrower's contractually established payment obligation or be a component of project related revenues payable to investors. Applying performance metrics, investors would have been paid in whole or in part based on the benefits derived from the project work. It was determined in the course of discussions with Yuba Project stakeholders, including Yuba Water, that historical data was sufficient for it to conclude that project benefits would result from the work.²⁷ Consequently, the Forest Restoration Services Agreement negotiated between the Agency and the FRB provided for

Flagstaff Watershed Protection Project

Following the Schultz Fire in 2010, there was severe and repeated downstream flooding causing tens of millions in damage surrounding Flagstaff, Arizona. In 2012, the City issued a \$10 million tax-free municipal bond to fund forest restoration in the Coconino National Forest and surrounding lands to avoid damage over the next 8-10 years. By September 2019, FWPP has thinned nearly 5,500 acres of forest in and around Flagstaff. Through the many collaborative partners, FWPP has brought in an additional \$8M dollars through in kind and cash leverage.

²⁵ <https://www.fs.usda.gov/detail/r2/news-events/?cid=STELPRDB5195008>
<https://www.denverpost.com/2017/02/26/denver-water-forest-health-plan/>
<https://in.nau.edu/wp-content/uploads/sites/212/Flagstaff-Watershed-Protection-Project-2014.pdf>
<http://flagstaffwatershedprotection.org/about/background/>

²⁶ On December 21, 2018, President Trump signed Executive Order 13855 "Promoting Active Management of America's Forests, Rangelands, and other Federal Lands to Improve Conditions and Reduce Fire Risk." EO 13855 declared that it is the policy of the United States "to promote healthy and resilient forests, range lands, and other Federal lands by actively managing them through partnerships with States, tribes, communities, not-for-profit organizations, and the private sector." The EO directed the USDA and DOI Secretaries to adopt the following policies in furtherance of partnership engagements with stakeholders: shared management priorities, coordination of federal, state, tribal and local assets, remove hazardous fuels and increase active management, and support rural economies.

²⁷ This involved extensive data gathering and expert analysis, which was provided by Sierra Nevada Research Institute (SNRI) at University of California, Merced and the Natural Capital Project and Water in The West at Stanford University.

payment based on the project work but not be based on measured outcomes. In other words, the repayment obligation was linked only to project performance in its most traditional sense – in relation to the investment made in the project work. To the extent that third party investment dollars have flowed to the project, project beneficiaries are obligated to make good on their scheduled payment obligations. The result was a cost share approach not unlike the Denver Water-USFS and Flagstaff, AZ-USFS cost share collaboratives (see insets), but with an added element of financing that could accelerate the pace and scale of treatments and enable more widespread participation by a broader set of utilities that may not have the capacity to commit to large upfront investments. Recognizing the future potential for financing terms that would include performance metrics, the Forest Restoration Services Agreement contains a requirement to collect and provide data to Yuba Water which can inform performance benchmarks for future agreements.^{28, 29}

Data Collection, Aggregation and the Development of Future Revenue Streams

Blue Forest and its development and research partners reviewed all the environmental benefits associated with forest restoration and decided to focus on water quality and quantity as the most quantifiable and reliable benefits to monetize, in addition to the more obvious benefits of fire risk reduction. Future iterations will continue to capitalize on standardized methodologies and high-tech applications, which make data gathering more efficient and/or more reliable (e.g., the Sierra Nevada Research Institute, an FRB research partner, is already using satellite imagery for data collection³⁰). These sorts of data collection methods and technologies allow for expedited scaling opportunities as well as the potential for “stacked” monetization of environmental benefits beyond increased water quality resulting from proper forest maintenance that is paid for by multiple beneficiaries. Further refinement and standardization of outcomes such as reduced fire probability and liability, improved forest health, increased community resilience, carbon emissions stability and sequestration, or protected air quality could all become monetizable factors for projects. Once these factors are consistent and measurable, introducing performance outcomes could potentially factor into determining investor compensation in “pay-for-performance” model FRBs. The key consideration will remain the ease with which

²⁸ Article 4, Section 4.02 of the YCWA-FRB Forest Restoration Agreement requires the FRB to provide the Agency with an annual Water Quantity Benefit Report showing estimated positive or negative change in water quantity in the watershed against baseline.

²⁹ An early example of pay for performance-based financing is the October 2016 Washington, D.C. Environmental Impact Bond which established both upside and downside adjustments to investor returns that was contingent on green infrastructure project performance. For more information see <https://www.epa.gov/waterfinancecenter/dc-waters-environmental-impact-bond>.

³⁰ For more information, see <https://snri.ucmerced.edu/>

The Forest Resilience Bond: Structural Design and Contribution to Water Management in Collaborative Forest Restoration Partnerships

such benefits can be monetized versus transaction complexity – one of the core FRB development tenants, highlighted above. Also essential will be the role played by stakeholders to establish well documented and standardized methods to quantify benefits.

Table 5: U.S. State Department’s examples of outcome- and output-based metrics for different types of forest finance projects.

Project focus	Explanation	Revenue Source (Example)	Outcome Metrics Example 1	Outcome Metrics Example 2	Output Metrics Example 3
Water	Forest conservation or restoration projects that seek to enhance the quality or availability of water for downstream users	Water utility payment for service or payment for performance	Sedimentation	Water quality	Hectares of degraded forest in watershed improved
Climate	Forest projects that seek to reduce greenhouse gas emissions from deforestation or forest degradation, or enhance the sequestration of carbon through reforestation, forest enhancement, or better forest management	Carbon emitter purchase of carbon offset credits	Net GHG emissions	Carbon stocks	Deforestation, reforestation, forest cover (proxies)
Biodiversity and ecosystem health	Forest projects that seek to protect or restore the habitat of key species, or preserve and enhance ecosystem health	Government or NGO payment for services or payment for performance	Hectares of forest conserved (protected) or restored	Number of indicator or target species	Hectares of forest under legal protection status
Fire	Forest projects that seek to reduce the incidence of catastrophic wildfire	Parties that benefit from avoided cost of catastrophic fire risk	Number of fires in a given area over a specific period of time	Average fuel load in a given area	Number of hectares where prescribed thinning has occurred
Resilience/flood management	Forest projects that intend to enhance the resilience of	Parties that benefit from avoided cost of	Number of hectares of mangrove,	Number of communities experiencing	Number of hectares of mangrove,

The Forest Resilience Bond: Structural Design and Contribution to Water Management in Collaborative Forest Restoration Partnerships

	communities to extreme events such as floods, landslides, storm surges, or sea level rise	catastrophic flood risk	coastal forest, steep slopes or flood plain protected or restored	damage from extreme events in a given location over a specific period of time	coastal forest, steep slopes or flood plain protected or restored
<i>Productive forestry</i>	Productive forest projects may include standard production metrics as well as other metrics of sustainability	Government, NGO or company payment for services or performance	Quantity of timber extracted (e.g., Board feet or roundwood volume)	Total value per hectare of the sustainably managed forest	Hectares of forest under forest management certification
<i>Economic value</i>	Forest projects with an objective of increasing the economic benefits generated by the forest, including for local communities	Government, NGO or company payment for services or performance	Increase in revenue from additional tourism	Value to communities from payments for environmental services, including carbon	Number of hectares of forest under management plan
<i>Risk/cost reduction</i>	Some forest projects seek to avoid an outcome they are often measured against such as a baseline that reflects the status that would have been expected in the absence of action (known as a Business As Usual, or BAU).	Government, NGO or company payment for services or performance	Net greenhouse gas emissions measured against a BAU baseline	Firefighting costs compared to average costs over a prior period	Value per hectare of a sustainably-managed forest, compared to neighboring forests

Source: Background Paper for 2nd Brazil-U.S. Forum on Innovative Forest Investment, Sao Paulo, Brazil, July 30-31, 2019. U.S. State Department

Federal Support in Place to Expand on the Forest Resilience Bond Public-Private Partnership Model

In 2019, the USFS National Partnership Office initiated the Innovative Finance for National Forests grant program to support the development and implementation of innovative finance models that leverage private capital to

invest in the resilience of the National Forest System and surrounding lands. The program objective is to deliver environmental, social, and financial outcomes on National Forests and adjacent state, private, or tribal lands in partnership with local communities and stakeholders. The program is jointly administered and funded by the USFS National Partnership Office, the National Forest Foundation, and the U.S. Endowment for Forestry and Communities.

As of August 2020, \$1.8 million in grants have been awarded to 10 recipients, including Blue Forest.³¹ The funding provided to Blue Forest will allow them to refine and replicate the FRB model with the launch of four additional National Forest initiatives in California and the Pacific Northwest. It is a stated goal of the grant award to expand beyond water to incorporate new ecosystem co-benefits into repayment revenue streams.

Grants have also been awarded for emerging, related models. Quantified Ventures, LLC, has been awarded funding to create and establish a Wildfire Environmental Impact Fund to address wildfire risk to watersheds and communities in Southwest Colorado. The Fund will leverage federal resources, private landowner contributions, and revenues from the sale of biomass. The Fund is expected to function as a revolving fund. The Nature Conservancy has been awarded funding to demonstrate a link between ecological forestry practices at scale and the price of property and casualty insurance. A successful demonstration is expected to provide the data necessary to incentivize stakeholders to monetize premium savings and finance forest restoration projects that deliver severe wildfire risk reduction benefits.³²

A Role for State Revolving Funds

In the future, there is the potential for alternative funding sources to be the Lenders in FRBs. The federally sponsored and state-administered State Revolving Funds (SRFs) have statutory authority to provide financial assistance at or below market rate to eligible recipients in the form of loans, the purchase of debt obligations, and the provision of financial guarantees to support Clean Water Act (CWA) eligible projects. Depending on how

³¹ Funding for Round 1 grants through the [Innovative Finance for National Forests](#) program came from the US Endowment for Forestry and Communities (\$500K) and USFS (\$1.3M). Funds are pooled and dispersed by the US Endowment (Nathalie Woolworth, USFS Partnership Office, July 28, 2020 email).

³² <https://www.nationalforests.org/grant-programs/innovative-finance-for-national-forests-grant-program> and <https://www.usendowment.org/new-grant-program-seeks-private-investment-in-our-national-forests/>

states use the CWA additional subsidization authority, loan principal forgiveness may also be available. The CWA establishes broad categories of eligibility and includes projects that address non-point sources of pollution. Projects may be publicly or privately owned and must address non-point sources of pollution identified in the state's 319 Plan or 320 Estuary Plans, which are operational in each of the nation's 20 national estuaries. The Yuba Project falls within the San Francisco Bay Estuary suggesting that it could be SRF eligible depending on categories of eligibility established by the plan. In addition, the 2014 amendments to Section 122 of the CWA, included in the Water Resources Reform Development Act identified watershed partnerships, defined as: "Efforts of municipalities and property owners to demonstrate cooperative ways to address nonpoint sources of pollution to reduce adverse impacts on water quality." CWA, Section 603 (c) (7) establishes such watershed partnerships as eligible financial assistance recipients. Criteria set forth in Section 122 establishes that eligible projects can be publicly or privately owned but limits such assistance to a municipality or municipal entity.³³ In 2016, the State of California enacted new legislation (Bill AB240) that recognizes watersheds as part of statewide infrastructure making it easier for water utilities to invest in watershed restoration.

States will determine how and to what extent their SRFs support forest restoration efforts, consistent with federal SRF authority and state project priorities. Key to effective participation is the continued optimization of SRF financial assistance through the strategic use of balance sheet strengths including liquidity to fund short-term lending vehicles and credit capacity to leverage SRF balance sheets or to introduce capital efficient guarantees each of which could serve to accelerate the market scaling of private capital investment in forest and watershed health.³⁴

Conclusion

The Forest Resilience Bond is an investment vehicle designed to finance forest restoration projects across the western United States to decrease the risk of severe wildfire that threaten the public goods derived from our forest resources. The financing serves to provide upfront capital in advance of committed public funds and to enhance available resources necessary to scale projects and benefits. By participating in the Yuba Project, Yuba Water committed to improving forest health in their upper watershed. Yuba Water contributed \$1.5 million to

³³ https://www.epa.gov/sites/production/files/2016-07/documents/overview_of_cwsrf_eligibilities_may_2016.pdf

³⁴ <https://www.epa.gov/cwsrf/overview-clean-water-state-revolving-fund-eligibilities> and https://www.epa.gov/sites/production/files/2017-05/documents/financing_options_for_nontraditional_eligibilities_final.pdf

the FRB, but the benefits they will get from the project far outweigh the costs, according to WRI's economic analysis. The forest restoration work will decrease the risk of severe wildfire and protect the utility's water infrastructure and prevent water quality degradation, caused by post-wildfire woody debris flooding that can have significant impacts on reservoir capacity and water treatment costs. Additionally, because of the forest characteristics, Yuba Water is expected to see additional streamflow and hydropower revenue due to the removal of small diameter trees from the landscape. Yuba Water has further determined that increased stream flows would support current and future commitments to provide a share of the required environmental flows needed to protect environmental integrity of the Sacramento Delta.

The financing model piloted on behalf of the Yuba Project is scalable. There are additional revenue streams that can be secured to further the flow of private investment capital into the forest restoration and public goods protection space. To the extent that public good beneficiaries can be identified and can recognize their economic self-interest in supporting investment in public goods, or can be incentivized via public policies, the corresponding revenue stream expansion would enable larger project undertakings. This, in turn, will yield greater forest resilience and greater certainty with regard to sustainability of the quality and quantity of public goods provided by the nation's forest lands. Reduced risk of wildfire also yields direct benefits to local economies and business interests that would face reduced liabilities and their related costs. Also, revenue streams might be better timed to the benefits expected to be delivered. With well documented and market accepted measurement methods and high confidence in the data, annual revenue payment requirements might be lowered in favor of longer payment periods that could be matched by longer financing terms.

In addition, it is possible to scale the existing FRB product in several ways. In this case, Blue Forest assembled all the pieces of the FRB through negotiations with all parties. In the future, there is potential to separate the data collection and financing pieces to accomplish two goals: greater independence and standardization in metrics, as previously discussed, and a commodification of the financial product. This financial independence could allow the FRB to become a tradeable bond as opposed to the private placement debt model it currently resembles. In addition, centralized independent financing would allow for a more sophisticated capital structure that could be adapted for various investors' risk tolerance.

As the market develops and data reliability improves, the addition of pay-for-performance parameters to transactions should attract impact investors that cannot participate based on the initial design due to impact

investment constraints. This model could be highly valued by beneficiaries that see the linkage between measurable project performance and payment obligations as key to community buy-in and participation. This aspect has a precedent of success (DC Water’s Environmental Impact Bond Issue) and could readily be incorporated to the existing structure with willing participants – especially the water quality and quantity metrics.

Blue Forest’s role as partnership and financial intermediary establishes a model baseline for future efforts to deliver investment capital in all its forms. The FRB model, as described herein may be replicated in its current form or, as is likely, match attributes cleaved from the Yuba Project with new model elements that are responsive to the needs of new project collaboratives and their stakeholders. Blue Forest expects that SPVs will be core to all collaborative project funding models that serve rural watersheds.

If the model can create a repetitive pathway for private capital investment, it could accelerate the pace of restoration work which is critically needed to address the public forest restoration investment gap, improve forest management conditions, and reduce risk. With long-term restoration planning, restoration could be a source of stable and safe employment that further contributes to the economic resilience of local communities.

U.S. EPA Water Infrastructure and Resiliency Finance Center

The Water Finance Center is an information and assistance center, helping communities make informed decisions for drinking water, wastewater, and stormwater infrastructure to protect human health and the environment. Through its technical assistance to states, local government, and non-governmental entities the Water Finance Center helps communities understand their financing options, improves the effectiveness of federal funding, and supports local decision-making for resilient water infrastructure.

If you have any questions, please contact the Water Finance Center at:

- waterfinancecenter@epa.gov
- www.epa.gov/waterfinancecenter