



**FOREST  
RESILIENCE  
BOND**

# Introduction to the Resilience Bond

Prepared for Upper Mokelumne River Watershed Authority

*January 22, 2021*

**Nick Wobbrock, COO & Co-Founder**  
**Phil Saks, Chief Scientist**



# North Fork, Feather River 1890-1993

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Photo Credit: George E. Gruell, Fires in the Sierra Nevada, 2001



1926 - Old growth Ponderosa pine stand between Beaver and East Panther Creek in Amador County.

# 2015 Butte Fire

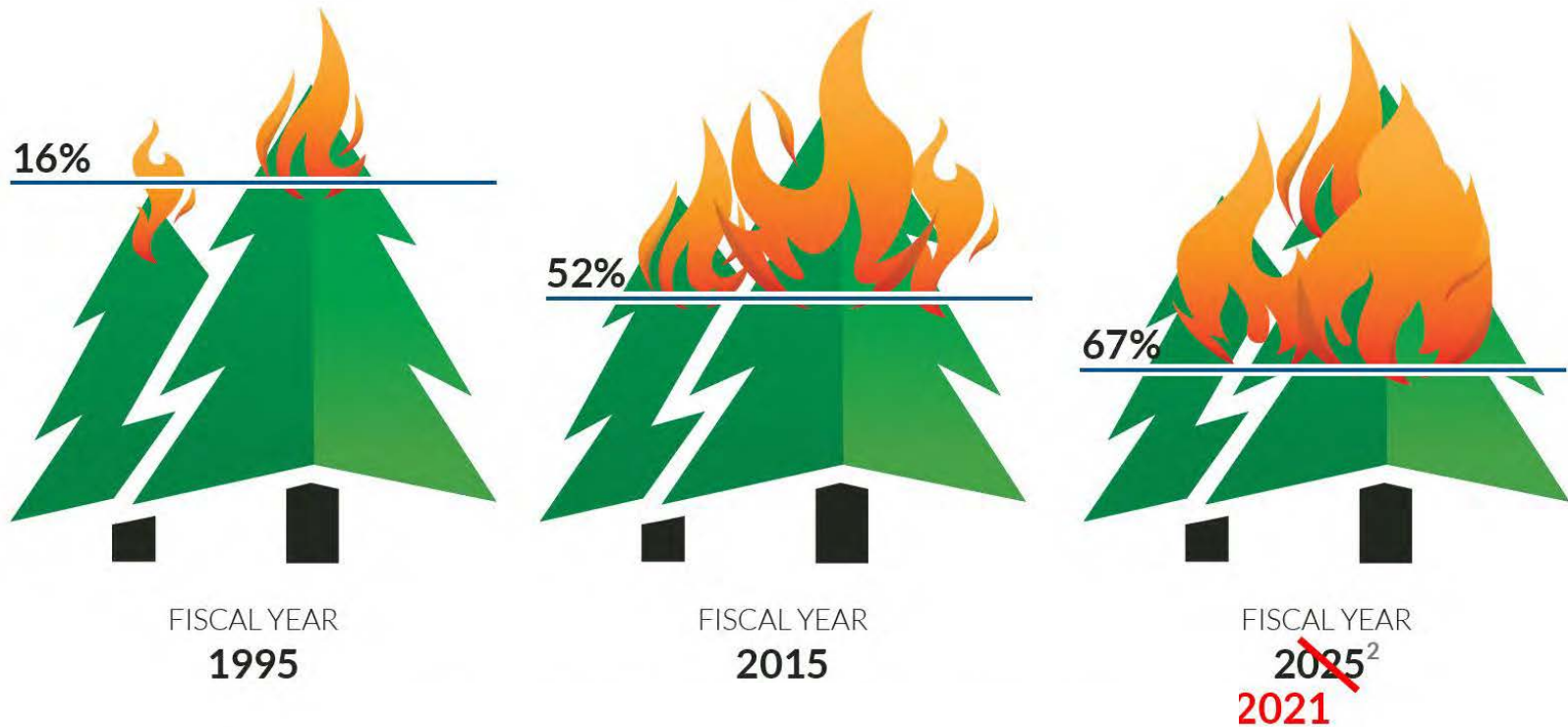
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# Fire is consuming much of the USFS budget

## US Forest Service

Vicious cycle in which USFS is forced to pay for today's fires out of the funds designed to prevent tomorrow's



# Forest Restoration as a Solution

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## Overgrown



## Restored



# Financial Tools For Natural Infrastructure

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Treats Water

Municipal Bonds



Delivers  
Electricity

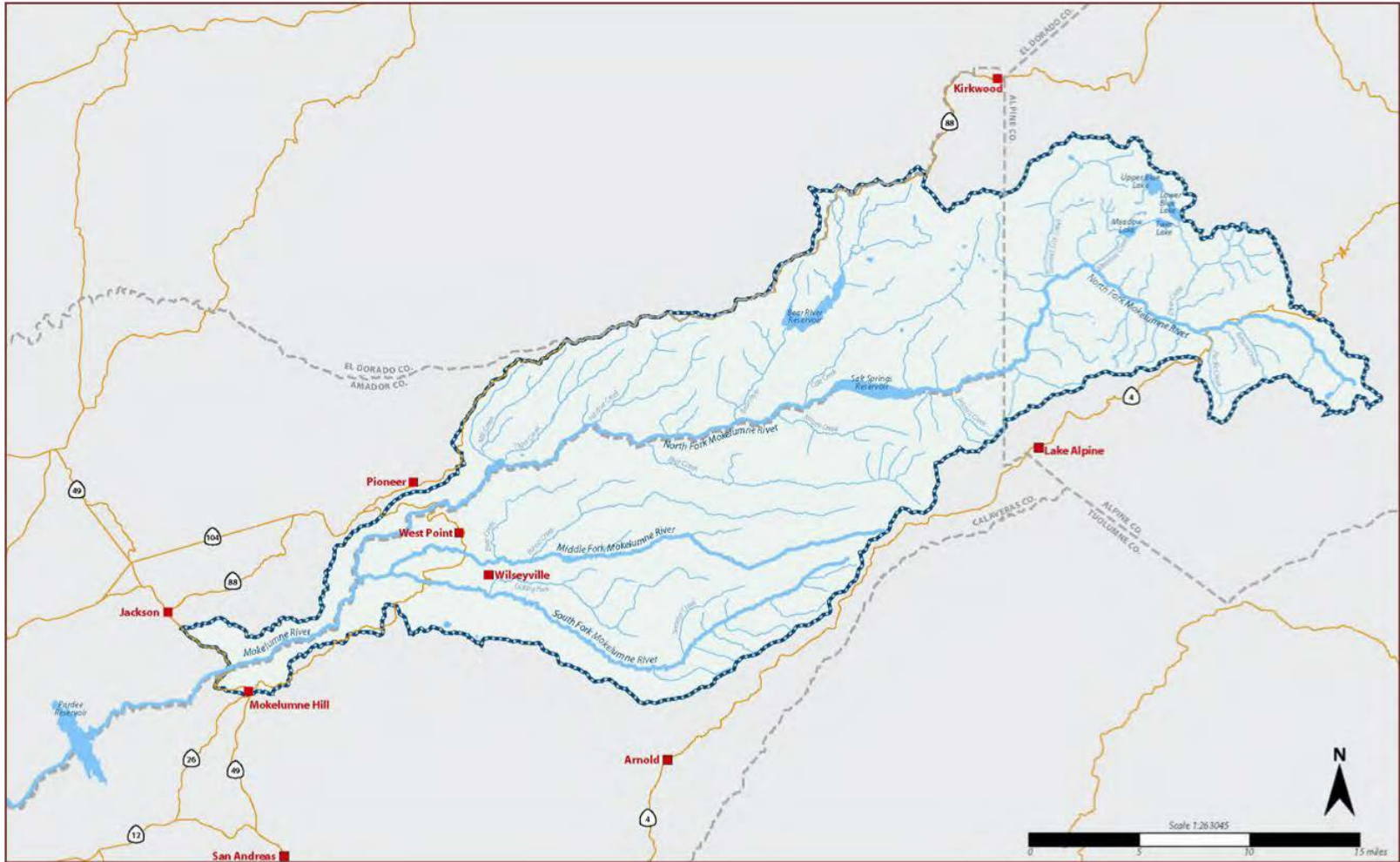
Investor Owned  
Utilities



Place to Live

Home  
Mortgages

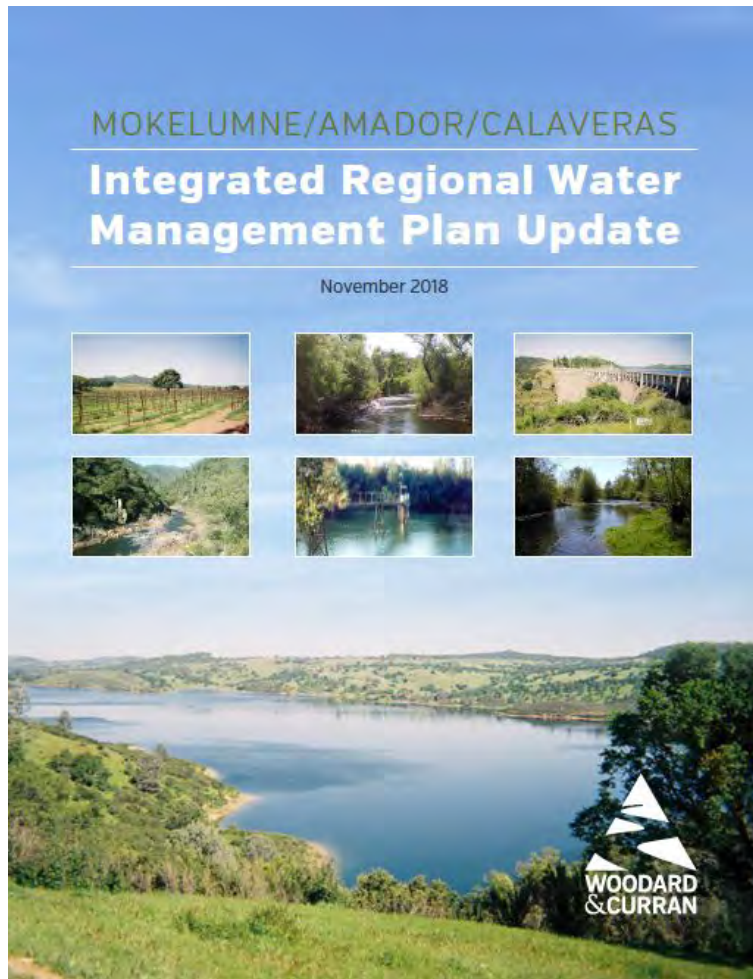
# Your Watershed & Your Vision





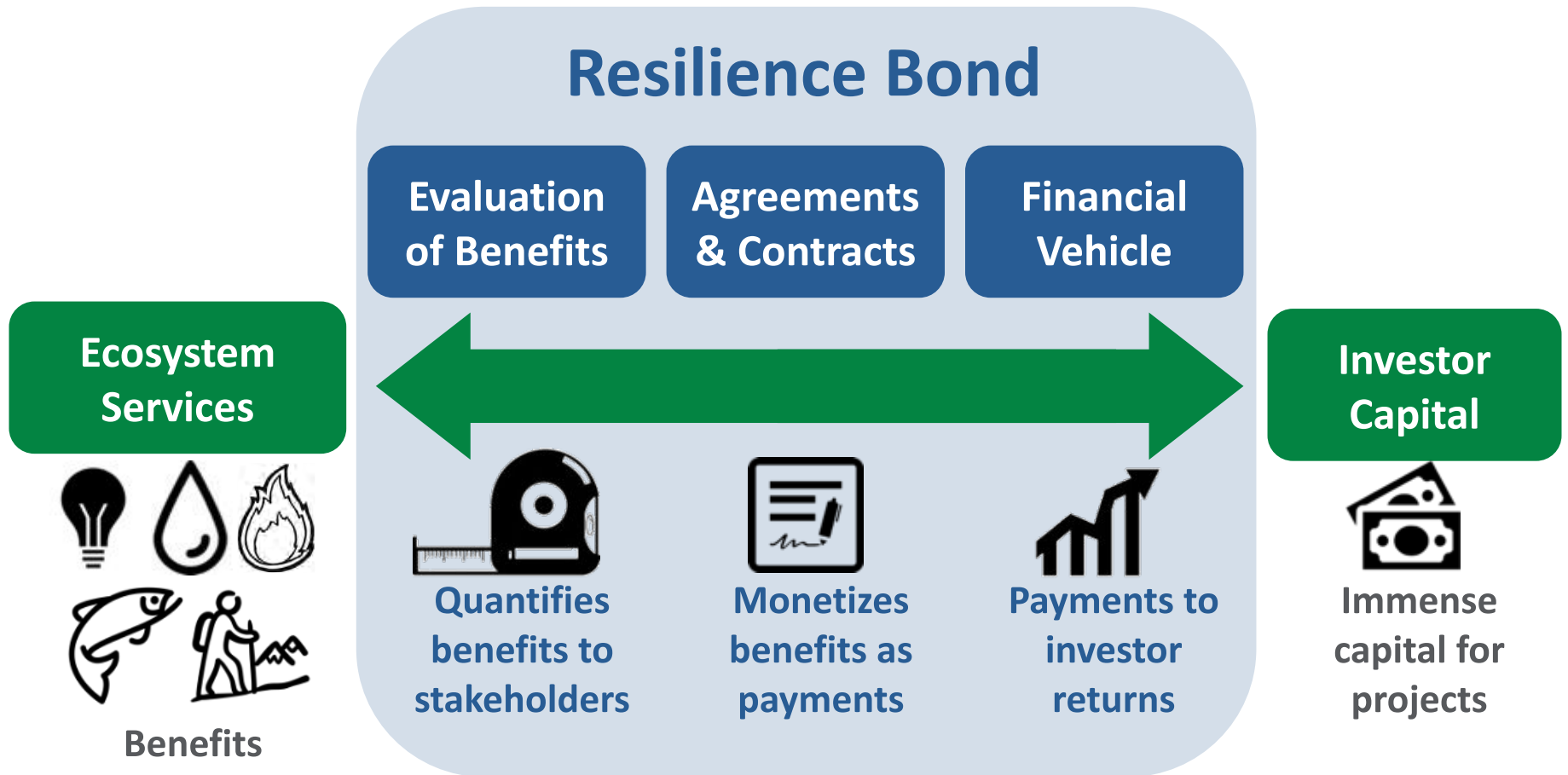
# UMRWA Needs & Opportunities

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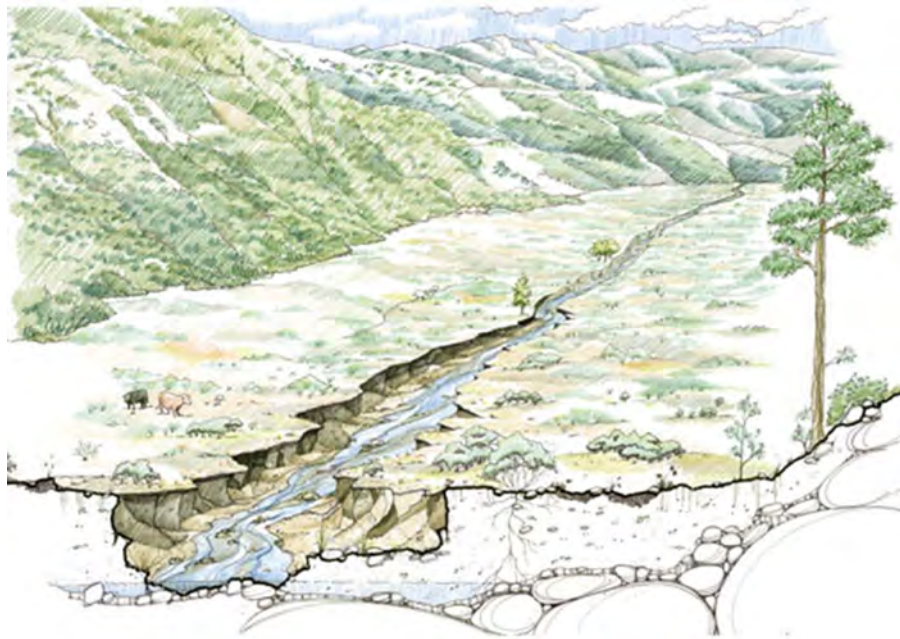
- Protect and maintain water quality and quantity
- Practice Resource Stewardship
- Increase the watershed's resilience to climate and land use changes
- Promote partnerships for coordinated watershed-level conservation
- Leverage funds from other sources to support multi-benefit projects

# Connecting Investor Capital to Conservation



# Evaluation of Benefits Example

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## Meadow Degradation and Restoration



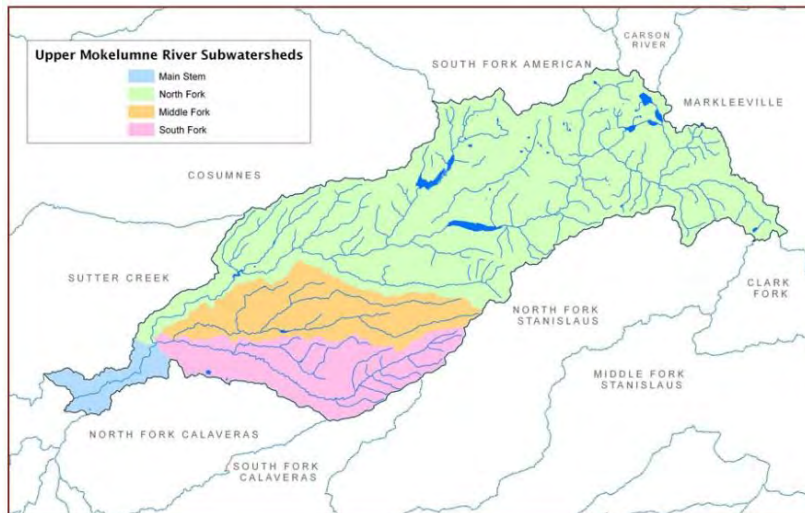
# Multiple Benefits of Watershed Restoration

## Avoided Cost

- Reduces fire risk to water quality and infrastructure
- Reduces sedimentation
- Protects from species loss

## Common Watershed Challenges

- Fire risk
- Infrastructure damage
- Water quality
- Sedimentation
- Declining yield
- Regulatory compliance
- Regulated land use
- Fish passage/habitat
- Timing of flows/runoff
- Flood control



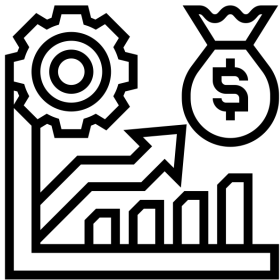
## Revenue Enhancement

- Enhance water quality
- Improved water availability for irrigation
- Potential carbon credits
- Recreation permits

# No Cost Feasibility Study Informs Benefits

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## Revenue enhancement



- Increased water supply, hydropower, carbon
- Tax revenue from recreation-based tourism

## Cost avoidance or risk mitigation



- Decreased risk of severe wildfire
- Protected water quality, infrastructure
- Avoided liability

## Regulatory efficiencies



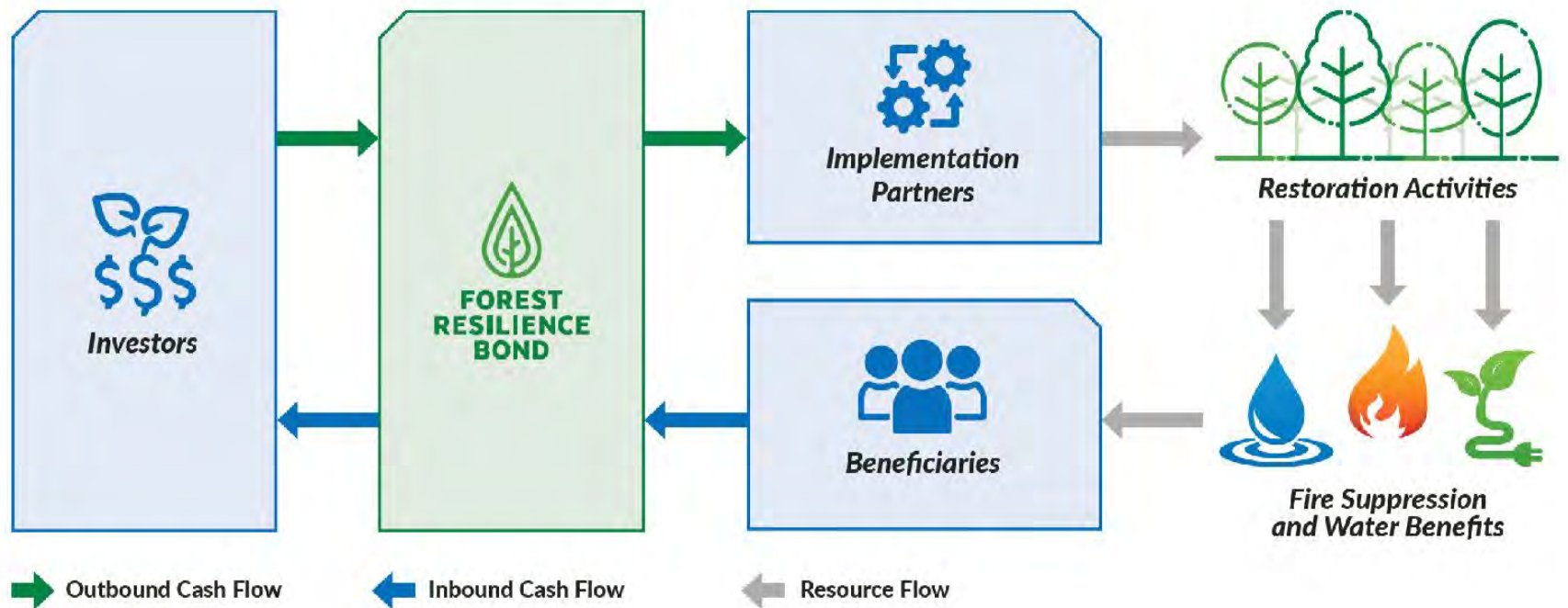
- Aquatic habitat obligations
- TMDL requirements

# Project Proposal Development

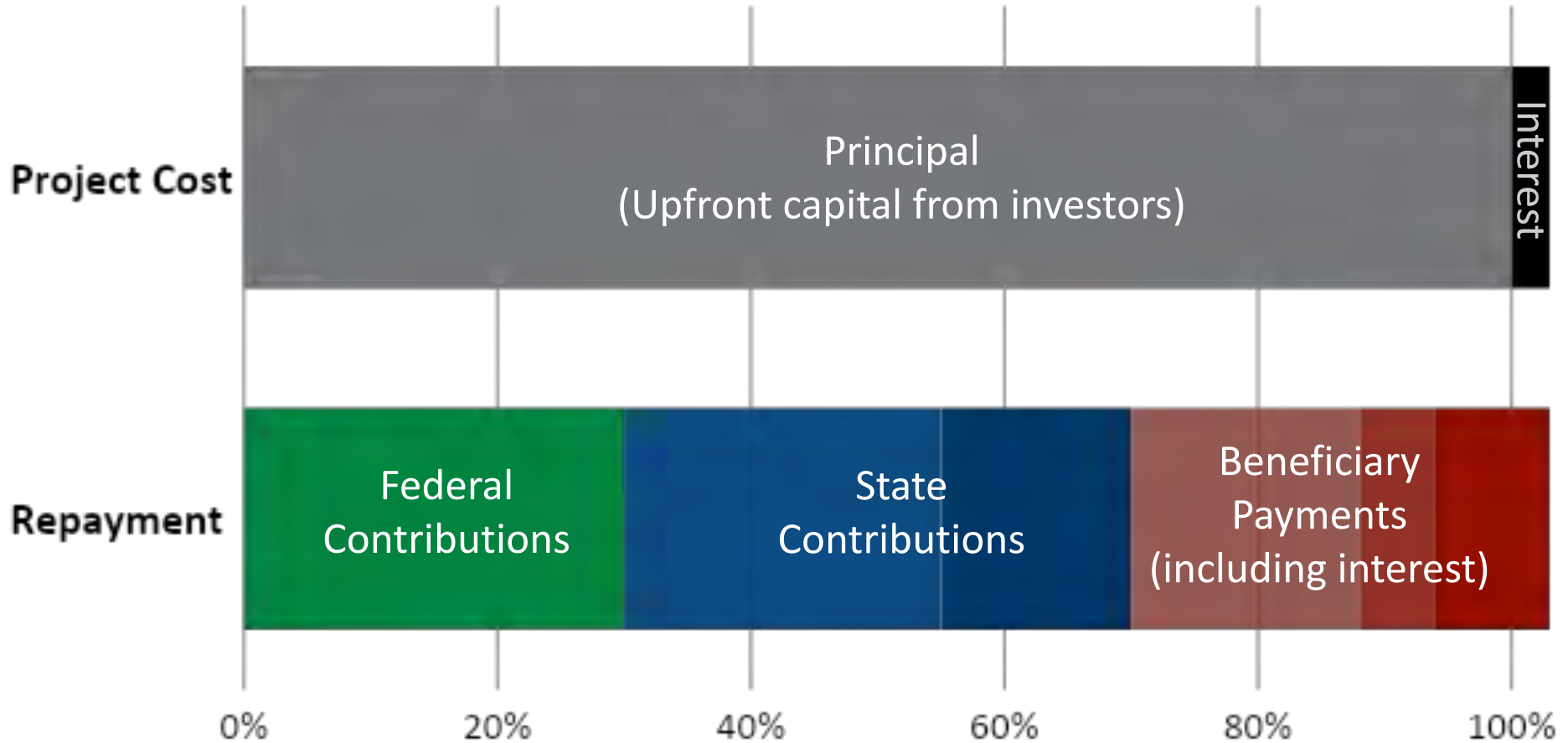


Projected Benefits of Twofer and John Don't Forest Restoration Projects to SMUD	
<b>Water Quantity</b>	<p>12,950 acre-feet/year on average (10,950-14,590) for 10 years.</p> <p>This estimate from the Sierra Nevada Research Institute includes variable climate and vegetation regrowth, and uses remote sensing data on previous water quantity changes and vegetation regrowth from nearby historical wildfires.</p> <p>Actual water quantity gain will depend on precipitation level, amount of biomass removed, and rate of vegetation regrowth, and likely will extend beyond 10 years.</p>
<b>Water Quantity Value</b>	<b>\$9.5M in additional hydropower revenue</b>
<b>Wildfire Risk Reduction</b>	<p>Overall SMUD asset risk (above Camino Powerhouse) for catastrophic fire over the next 20 to 30 years, which is anticipated to be the effective period of fuels treatments, drops from the current average of 10.1% to between 7.7% and 9.1%.</p> <p>SMUD liability, if found to be responsible for the ignition of a wildfire within the project area, was estimated from an average wildfire size simulated by the USFS FSim Model.</p> <p>These estimates are based on 2014 USFS FSim wildfire data, and the current risk may be higher given recent extreme drought and climate events.</p>
<b>Wildfire Risk Value</b>	<b>\$0.7-1.6M in avoided wildfire costs to SMUD assets</b> <b>\$7.2M in avoided wildfire liability to SMUD</b>

# How the Resilience Bond Works

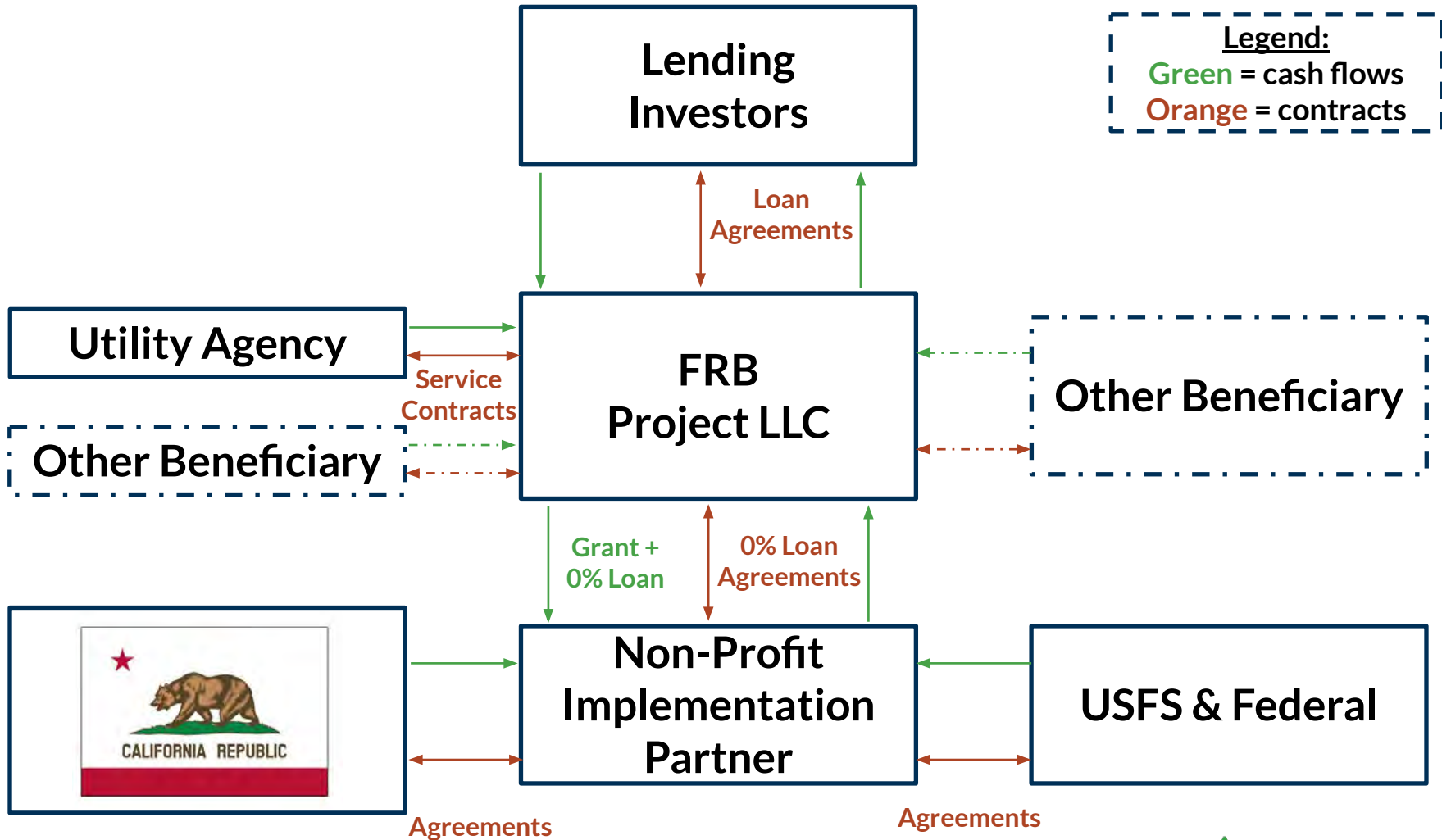


# Forest Resilience Bond Payment Structure





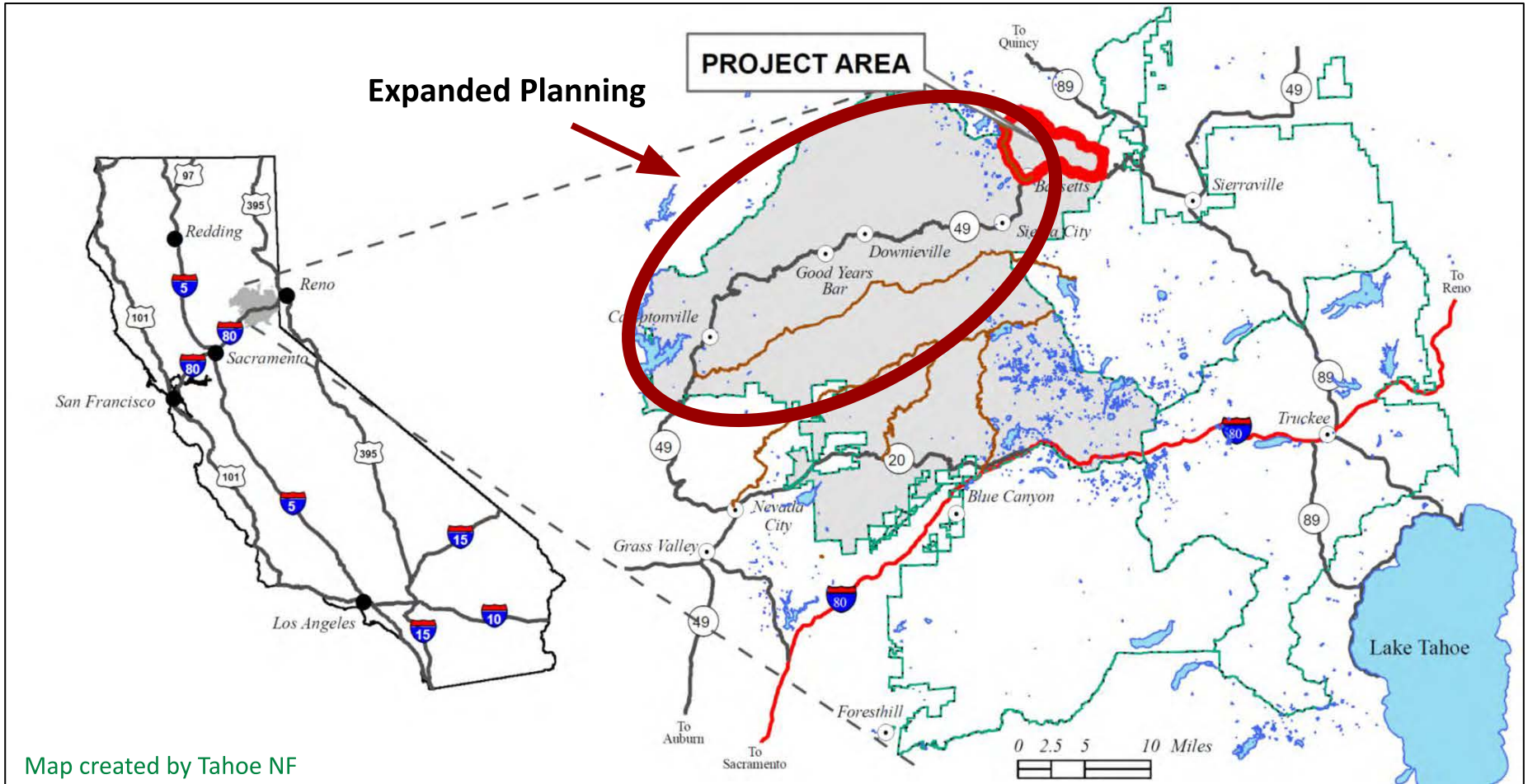
# Example Resilience Bond Structure



# The Yuba Project, Tahoe NF

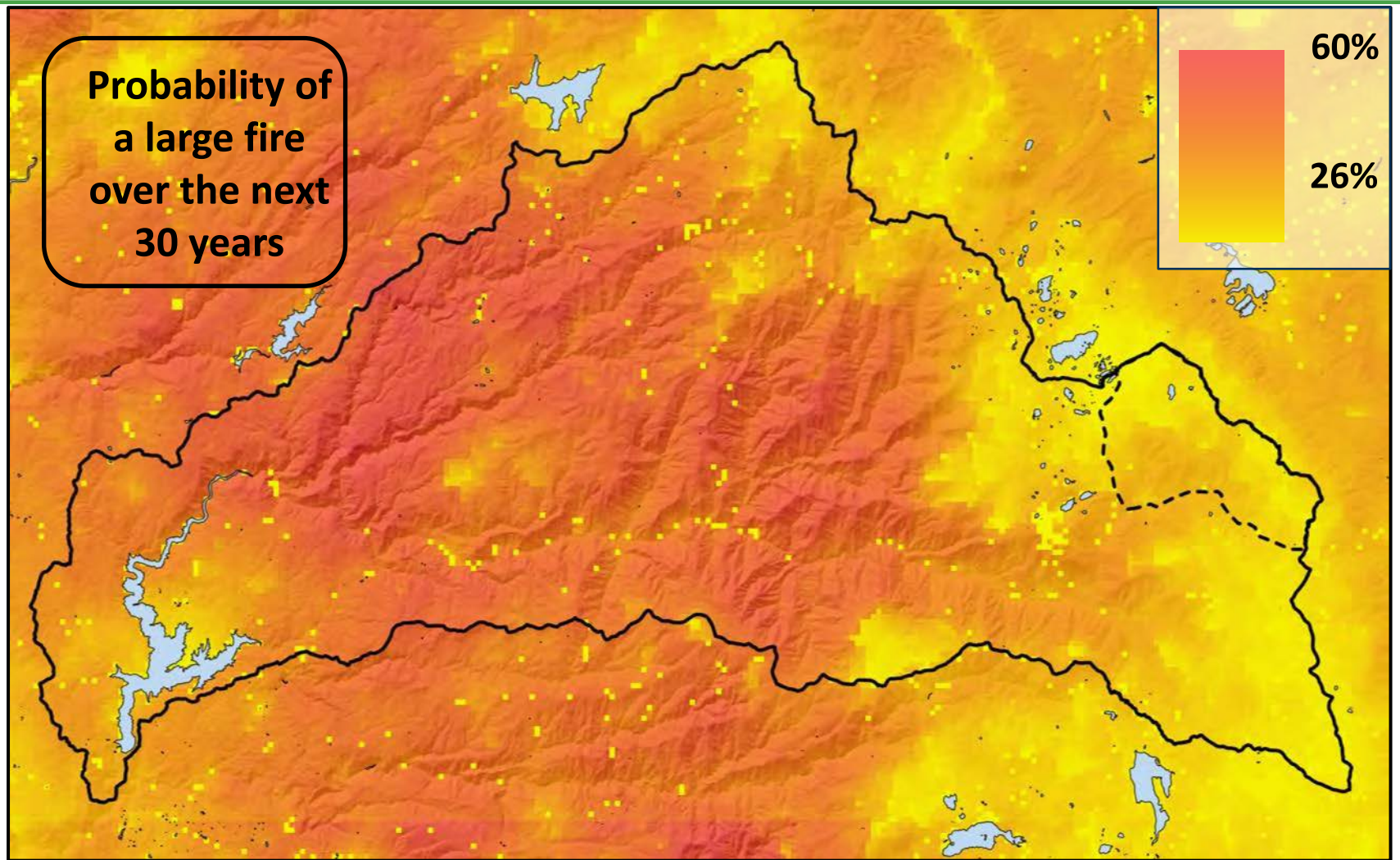


# Yuba Project

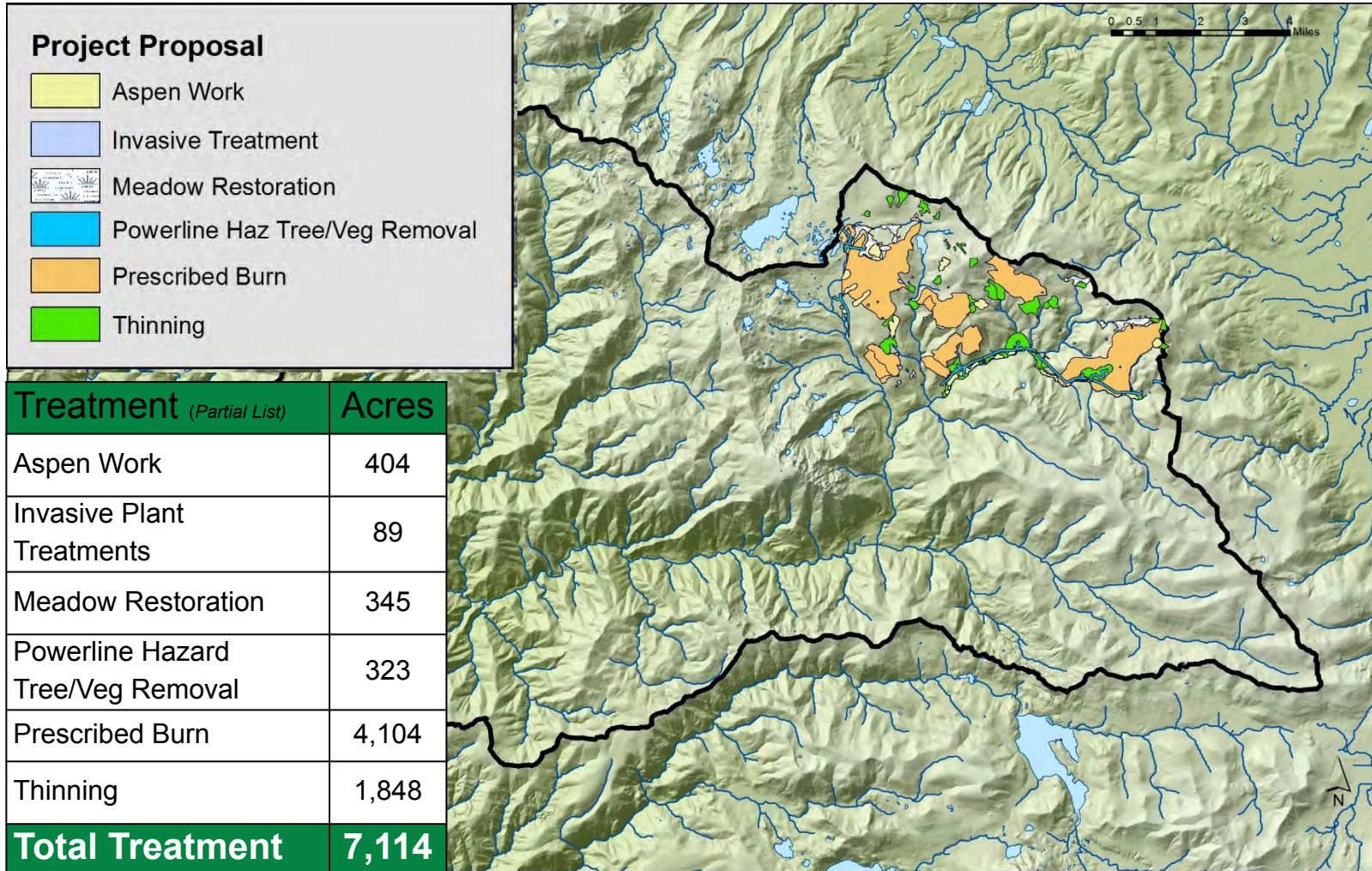


Map created by Tahoe NF

# North Yuba Wildfire Risk



# Yuba Restoration Project



# Diverse Benefits to Yuba Water Agency

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Recreation opportunities

Sustainable streamflow

Protected water quality

Job creation & economic security

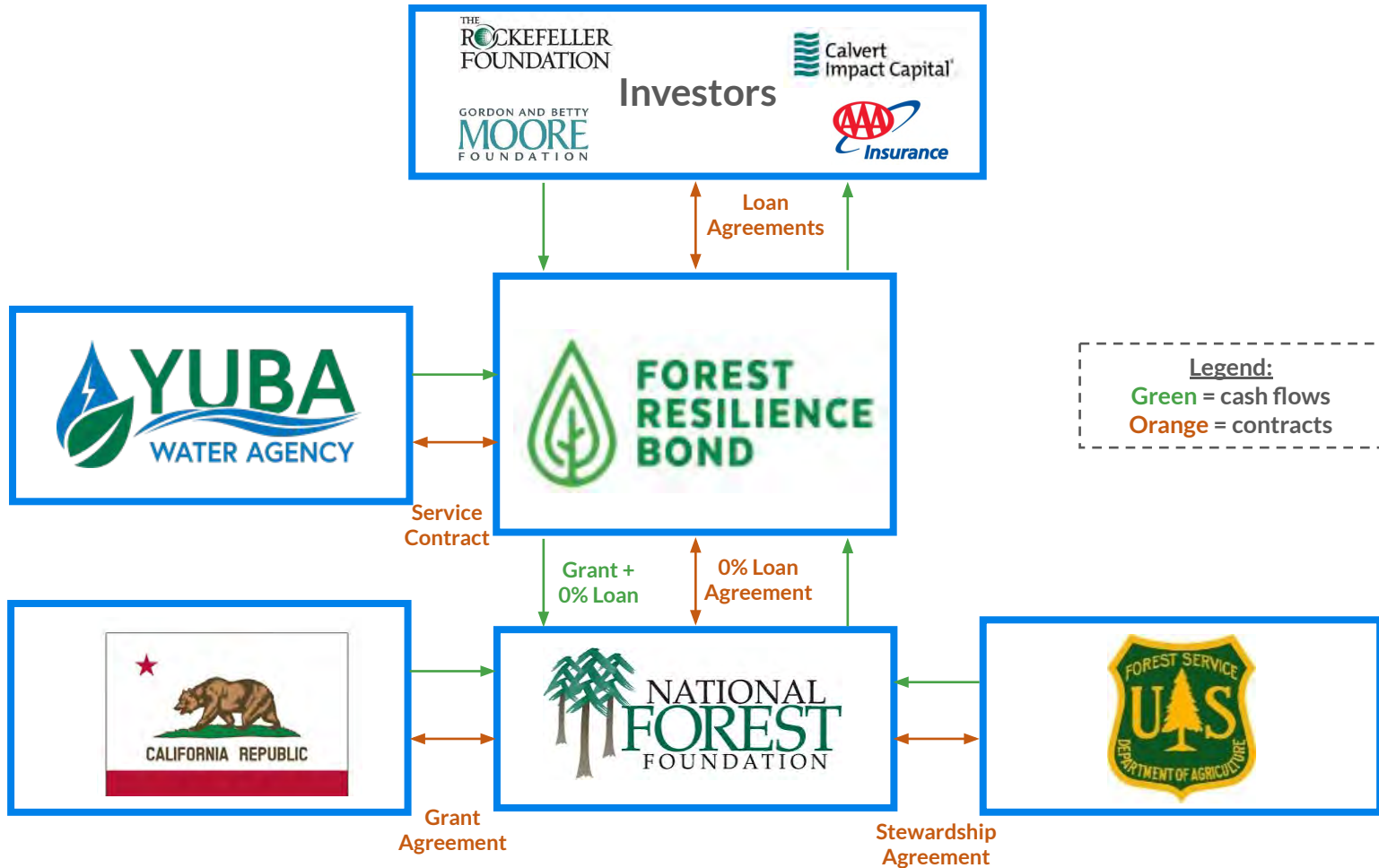
Reduced fire risk to infrastructure

Partner and fundraising support



Yuba River

# Yuba Project Contracts & Agreements



# Yuba Project and Forest Resilience Bond

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Yuba Water pays back a portion of cost over time

Yuba Water payment of \$300k per year for 5 years

Flexible repayment terms

Yuba Water pays below market rates while also benefiting from cost sharing with parties



# USFS Testimonial

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“Typically, a large restoration project such as Yuba would take over ten years, if ever fully implemented. Instead, **we will complete it within three years.** This means a healthier, more resilient forest before insects, disease or wildfire negate our planning and before our communities are adversely impacted.”

- Alonzo “Lon” Henderson, District Ranger,  
Tahoe National Forest



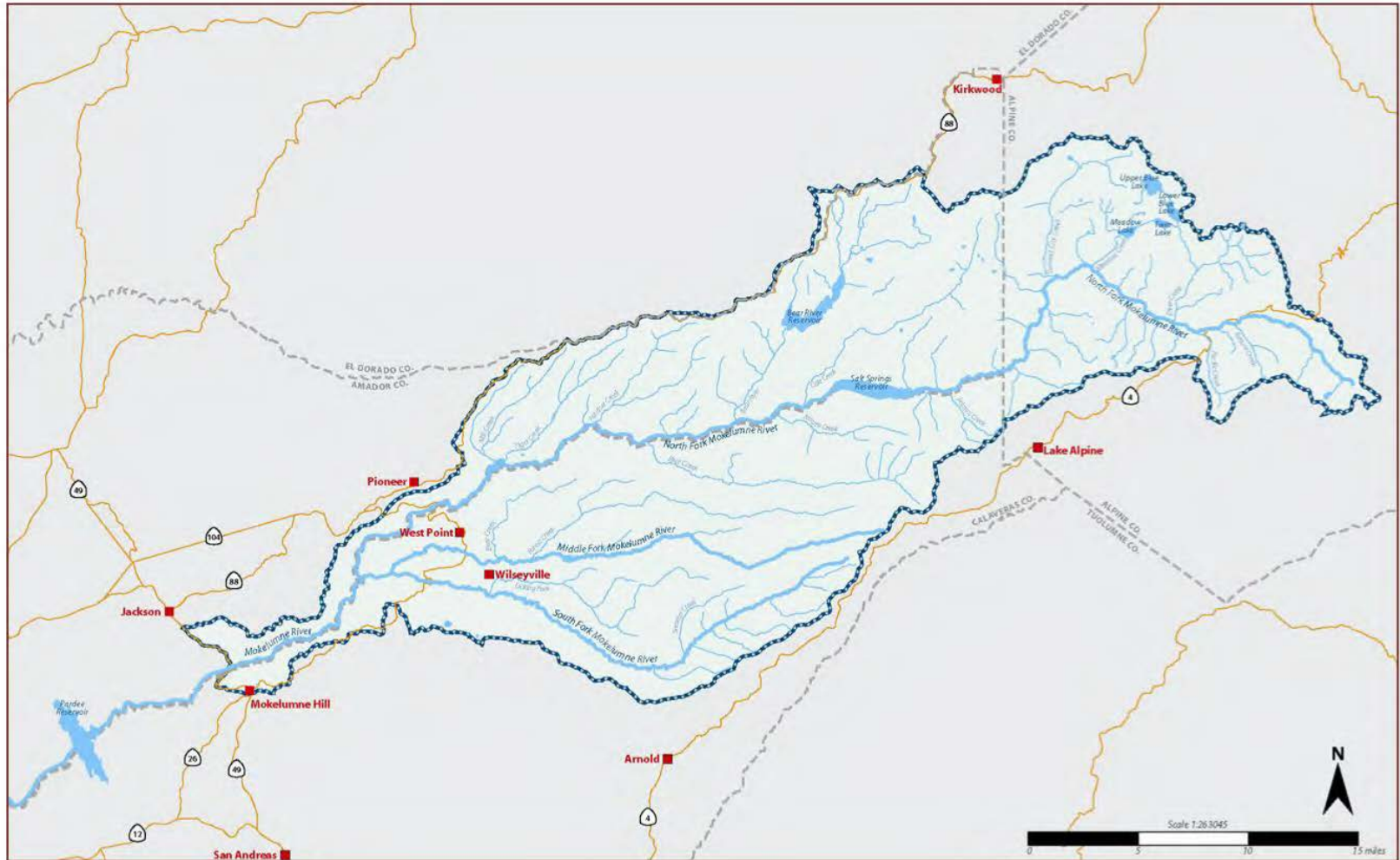
# FRB Benefit to Utilities & Beneficiaries

Project Finance	Contracting & Accountability	Science & Monitoring
Below market-rate interest rates for projects	Pay as work progresses	Monitoring and evaluation costs built into project
Sharing repayment w/ other beneficiaries or agencies	Pay on measured outcomes	Blue Forest feasibility study at no cost
No bond to issue or financial management	Flexible Contracting	
Accelerated project implementation	Determine financial contribution at a later date	

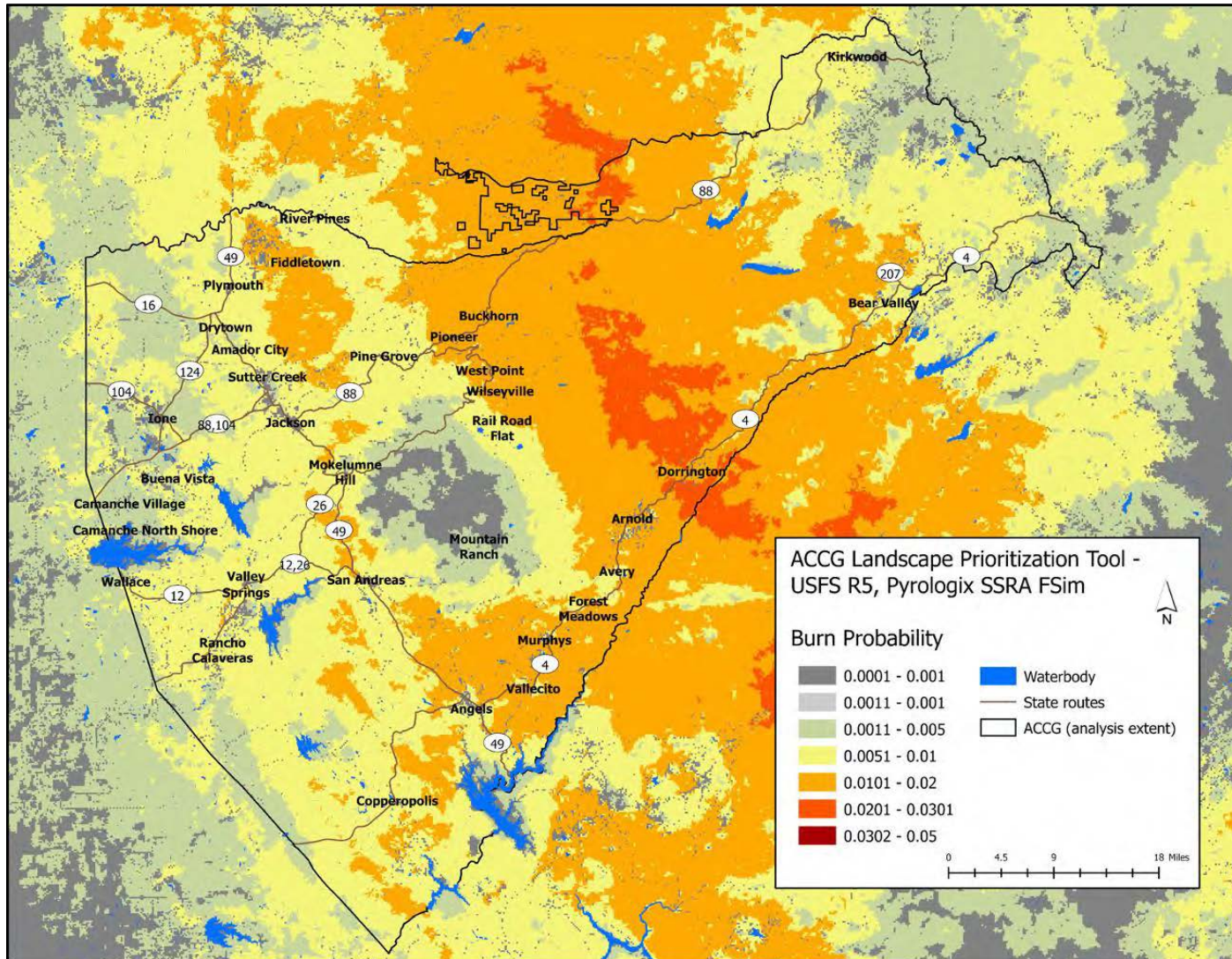
Blue Forest can approach other beneficiaries to contribute and help apply for public grant funds

# Opportunities

# Back To Your Watershed & Your Vision



# Wildfire Risk

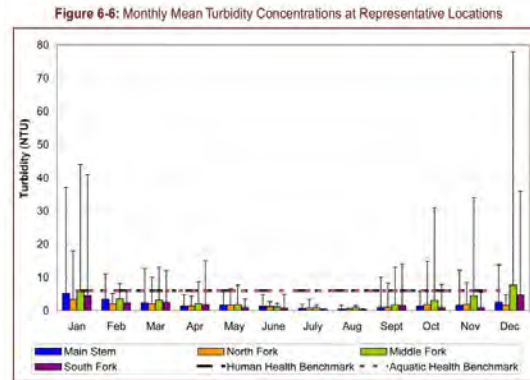


# UMRWA Needs & Opportunities

## Hydro Infrastructure



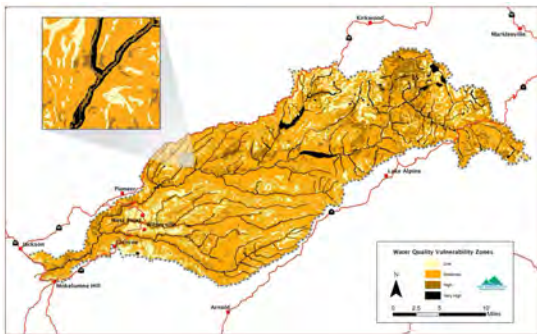
## Drinking Water Quality



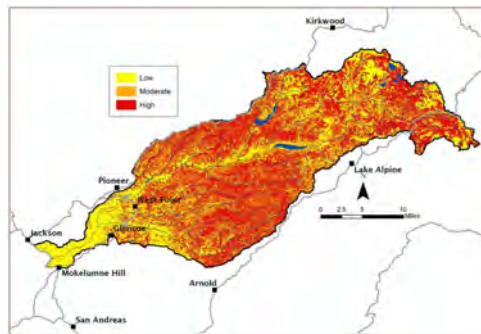
## Maintain Supply



## Sediment Reduction



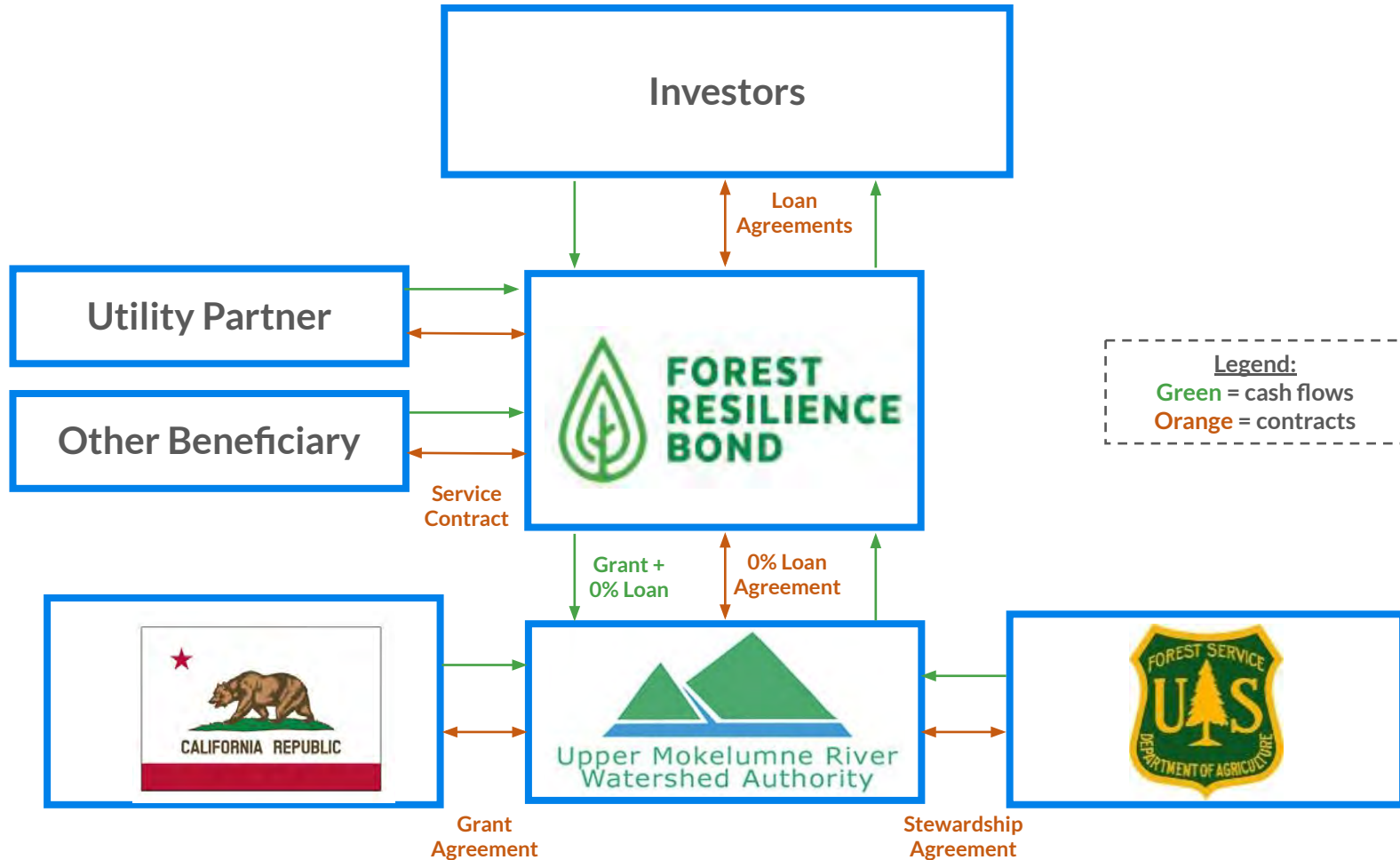
## Fire Risk Reduction




## Post Fire Flooding - King Fire



# Potential UMRWA Contracts & Agreements



# Support From the US Forest Service



USDA, Forest Service

OMB 0596-0217  
FS-1500-15

FS Agreement No. 17-MU-11132544-043  
Cooperator Agreement No. \_\_\_\_\_

**MEMORANDUM OF UNDERSTANDING**  
Between  
**BLUE FOREST CONSERVATION, INC.**  
And The  
**USDA, FOREST SERVICE**

This MEMORANDUM OF UNDERSTANDING (MOU) is hereby made and entered into by and between Blue Forest Conservation, Inc., hereinafter referred to as "BFC," and the United States Department of Agriculture (USDA), Forest Service "Forest Service."

**Background:** Our nation's forests and grasslands provide essential services, from flood control and healthy soils to clean water and air. This 'natural infrastructure' on our working landscapes serves local communities all across the nation. Forest restoration activities can help decrease catastrophic wildfire risk while mitigating the effects of drought, protecting air quality for urban and rural residents, and creating jobs in rural areas. Investing in this natural infrastructure alongside built infrastructure such as dams, bridges, and roads can stabilize water flow while reducing costs – or even avoiding them altogether – as part of an integrated system that delivers benefits to all Americans while achieving financial returns.

The Forest Service and BFC have collaborated for over two years, exploring the application of innovative conservation finance models to accelerate landscape-scale forest restoration. In cooperation with other partners, the objective of our work together is to identify opportunities to leverage private sector capital to increase the pace and scale of forest treatments across all-lands to enhance watershed benefits and reduce high-severity wildfire risk. The primary tool, BFC's Forest Resilience Bond (FRB), brings together the Forest Service, private landowners, downstream beneficiaries, states, utilities, and investors to protect and enhance critical water sources and infrastructure through on-the-ground forest management and watershed restoration activities.

**Title:** Exploring Conservation Finance for Accelerating Restoration

**I. PURPOSE:** The purpose of this MOU is to document the cooperative relationship between the parties to explore the mechanics of leveraging private capital to support accelerated restoration outcomes across priority public and private forest lands in the US. The MOU also documents shared intent for future collaboration. The parties will build on demonstration projects with the FRB to inform future efforts to utilize innovative funding models to promote mutual goals in highlighting the role of forests as natural infrastructure.

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United States  
Department of  
Agriculture

Forest  
Service

Pacific Southwest Region  
Stanislaus National Forest

19777 Greenley Road  
Sonoma, CA 95370  
209-533-3671  
TDD: 209-533-0765  
Fax: 209-533-1898

File Code: 1920  
Date: July 9, 2020

Nicholas Wobbrock  
COO and Head of Project Development  
Blue Forest Conservation  
UC Berkeley Haas School  
2220 Piedmont Avenue  
Berkeley, CA 94720

Dear Mr. Wobbrock:

The Stanislaus National Forest (STF) recognizes the threat that catastrophic wildfire poses to our forest and water resources, air quality, tourist dependent businesses, infrastructure, and communities. In the cooperative spirit of the MOU signed between the USDA, Forest Service (Forest Service) and Blue Forest Conservation (BFC) in 2017, STF is interested in exploring the feasibility of a Forest Resilience Bond financing model to increase the pace and scale of forest restoration and fuel reduction work required to address the risk of catastrophic wildfire.

The Forest Resilience Bond is a public private partnership that strategically employs cost sharing with regional stakeholders to address gaps in funding for restoration activities. This model creates stability by leveraging partnerships with local utilities and other stakeholders that can provide additional investments in forest management to create ecological resilience and protect infrastructure. Ultimately, this model would reduce the overall cost of management activities on the forest and lower the risk of damaging fires by removing hazardous fuels at the landscape scale, benefiting the economic and environmental health of rural communities.

We recognize the Forest Resilience Bond as a creative approach to how the Stanislaus National Forest can more effectively implement planned land management activities. The STF has over 25,000 acres of restoration projects within the Rim Fire footprint in need of support from partnerships like the Forest Resilience Bond. We would like BFC and its partners to engage relevant stakeholders to evaluate whether an economic and environmental analysis would support implementation of forest restoration activities on the STF.


Sincerely,



Jason Kuirén  
Forest Supervisor



Caring for the Land and Serving People







# Project Development Framework

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**1** Introduce Forest Resilience Bond

**2** Identify and Scope Potential Projects

**3** Confirm Stakeholder Interest

**4** Develop Proposal with Economic Analyses

**5** Engage Investors

**6** Finalize Contracts

**7** Implement Projects & Communicate Progress

# What Is Needed To Start

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What are the activities?

What are the goals and potential outcomes?

Who else might care (and value) those outcomes?

# Questions & Thoughts



**BLUE FOREST**  
**CONSERVATION**  
Financial Innovation for Sustainable Solutions



**WORLD  
RESOURCES  
INSTITUTE**



**FOREST  
RESILIENCE  
BOND**

**Phil Saksa, PhD.**  
Chief Scientist  
[phil@blueforest.org](mailto:phil@blueforest.org)

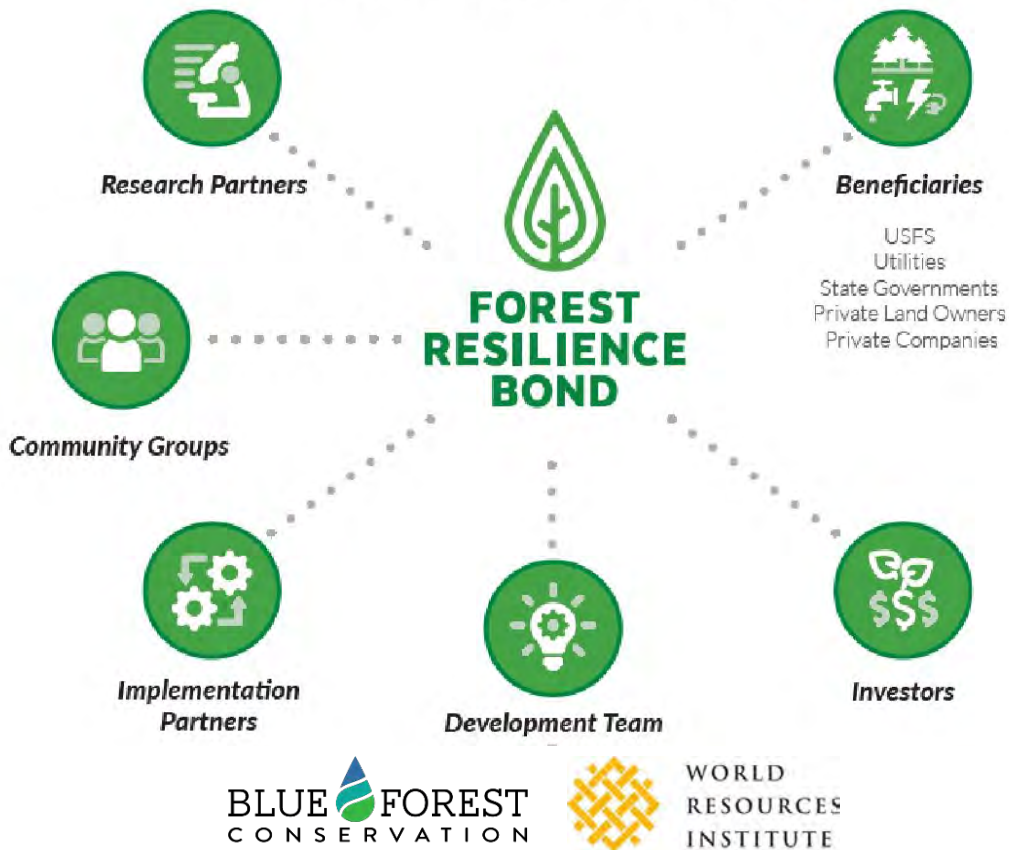
**Nick Wobbrock**  
Co-Founder and COO  
[nick@blueforest.org](mailto:nick@blueforest.org)

**Zach Knight**  
Co-Founder and CEO  
[zach@blueforest.org](mailto:zach@blueforest.org)

**Peter Wyrsh**  
Senior Project Associate  
[peter@blueforest.org](mailto:peter@blueforest.org)

# Appendix

# The Forest Resilience Bond Ecosystem



## Project Partners



## Research Partners



## Foundation Support



## Legal Resources

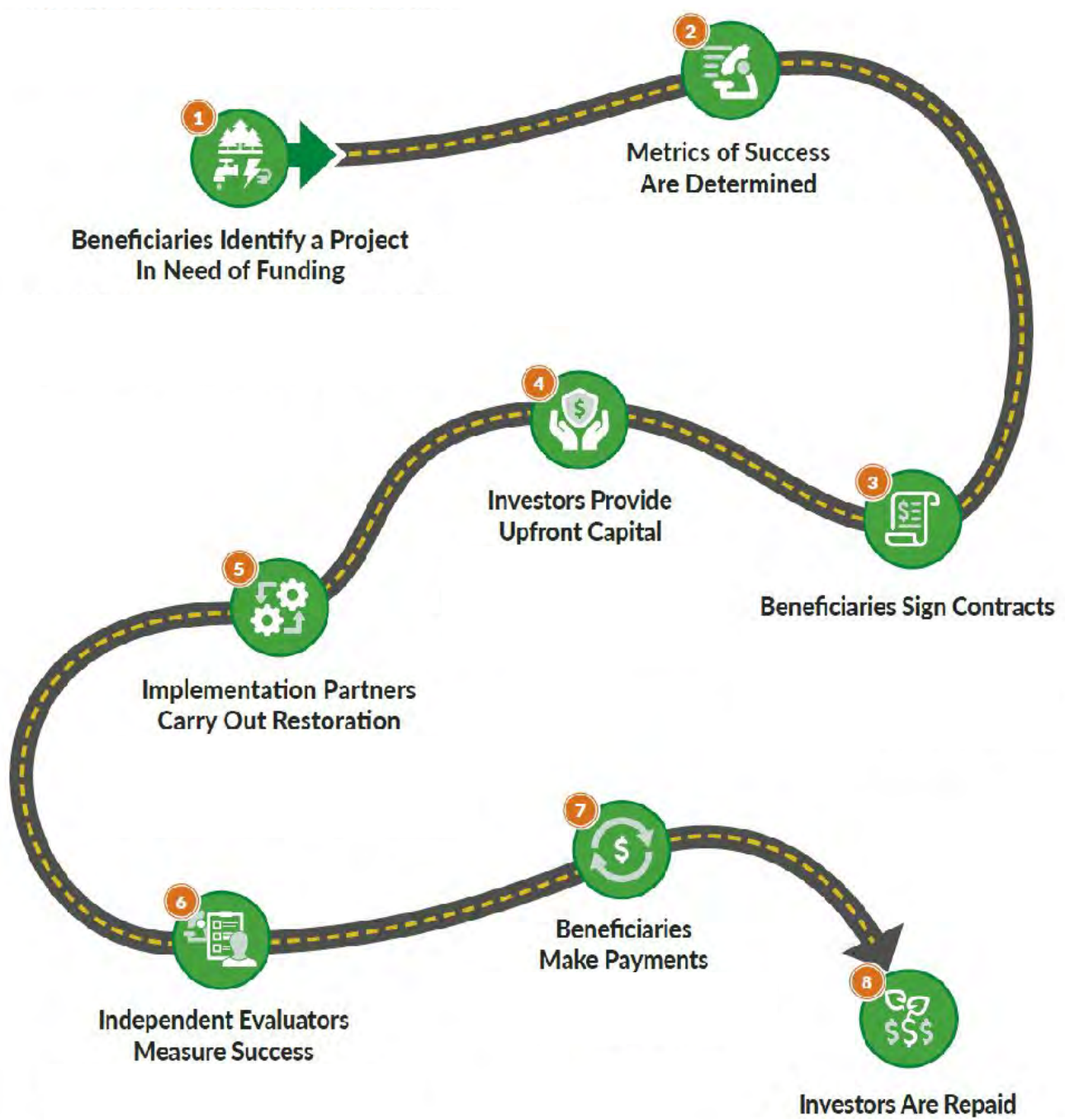


# Yuba Project Investors

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# How to Develop an FRB





# How Blue Forest Supports Projects

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An economic analysis of your projects

A non-profit partner that helps engage local and state and partners

Opportunity to leverage existing contracts and templates

# What Blue Forest does NOT do

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Blue Forest does not plan projects, the prescriptions, or the environmental analysis

Blue Forest does not expect that a project shared by USFS to Blue Forest indicates a commitment

Blue Forest needs to present a compelling case

Secure project financing and repayment contracts from beneficiaries in less than 4 months

# Efficiency of the FRB - More Than Finance

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## MORE THAN FINANCE: THE NON-MONETARY BENEFITS OF THE FOREST RESILIENCE BOND

*A finance tool at its core, the Forest Resilience Bond was developed to expedite the availability of funding for forest restoration on National Forest System lands. But as Blue Forest's pilot project on the Tahoe National Forest is already demonstrating, the benefits of this model extend well beyond finance.*

Read More →

Aug 13, 2019



<https://www.blueforestconservation.com/#thoughts>