

# Blue Forest Conservation Notes

An innovative investment vehicle to alleviate historic droughts, reduce the risk of devastating forest fires, and generate rural and middle class jobs

## TWIN CHALLENGES: Increasing Severity of (1) Wildfires and (2) Droughts

For most of the 20<sup>th</sup> century, the policy of the United States Government has been “fire suppression” – artificially restraining “natural, low-intensity fires that historically helped clear out forests.”<sup>1</sup> The irony of traditional fire suppression is that the approach actually creates significant overgrowth, increasing the risk of severe wildfires and causing more water to be consumptively used in the watershed before reaching reservoirs.

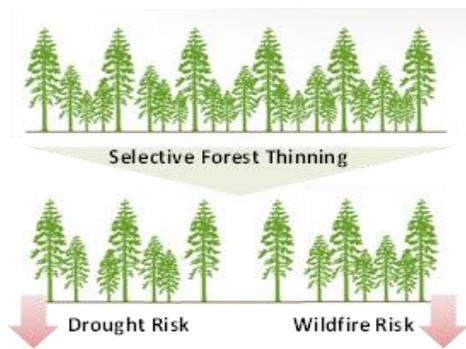
According to the USDA Forest Service (USDAFS), 65-82 million acres of Forest Service Lands are at “high risk” of severe wildfires.<sup>2</sup> Larger wildfires result in significantly increased carbon emissions – 200,000 tons for a medium-size fire versus 1,000,000 tons for the increasingly prevalent large fires.<sup>3</sup> Additionally, nearly 40% of recent development in the Western US has occurred in wild land fire zones – increasing the risk to human life, property, water supplies, electricity grids, wildlife habitats, and recreational land.<sup>4</sup>

At the same time, climate change – through increased temperatures, more precipitation “falling as rain rather than snow, earlier snow melt, and increased evaporation and transpiration”<sup>5</sup> – has and will continue to accelerate and intensify the risk of drought and further strain water resources. Droughts are so severe that “California is only delivering 15 percent of the water requested [...] to farmers and local agencies this year,”<sup>6</sup> leaving the Golden State in its fourth year of unyielding drought and a State of Emergency.

## IMPACTED STAKEHOLDERS

- Due to persistent water shortages, small farmers must either pay substantially higher water bills than in years past, or – if no water is available – risk losing an entire season of crops and/or livelihoods in the case of permanent crops. A recent study finds that in 2014 alone, the California agricultural industry **lost \$1.5b in direct economic output and 17,100 seasonal and part-time jobs.**<sup>7</sup>
- These persistent water shortages require water utilities to procure emergency water at far higher costs (often a **70-100% premium**) and far lower quality from large rivers, such as the Sacramento River that suffer from high agricultural runoff.
- In addition to the **19 deaths** directly resulting from wildfires in the US each year (annual average from 2000 to 2013),<sup>8</sup> a single wildfire can result in **over \$1b of insured property damage and firefighting costs.** US federal agencies, not including state and local efforts, spent nearly \$1.8b in 2014 in total fire suppression costs.<sup>9</sup>

## INTEGRATED SOLUTION: Optimal thinning increases water flow while decreasing risk and severity of forest fires.



- By removing overgrowth, which includes ladder fuels that allow ground fires to climb combustible forest canopies (where fires burn more severely and at much higher temperatures), proactive forest thinning of about 15% to 20% of ground level shrubs and excess tree density can **erase the risk of catastrophic wild land fires.**
- At the same time, proactive and strategic forest thinning has been scientifically demonstrated (without the aid of additional precipitation) to increase the flow of water to downstream reservoirs by allowing increased accumulation of snowpack on the forest floor by minimizing sublimation and reducing evapotranspiration.
- Over 40 years of research has demonstrated that every acre thinned can **produce an extra 0.14 to 0.41 acre-feet of water per acre each year for up to 10 years** (until the next thinning cycle) for forests in the semi-arid Western United States.<sup>10</sup>
- Traditionally, potential solutions to droughts and forest fires have been devised as discrete responses to independent challenges. However, **both challenges can be successfully addressed through coordinated thinning programs.**

## EXISTING OBSTACLES: Misaligned Incentives

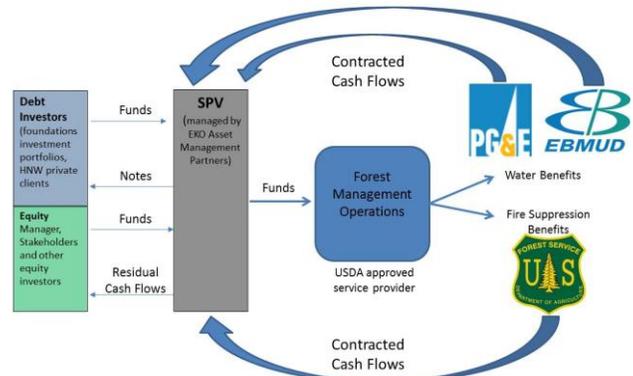
- **Wildfires:** Historically, USDAFS and the Bureau of Land Management have devoted less than 20% of their budget to fire suppression, but recently (given the increase prevalence and severity of wildfires) they have been spending over 50% of their existing budget on such efforts.<sup>11</sup> As a result, these agencies are forced to spend far less on healthy forest management (programs that thin trees, underbrush, and other ladder fuels resulting in reduced wildfire risk). Through the cannibalization of prevention funds by mitigation funds, this **vicious cycle exacerbates wildfire risk.**
- **Drought:** Water utilities do not often own land from which water is sourced, so as a single entity, such utilities have little ability to drive increased flow from proper forest management of source land or to minimize risk to water quality from fire.

## INVESTMENT THESIS: Aligning incentives and de-risking opportunities

- **Shared Benefits, But Not Shared Costs:** Stakeholders have relied on the budget-constrained USDAFS to pay for forest management even though fire suppression is just one of the benefits. By creating a system to monetize the value of forest management among stakeholders, Blue Forest Conservation Notes (BFCN) will help distribute costs of this vital work while only requiring stakeholders to pay for the benefits they receive.
- Our solution involves contracting with beneficiary stakeholders including a water utility (EBMUD), an electric utility (PG&E), and the USDAFS, to create the first ever pay-for-performance structure (PFP) in the conservation investment space.
- By monetizing the shared benefits of forest management, we will allow multiple stakeholders to eliminate upfront and ongoing capital requirements of forest management while de-risking the opportunity by allowing entities to pay only for the value they receive.

## FINANCIAL INSTRUMENT

# Blue Forest Conservation Notes



- The BFCN framework is based on instruments that have been successfully implemented in other impact fields: (1) PFP structures employed by Goldman Sachs and others in social impact bonds; and (2) energy service agreements (ESAs) used in financings that contract energy savings to fund building efficiency upgrades. **Simply, these structures shift risk and corresponding returns from existing stakeholders to investors.**
- This structure also takes into account the significant demand that investment banks are receiving from private clients for impact related investments. According to a recent report by NatureVest and EKO Asset Management Partners, **investors are ready to deploy \$5.6b for conservation investments by 2018.**<sup>12</sup> BFCN synthesizes the most impactful and relevant financial instruments and applies them to a new impact asset class, for which investor appetite is growing.
- BFCN will utilize an SPV managed by conservation finance experts (e.g., EKO Asset Management Partners, Equilibrium Capital, etc.). This SPV will contract with the three stakeholders (EBMUD, PG&E and the USDAFS) and raise required capital by issuing debt and equity. We are targeting a conservative mix of 50% debt and 50% equity to provide substantial credit enhancement to debt holders.
- The upfront capital will be deployed over a two-year period to complete the required forest management services **utilizing a best in class provider that meets USDAFS criteria. USDAFS will have veto power over this selection.** Importantly, the contracted cash flows from these monetized benefits will allow the BFCN platform to **price this structure WITHOUT requiring a credit enhancement grant from a foundation.**

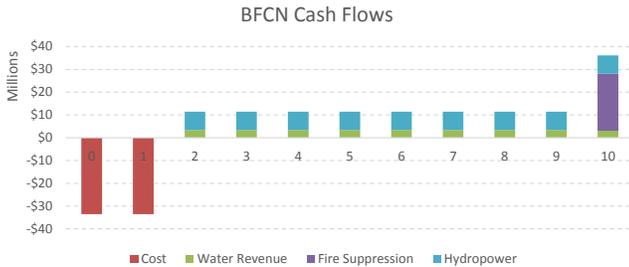
**STAKEHOLDER CONTRACTS: Monetizing Success**

- **Water (EBMUD & PG&E)** – The benefits of forest thinning include additional water, which will be sold to a water utility based on contracted rates that account for water quality as well as overall water availability.
- This contract will rely on the manager and the water utility to utilize a common precipitation and evapotranspiration model and monitoring program, developed by an independent third party (e.g., The Nature Conservancy), which will credibly verify additional water generated by contracted forest management services.
- The utility simply pays the contracted rate for all additional water generation. This structure works well as EBMUD is the majority water right owner in this watershed, thus requiring only one PFP contract. **BFCN pricing assumptions are based on historical data that includes all major water transactions with utilities in California.** Pricing assumptions are also set at **50-80% discount to EBMUD's next cheapest alternative** (water purchases or water treatment plants).
- The evapotranspiration model is also used to determine the additional flow through PG&E's four hydroelectric plants located across the watershed. This, in turn, will allow BFCN to value and monetize the electricity generated from these four hydro plants. Both contracts will require counterparties to pay-for-performance, but the contracts will be struck at a discount compared to the next cheapest alternative, allowing all parties to share in the benefits.
- **Fire Suppression (USDAFS)** – Due to budget constraints, the USDAFS is interested in a PFP structure and is actively seeking partners. In terms of contracted cash flows, there are two scenarios: (1) there is a fire and we can compare the treated area to the non-treated area (and years of USDAFS data) to determine the success of forest management, with payment tied to this result; or (2) if there is no fire, the thinning is considered a success and repayment is set at a return to investors of 3% (allowing USDAFS to pay back the cost of forest management at the end of the 10-year period with funds saved from the absence of fires).
- **Negative correlation between cash flows creates a natural hedge** – in drier years, the water benefit will be smaller (though potentially more valuable) and the fire suppression benefit will be larger. In wetter years, as the risk of fires declines, the water benefit to the two utility stakeholders will be much larger.

**SUMMARY TERMS, FEES & CASH FLOWS**

**Blue Forest Conservation Notes are an issuance platform that can be scaled to meet the growing need for forest management capital on a watershed-specific basis.**

- **Pilot Program:** \$67,000,000 to fund forest management in the Mokelumne Wilderness in the Western Sierras in California.
- **Legal Final Maturity:** 10 years to coincide with the final PFP cash flows. The debt tranche is structured to amortize over the first 7 years of cash flows.
- **Use of Funds:** Thinning 67,000 acres at a net cost of \$1,000 per acre (which could decrease in future years as mobile biomass generation opportunities develop).
- BFCN will be issued by an investment bank, which will earn a 2% underwriting fee.
- BFCN will include annual senior management/servicing fee of 50bps and junior incentive management fee of 100bps (once debt payments have been satisfied).



**Cash Flow Assumptions:** Water can be sold at \$200/acre-foot per year (assuming near low end of expected increased flow), hydro power utilization of only 20%, 12MWh generated per acre-foot (low end of productive range) and \$35/MWh pricing (low end of FERC historical pricing in California), low end return on fire suppression benefit of 3%. We assign no value to carbon credits because it could take up to three years to obtain approval from an existing carbon standard, but this an opportunity for future issuances.

**CAPITAL STRUCTURE & PRICING CONSIDERATIONS**

- **The Debt Tranche** (targeting \$35mm offered at 95.24 to yield 5%) – Part of the driving force behind this structure is the unmet demand for competitive rate fixed income investment opportunities from the investment side of foundations as well as high net worth private clients. Structured to meet this need, our debt tranche will pay interest of 5% and will amortize over seven years (with forest management benefits expected to last for 7-10 years). The debt tranche will benefit from \$30mm+ credit enhancement from the invested capital of the equity tranche. We will also utilize covenants that accelerate cash flows to the debt tranche if contracted cash flows fall below a certain rate (e.g., an interest coverage test or a minimum contracted cash flow covenant). The debt is priced at an original issue discount (OID) to adjust for no cash interest paid in year 1.
- **The Equity Tranche** (targeting \$33.7mm offered @ par) – This tranche will be entitled to all residual cash flows in this structure. The waterfall will first make interest and amortization payments to the debt tranche. From year 2 to year 10, there is projected to be significant excess cash flow in the structure, including tail end cash flows from the fire suppression benefits. The target IRR of this tranche is 12-15%.
- **Manager Incentives** – As part of this structure, we will require the manager to invest at least half the capital for the equity tranche, thus aligning the incentives of the manager with the success of the project. Additionally, we will allow, but not require, other stakeholders to invest in the equity tranche.

**RISKS AND MITIGANTS**

Risk	Mitigation Strategy
Utilities are risk averse and slow to act	No upfront capital required. Utilities pay only for the benefits they receive. Allow stakeholders to shift risk to investors.
Permitting/policy – USDAFS will require congressional approval for larger contracts	BFCN will use this pilot program to prove PFP benefits, showing that proactive budgeting is possible through relationships with investors.
PFP structures require monetizing avoided costs, not real revenues	BFCN contracts with PG&E and EMBUD actually generate salable goods – water and electricity – and do not rely on budgeted savings to pay back investors.
Extrapolating theoretical data gathered from smaller scale model	BFCN relies on extremely conservative assumptions throughout, making it easier to find agreeable pricing levels with stakeholders.

**MARKET EXPANSION OPPORTUNITY: Significant scale**

By creating an issuance platform, we reduce the legal cost, sales effort and general friction associated with bringing clients up to speed on a new product. The first issuance of BFCNs will be a pilot program focused on the Mokelumne Wilderness, while future issuances of BFCNs will focus on forest management opportunities in other government owned/managed land. Following the pilot program, we will work to get the debt tranche rated by 2 rating agencies, which will create a larger investor base for future structures. **There are currently 12 additional forest management deals, spanning over \$1.6bn of required capital, which could utilize this structure.** Furthermore, the 10-year life of the benefits means that these structures could be drawn on **in perpetuity** to maintain the forest after the initial deals are completed.

Region	Watershed	Total Acres	MANAGEMENT ACTION	
			Forest Thinning Operable Acres	Cost
Western Sierra	Battle Creek	236,000	26,000	\$ 26,000,000
	Mill Creek	85,000	10,000	\$ 10,000,000
	Deer Creek	142,000	16,000	\$ 16,000,000
	Butte Creek	97,000	12,000	\$ 12,000,000
	Feather River	2,306,000	770,000	\$ 770,000,000
	Yuba River	861,000	201,000	\$ 201,000,000
	Bear River	180,000	7,000	\$ 7,000,000
	American River	1,199,000	260,000	\$ 260,000,000
	Cosumnes River	341,000	86,000	\$ 86,000,000
	Mokelumne River	370,000	67,000	\$ 67,000,000
#1 Eastern Sierra	Truckee/Tahoe	607,000	139,000	\$ 139,000,000
	West Carson River	42,000	11,000	\$ 11,000,000
	East Carson River	225,000	27,000	\$ 27,000,000

**Initial TAM \$1.6b**

	Positive Impact	Direct Beneficiary	Measurement Approach
Social Econ	Increased employment	Drought-afflicted farmers; rural forest thinning laborers	Number of jobs created and saved
	Higher agricultural output	Farmers and consumers	Agricultural GDP
Social	Decreased homeowner insurance costs	Citizens of wildfire-prone areas	Premium dollars saved
	Fewer homes destroyed by wildfires	Citizens of wildfire-prone areas	Actual vs. expected homes destroyed
Environmental	Reduced carbon emissions from healthy carbon-sequestering forests and non-hydro electricity generation sources	Electric utilities, citizens of wildfire-prone areas	Actual vs. expected carbon emissions
	Increased water flow and quality	Citizens of wildfire-prone areas, groundwater ecosystems, water utilities	Actual vs. expected water flow and turbidity

References: (1) <http://www.nature.org/science-in-action/science-features/ask-the-conservationist-june-2013.xml>; (2) <http://naturalresources.house.gov/issues/issue/?IssueID=5924>; (3) *Ibid*; (4) <http://www.nytimes.com/2014/06/18/opinion/paying-for-the-forest-fire-next-time.html>; (5) [http://www.ucusa.org/global\\_warming/science\\_and\\_impacts/impacts/causes-of-drought-climate-change-connection.html#.VNkPAIV4ovg](http://www.ucusa.org/global_warming/science_and_impacts/impacts/causes-of-drought-climate-change-connection.html#.VNkPAIV4ovg); (6) <http://www.nytimes.com/aponline/2015/02/06/us/ap-us-california-drought.html>; (7) [https://watershed.ucdavis.edu/files/biblio/DroughtReport\\_23July2014\\_0.pdf](https://watershed.ucdavis.edu/files/biblio/DroughtReport_23July2014_0.pdf); (8) [https://www.nifc.gov/safety/safety\\_documents/Fatalities-by-Year.pdf](https://www.nifc.gov/safety/safety_documents/Fatalities-by-Year.pdf); (9) <http://www.nytimes.com/2014/06/18/opinion/paying-for-the-forest-fire-next-time.html>; (10) Bosch, J.M. and J.D. Hewlett. 1982. A review of catchment experiments to determine the effect of vegetation changes on water yield and evapotranspiration. *Journal of Hydrology* 55:3-23 (11) [https://www.nifc.gov/safety/safety\\_documents/Fatalities-by-Year.pdf](https://www.nifc.gov/safety/safety_documents/Fatalities-by-Year.pdf) (13) [http://www.naturevestnnc.org/pdf/InvestingInConservation\\_Report.pdf](http://www.naturevestnnc.org/pdf/InvestingInConservation_Report.pdf)