



THE CALIFORNIA FOREST OBSERVATORY

A real-time, dynamic data platform to inform wildfire risk, emergency operations, and forest management decisions



SUMMARY

Wildfires are considered natural disasters when they impact communities, but there is nothing natural about the recent megafires in California: long-term fire suppression, rapid development at the wildland interface, an aging utility infrastructure, and climate change have created this catastrophe. Our forests are now a tinderbox of fuel, with people the spark for ignition, and extreme weather fanning the flames.



Hardening infrastructure, improving defensible space, and powering down the grid on “fire weather” days are important short term strategies, but not enough to protect lives, property, human health, and ecological resilience. We need a new approach to risk mapping in this era of megafire and a new approach to forest management. The State is taking decisive action on both.

California’s wildfire risk maps are outdated, inaccurate, and coarse. They weren’t based on detailed fuel load data, and they aren’t updated in response to real-time wind, weather and climate data, which are all critical for predicting

wildfire risk and behavior with today’s new normal. This lack of timely, accurate and detailed information leaves the state and its communities underprepared and overexposed. A McClatchy analysis recently reported that more than 350,000 Californians live in towns and cities within Calfire-defined “very high fire hazard severity zones,” as are more than one million structures, about 10% of California’s built environment. California’s Central Valley and urban populations risk inhaling toxic wildfire smoke on a regular basis, with short- and long-term health impacts and costs.

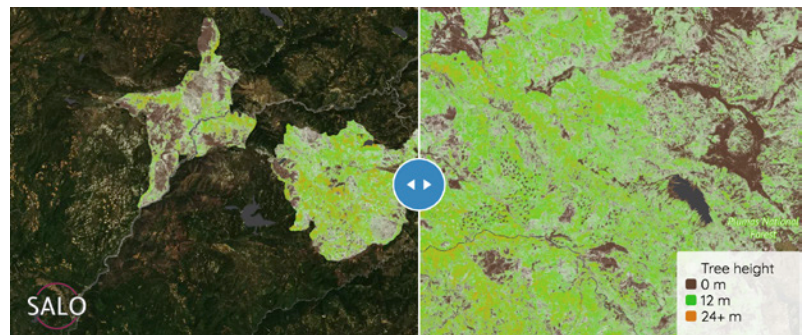
California’s valuable forests are also at enormous risk. Scientists estimate that 23 million of its 33 million acres of forest are at high risk of megafire, disease, and climate change, and many of California’s iconic forest landscapes could be converted to shrublands or grasslands if we don’t rapidly accelerate the pace and scale of forest restoration. We can’t afford to lose these forests. They fight climate change, with some forests storing carbon at densities as high as tropical rainforests. They’re a key water reservoir, with 60% of the state’s water coming from Sierra Nevada snowfall that’s stored and filtered by its forests. And they harbor the striking and unique biodiversity of the region, which are crucial to the health of California’s citizens and its economy.

Data, artificial intelligence (AI), and other technologies have not yet been fully harnessed to address these challenges. We're able to pinpoint a coffee shop, yet we don't have an accurate view of forest structure, health, and wildfire risk. Salo Sciences, Vibrant Planet, and Planet Labs have teamed up to build the California Forest Observatory, a combination of cutting-edge satellite imagery and AI to map forest fuels, wildfire risk, and forest health in unprecedented detail. These timely, accurate, and precise maps will be delivered via a platform designed to support planning and executing short- and long-term strategies to tackle the complexities of wildfire and forest health. This platform will reveal where and when communities face the greatest risk, and where forests are failing. We can use this knowledge to design dynamic evacuation plans and to facilitate rapid firefighting response. The same platform can be used to improve forest management, reducing hazardous fuel loads while improving ecological function, dramatically improve carbon and tree mortality accounting, and monitor restoration project outcomes. The Observatory can also support multiple objectives in Governor Newsom's [April 2019 Strike Force Report](#), including:

- Identifying where to invest in fire mitigation, vegetation management and other fuels reduction strategies
- Rapidly providing risk and fuels data for wildfire response
- Reducing the number of utility-sparked wildfires with high resolution risk assessments and informed management decisions around electrical lines

The core of the platform is an AI engine that provides a tree-level view of forest structure and fuel loads that scales statewide. It also integrates data on

soil and vegetation moisture, wind and weather, and population and infrastructure. Combined, these data capture the complex drivers of wildfire risk and will be integrated with contemporary wildfire models to provide a real-time, dynamic map of wildfire risk—and actions we can take to make communities and forests more resilient. Looking forward, we envision a series of derivative applications that leverage the Observatory to support planning and response efforts.



An unprecedented view of forest structure, fuel loads, and risk

Left: Lidar mapping of tree heights and wildfire risk in the Sierra Nevada from publicly available data.

Right: AI mapping of the same area by Salo Sciences using a combination of Lidar data and 10 meter resolution Sentinel satellite data (2018) to train Salo's AI models to map areas where Lidar data isn't available. Planet's 3 meter resolution data, plus Salo AI, will enable a tree-level view of forests via the CA Forest Observatory to be delivered May 2020.

How the CA Forest Observatory can support California’s Strike Force goals—immediately or through derivative applications:

WILDFIRE RISK MAPPING, EARLY FIRE DETECTION AND EMERGENCY SERVICES OPERATIONS	FOREST RESTORATION PROJECT PRIORITIZATION, PLANNING, AND MONITORING
Real-time, dynamic wildfire risk mapping at the neighborhood, community, region, or state level	A dynamic treatment decision-making tool to help strategically prioritize forest treatments based on highest risk populations, most valuable watersheds, critical wildlife habitat, etc
More accurate evacuation scenario building and improved wildfire management operations given current conditions.	Modeling treatment options, with the ability to weigh various values and outcomes. A visual tool to align federal, state, municipal, NGO, corporate stakeholders on a vision and plan for risk mitigation at the community or regional level.
Integration with early fire detection networks to drive initial fire operational decision making and deployment.	Automating / augmenting the project planning and restoration process, from carbon accounting to species habitat prediction to automated biomass supply quantification and cost-to-landing.
Real-time risk mapping for Calfire, Federal, and municipal emergency services intelligence units to improve/augment in situ decision making on fire operations.	Workforce management apps, helping to more strategically and efficiently train and deploy harvesters and logistics management based on treatment prescriptions; connecting harvests to end markets.
Citizen-focused applications providing real-time road information, downed power lines/ trees/other hazards, wildfire updates, and evacuation orders.	A prescribed burn management application to aid in planning optimal burn timeframes, and empower the public with information to reduce anxiety around smoke and alert communities should certain individuals need to leave a burn area for health reasons.
Dynamic monitoring, post wildfire, of fire impact and post-fire hazards and support for recovery efforts.	Restoration project monitoring to verify work is completed and effective over time.

Salo Sciences, Planet Labs, and Vibrant Planet have developed the Observatory concept through consulting key stakeholders—the USFS; leading forest ecologists; wildfire, meteorological, hydrology, wildlife biology, and other scientists; Calfire and state agencies—and will continue to engage advisors and key stakeholders throughout the design and build of the product. The Observatory team is made up of world class forest ecologists and AI experts, user experience experts, and award winning

cartographers and information designers. The Gordon and Betty Moore Foundation is providing financial support for the beta version of the product and enabling free access for scientists and state and federal agencies.



We look forward to serving the State of California, the scientific community, and the CA-based US Forest Service. Please contact **Allison Wolff**, CEO of Vibrant Planet, for further information allison@vibrantplanet.net.



TEAM



Dave Marvin, Salo Sciences

Dave received his Ph.D. from the University of Michigan in Ecology and Evolutionary Biology. He previously worked at The Nature Conservancy and at the Carnegie Institution for Science. His expertise is in conservation policy, forest carbon mapping & machine learning.



Chris Anderson, Salo Sciences

Chris is pursuing his Ph.D. in Biology from Stanford University. He previously worked at the Carnegie Institution for Science in the Department of Global Ecology. His expertise is in biodiversity mapping, plant physiology & satellite image analysis.



Allison Wolff, Vibrant Planet

Allison's background is in strategy and narrative development, and building brand and product experiences. After building the Netflix brand and digital experience, Allison advised corporate and nonprofit leadership teams, including Google, eBay, Facebook, Chan Zuckerberg Initiative, Omidyar Network, Patagonia, Nike, HP, Drawdown, Conservation International, and GlobalGiving. She is now leveraging her experience and network to develop solutions for forest and landscape resilience.



Andrew Zolli, Planet

Andrew Zolli oversees the humanitarian and sustainable development Global Impact portfolio of Planet, a breakthrough geospatial imaging organization that has deployed the largest constellation of Earth-observing satellites in history. Together, this system images the entire surface of the Earth every day, in high resolution. The resulting data has transformational value for addressing a host of global challenges.

Scientific & Strategic Advisors:

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