

Project Overview

Introduction

The impacts of wildfires in California have intensified in the past decades. Community development patterns near wildlands has increased the amount of wildland-urban interface (WUI) throughout the state and climate change and past forest management has led to wildland fuel conditions that have increased the likelihood of fire behavior that exceed the predictive power of existing wildfire models. In addition, the impacts of wildfire on the investor-owned utilities' (IOUs) electric grid have resulted in increased costs, reduced safety and weakened reliability to ratepayers — a situation that will likely worsen in a changing climate without improved mitigation strategies.

Wildfire science currently lacks needed information to forecast risk to natural and developed landscapes across California and are not able to predict extreme fire behaviors resulting from prolonged heat release by large woody fuels and deep duff layers typical of modern-day California forests. The current near-term risk fire-weather forecasts underestimate extreme weather events, surface fuel loads in elevated tree mortality areas and fire-spread dynamics due to omission of novel driving factors. For long-term planning, there is a lack of a comprehensive modeling framework to make mid- to late-century projections of fire risk. Consequently, IOUs, State agencies and stakeholders relying on the electric grid lack scientifically robust information and actionable insights to make effective near-term tactical and long-term planning decisions.

In Phase 1 of the project, the project team will advance wildfire science by incorporating the dynamics of tree mortality and extreme weather information into next-generation wildfire models. The project team proposes to develop computationally efficient wildfire risk models to demonstrate the potential of the technologies to reduce the impacts of wildfire on the electricity grid to IOUs and stakeholders. At both near- and long- term time horizons, our team will compare different wildfire risk modeling approaches to converge on the best approach to developing the next generation of wildfire models. In Phase 2, the project team will strive to integrate risk forecast models at IOUs and support the Fifth Climate Change Assessment with future fire-risk projections. The wildfire risk models developed as part of the project will be deployed on an open-source platform providing free access to IOUs and other stakeholders. Figure 1 provides a simplified overview of the project's workflow.

Project Team and Organization

Spatial Informatics Group, LLC is the primary contractor to CEC and will be supported by renowned research institutions from industry, academia, and government, including: Reax Engineering, National Center for Atmospheric Research, University of California (UC) Merced, UC Berkeley, US Forest Service - Missoula Fire Sciences Laboratory, Eagle Rock Analytics, United States Geological Survey, University of New Mexico, Pyrologix, Salo Sciences, Prometheus Fire Consulting, Sonoma Technology, Deer Creek Resources, Lumen Energy Strategy, University of San Francisco, Vibrant Planet, and Clere.

The Project Team is organized to delegate product development and tasks completion. The Project Management/Administration Team is composed of the Principal Investigator, Project Manager and Administrative staff from SIG (Figure 2). The Project Management/Administration Team is responsible for day-to-day planning, project coordination and project administration and is the primary contact with Commission Agreement Manager (CAM).

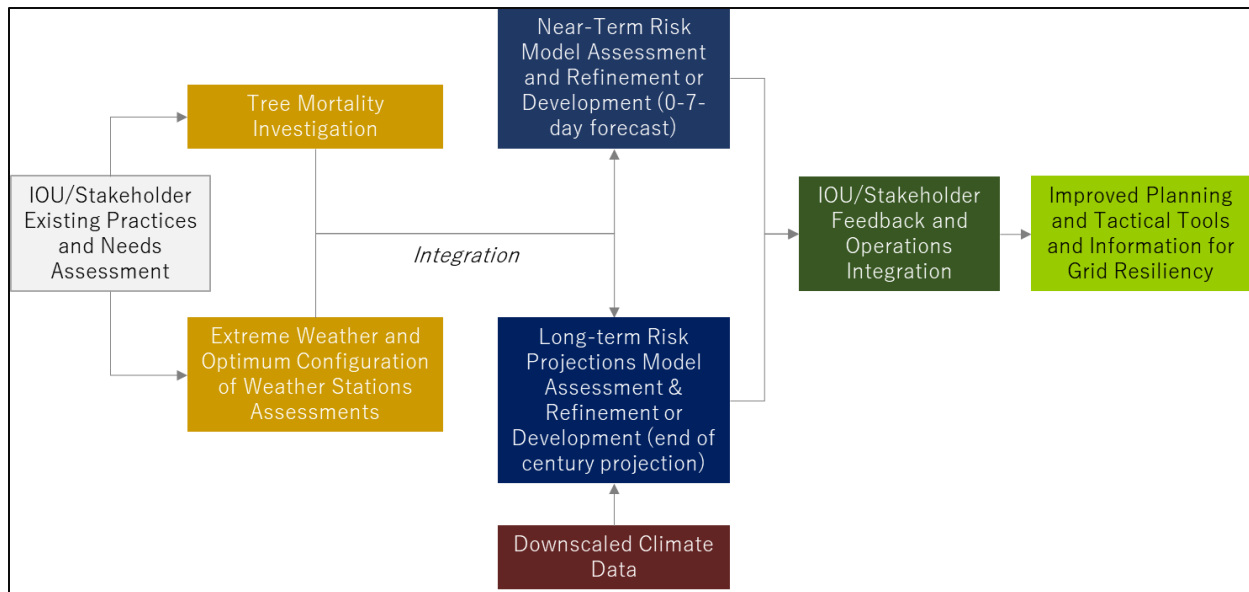


Figure 1. Overview of project workflow.



Figure 2. Generalized project organization structure

The Leadership Team is composed of Workgroup Leads, the Principal Investigator and the Project Manager. The Leadership Team is primarily responsible for:

- Task and Product coordination and delivery
- Critical Project Report (CPR) coordination with Workgroups
- Technical Advisory Committee (TAC) meeting preparation and coordination
- Technology/Knowledge transfer to California Energy Commission (CEC)

- Communications with CEC–CAM as appropriate

Workgroups are composed of technical experts from the Project Team and lead by Workgroup Leads. Four Workgroups are identified and will focus preparation and delivery of tasks and products identified in the CEC grant agreement. The four Workgroups, their task focus and associated leads are:

- Workgroup #1 will be focused on addressing tasks related to optimal configuration of weather stations and extreme weather historical analysis and is led by Janice Coen (UCAR/NCAR).
- Workgroup #2 will be focused on advancing wildfire science of tree mortality tasks and is led by Scott Stephens (UC Berkeley).
- Workgroup #3 will be focused on near-term forecasts model development tasks and is led by Chris Lautenberger (Reax Engineering).
- Workgroup #4 will be focused on next generation of long-term projections model tasks and is led by Leroy Westerling (UC Merced)

Workgroup #3 and #4 will work with the User Engagement Team (Figure 3) and hold meetings with IOUs and Stakeholders over the course of the project to understand information and tool needs and integrate findings and tools into their operational practices.

The Integration Team (Figure 3) will be led by John Battles (UC Berkeley) and is tasked to:

- Facilitate and provide technical review and input on internal products prior to delivery to CEC and TAC.
- Identify and facilitate integration of internal findings and products across workgroups and team.
- Identify and facilitate external integration opportunities, such as linkages with external research projects and agency initiatives.

Synopsis of Project Tasks

The following provides a high-level summary of project tasks.

User Engagement Workshops (Phase 1)

- Facilitate workshops with IOUs and other stakeholders to document current risk mitigation practices and understand information needs.

Optimal Configuration of Weather Stations (Phase 1)

- Provide recommendations for future siting of weather stations based on evaluation of historic statewide weather station information.
- Pilot test an upper-air profiler to improve understanding of extreme weather events.

Extreme Weather Historical Analysis (Phase 1)

- Improve understanding of the relationship of historical weather conditions and wildfire in order to improve fire weather forecasting accuracy.

Advance Wildfire Science of Tree Mortality (Phase 1)

- Develop repeatable and controlled fuel materials and mixtures that can be burned at laboratory scales. Test the predicted heat release rates across the range of fuel structures and environmental conditions found in wildland areas.
- Develop and deploy a new fuel measurement and mapping system to resolve the essential fuel components and spatial and temporal heterogeneity in California forests.

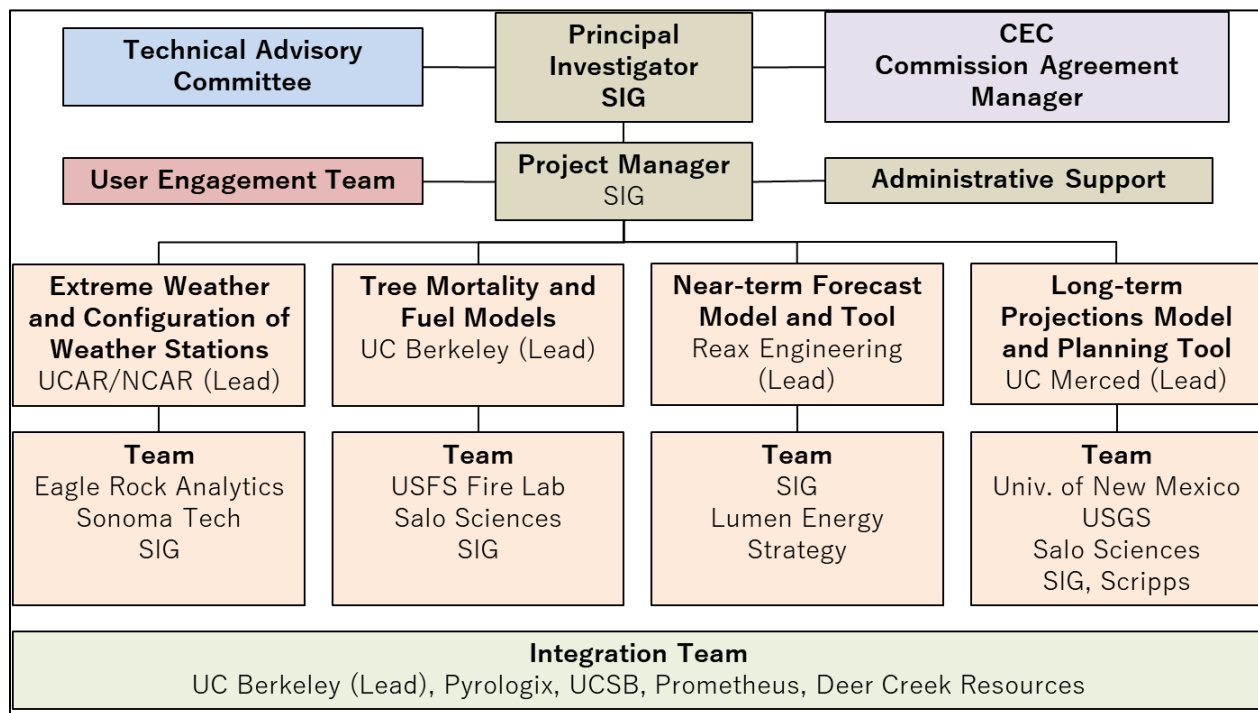


Figure 3. Project Team organization structure.

- Map current and projected future forest fuel conditions in areas of elevated tree mortality.
- Integrate the products into near-term wildfire risk forecasts and long-term wildlife risk projections with an emphasis on the wildland-urban interface.

Near-Term Risk Forecasts Model Development (Phase 1)

- Develop the next generation of models to provide near-term wildfire risk forecasts at a 0-to-7-day temporal scale and at a fine spatial scale (circa 30m) to simulate spread of extant fire ignitions and enhance current models with best practices in wildfire risk modeling.
- Prepare Near-term Risk Forecast Cost-benefits Analysis Factsheet.
- Prepare decision support tool brief that describes how near-term forecast model can be integrated into IOU operating practices.

Long-term Fire Risk Projection Models (Phase 1)

- Develop the next generation of coupled statistical/dynamical fire-climate-vegetation models to run long-term (to end-of-century) wildfire risk projections and incorporate best in-class science and technology to enhance the models.

Near-term Risk Forecast Integration (Phase 2)

- Integrate an electrical grid decision-support tool into operating procedures at IOUs.

Long-term Wildfire Projections (Phase 2)

- Support California's Fifth Climate Assessment by running the models for long-term wildfire projections

and developing a planning support tool for IOUs, State agencies and stakeholders relying on the grid to visualize the impacts of wildfire under a changing climate.

- Facilitate workshops to support the Fifth Assessment and integrate wildfire risk forecasts into IOU operations and gather user feedback on the Decision-support Tool for IOU wildfire risk forecasting and the Planning Support Tool for State agency and stakeholder analysis.

Project Schedule Overview

Task	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
General Project Task					
Product Management Plan - Phase 1					
Opt. Config. Weather Stations – Phase 1					
Fire Weather Analysis – Phase 1					
Tree Mortality – Phase 1					
Near-term Forecast – Phase 1					
Long-term Projections – Phase 1					
User Engagement – Phase 1					
Near-Term Forecast Integration – Phase 2			1/2022 Phase 2		
Long-term Projections – Phase 2					
User Engagement – Phase 2					
Project Benefits					
Tech/Knowledge Transfer					