



CAL FIRE - Office of the State Fire Marshal Risk Modeling Advisory Workgroup Approved Report Outline For Discussion March 20, 2023

I. Background & Executive Summary

PURPOSE

Cite enabling legislation

The Risk Modeling Advisory Workgroup (Workgroup) will provide a means to understand and model wildfire risk for a community and specified parcels through the input of mitigating factors. The Workgroup will provide a forum for subject matter experts in wildfire related fields to address wildfire risk modeling issues of statewide concern. CAL FIRE shall post the recommendations on how to understand and model risk for a community and specific parcel on the department's internet website.

- Possible Stakeholders, and what they may use this paper for
 - Legislators
 - Local Jurisdictions
 - Public Fire Services Professional
 - Firewise/Fire Safe Communities

GOALS AND OBJECTIVES

Goal:

To provide science-based solutions to enable CAL FIRE, in consultation with the State Fire Marshal, and the Insurance Commissioner to make recommendations on how to understand and model wildfire risk for a community and specific parcels within the local responsibility area or state responsibility area through the input of mitigating factors.

Objectives:

- *Provide science-based solutions to enable CAL FIRE, in consultation with the State Fire Marshal, and the Insurance Commissioner to make recommendation on how to understand and model wildfire risk on or before July 1, 2023*
- *Provide a discussion on how parcels can affect the risk of other parcels in close proximity to each other and what impacts that has on wildfire risk modeling*
- *Provide an evaluation of the effectiveness of using natural infrastructure as a community buffer and what impacts that has on wildfire risk modeling*



- *Review and provide a list of other jurisdictions' applicable wildfire risk models and their modeling components*
- *Review and provide a list of relevant wildfire risk research models from science, academia and industry, and other sources and their purpose and relevant attributes.*
- *Provide a list of identified barriers to determining the wildfire risk of a community and specific parcels*

Possible Stakeholders and Usage

Regulators
Legislators
Communities
Others?

MEMBERS

List work group members

EXECUTIVE SUMMARY

1. Vision for California wildfire – the Big Picture
 1. Measure, Communicate, and Mitigate in a cycle of continuous improvement
 2. Models will play a critical role in each of these elements
 1. Measuring baseline risk
 2. Communicating risk signals through insurance pricing and underwriting
 3. Measuring risk reduction via mitigations

Call to action

Affirmative statement that this can and should be done

CONTENTS OF REPORT

- Defining Wildfire Risk
- Mitigations that Matter
- Modeling Wildfire Risk
- Barriers & Recommendations for Determining & Reducing Wildfire Risk

II. Defining Wildfire Risk (Nov)

- How we define risk (definitions can start with the base from Melissa Semcer, provided in the chat from 11/21/2022)
 - Risk vs. Hazard



- Risk Defined: A measure of the anticipated adverse effects from a hazard considering the consequences and frequency of the hazard occurring¹
- Components of Wildfire Risk
 - Ignitions
 - Spread
 - Schematic template – provided by Melissa in the 11/21/22 chat, placed on the definitions page.
- Mitigation
 - Mitigation Defined: Activities to reduce the loss of life and property from natural and/or human-caused disasters by avoiding or lessening the impact of a disaster and providing value to the public by creating safer communities.
 - Types of risk considered/not considered in report
- How we define neighborhood/community
 - Importance of density
 - Structure
 - Fuel
 - Land Use
- Consideration of structure vs. parcel vs. community risk
 - Building Occupancy Types
- How we define mitigation: something that can be changed to reduce risk
- Risk factors vs. mitigation
- Focus on modeling risk for purpose of mitigation
- Risk change overtime
- Long term and short-term risk
 - Long term and short-term mitigation

III. **Mitigations that Matter (Dec)**

- Parcel level risk factors/mitigations
 - SSD < 30'
 - Structure
 - California Building Code compliant
 - Building construction type
 - Outbuildings
 - Surrounding vegetation
 - Interior verse perimeter
 - 0 – 5
 - SSD FROM 30 – 100'
 - Structure
 - California Building Code compliant
 - Building construction type

¹ Adapted from D. Coppola, 2020, "Risk and Vulnerability," Introduction to International Disaster Management, 4th ed.



- Outbuildings
- Surrounding vegetation
- Interior verse perimeter
- 0 – 5
- SSD>100'
 - Structure
 - California Building Code compliant
 - Building construction type
 - Outbuildings
 - Surrounding vegetation
 - Vacant lot
 - Property Lines
 - 0 – 5
- How parcels affect risk of other parcels (Dave S.)
 - Sphere of influence 1/4-1/2 mile from developed areas
 - Ground component
 - Ember cast
- Neighborhood / Community risk factors/mitigations
 - Pre-fire
 - Intermix (vegetation)
 - Interface (structures)
 - Ingress/egress
 - Fire response
 - Local
 - Regional
 - Effectiveness of natural infrastructure as community buffer
 - Water Supply
 - Local ordinances

IV. Wildfire Risk Models (Jan)

- Why models are needed to measure wildfire risk
- Types of models [see Matt Chamberlain PPT]
 - Risk Maps
 - Ordinal (Risk Scores)
 - Cardinal
 - Deterministic Models
 - Probabilistic Models
 - Climate Models verse CAT models.
- How models can be used to drive mitigation
 - Lessons from other states/perils
 - Vision for California wildfire
- Limitations of models
- Models Evolution
- Hazard Maps [see Dave Sapsis PPT]



- Purpose
- Relevant attributes
- Description
- Wildfire risk models used by other jurisdictions [other states, countries? See <https://naturaldisaster.royalcommission.gov.au/>]
 - Purpose
 - Relevant attributes
 - Components
 - Provide a link to maps with a short description
 - Model type
 - Geographic scale
- Wildfire risk research models from science, academia, industry [Research from Casualty Actuarial Society, American Academy of Actuaries, NIST, SJSU, IBHS]
 - Purpose
 - Relevant attributes
 - Components

V. Barriers & Recommendations for Determining & Reducing Wildfire Risk (Feb)

Barriers and recommendations for *determining* wildfire risk

- Barrier: Lack of agreed-upon standards
 - risk factors
 - mitigation
 - fire protection
 - regulatory standards
 - *Recommendation*: Establish agreed upon core set of mitigations that matter
- Barrier: Data availability and other data considerations
 - Limited data availability
 - Risk factors
 - Mitigation
 - Fire protection
 - Post-fire reconstruction
 - Other data considerations
 - Home v. community
 - Jurisdictions responsible
 - Data frequency and updates
 - Sensitive data
 - Verification
 - Standardization
 - Suitability
 - *Recommendation*: Create a wildfire open-source data commons
 - Agree on core set of data that needs to be captured
 - Free and available to property owner
 - Free and available to local fire professionals
 - Input for insurers/modelers



- Aggregate parcel level detail for neighborhood/community measurement
- Include community and local mitigation measures
- Fire wise communities

Barriers and recommendations for **reducing** wildfire risk

- Barrier: Lack of agreed-upon mitigation standards
 - Confusion about how much is enough
 - *Recommendation*: Agree on core set of mitigations that matter
- Barrier: Concerns regarding catastrophe models
 - *Recommendation*: Improve understanding of catastrophe models
 - Training on model development and use
 - Standardized techniques for model evaluation
- Additional Barriers
 - Inconsistent enforcement & financial disincentives
 - Financial concern for mitigation
 - Coordination challenges
 - Ownership of risk drivers vs property
 - HOAs
 - Fire spread across parcels in dense WUI communities
 - Parcel level mitigations may be inadequate to reduce wildfire loss in the absence of similar mitigations on surrounding parcels
 - Need to coordinate among public/private landowners
 - Homeowner and community disapproval
 - Desire for aesthetics
 - Disconnect between mitigation action and insurance availability and affordability
 - Environmental considerations and other obstacles
 - Special status species and habitat
 - Air quality
 - Water quality/ soil stability
 - CEQA
 - Carbon sequestration regulations
 - Traffic calming and egress