

INTRODUCTION: DAVID SHEW

- Retired from *CAL FIRE* in 2018 after 32 Years of Service
 - Office of the State Fire Marshal
 - Staff Chief – Division of Planning and Risk Analysis
 - California Strategic Fire Plan
 - 11 Years – Incident Management Team 3, Lead PIO
 - Napa County Fire Marshal
 - Extensive Field Experience – Operations and Administrative Chief
 - Practiced as a Licensed Architect
- Wildland Fire Consulting: ***Wildfire DefenseWorks***

History of Wildfire Disasters in California

Pre-European Settlement

- Historically, wildfire freely burned during all conditions that supported fire spread, keeping the forest free of brush, small saplings, and dead plant matter
- With little vegetative fuel and frequent fires, these fires burned with low intensity maintaining a healthy ecosystem
- Mature trees weren't harmed by these low intensity fires and grew large due to less competition for sun, nutrients, and water



The Hazard – Increased Fuel Loading



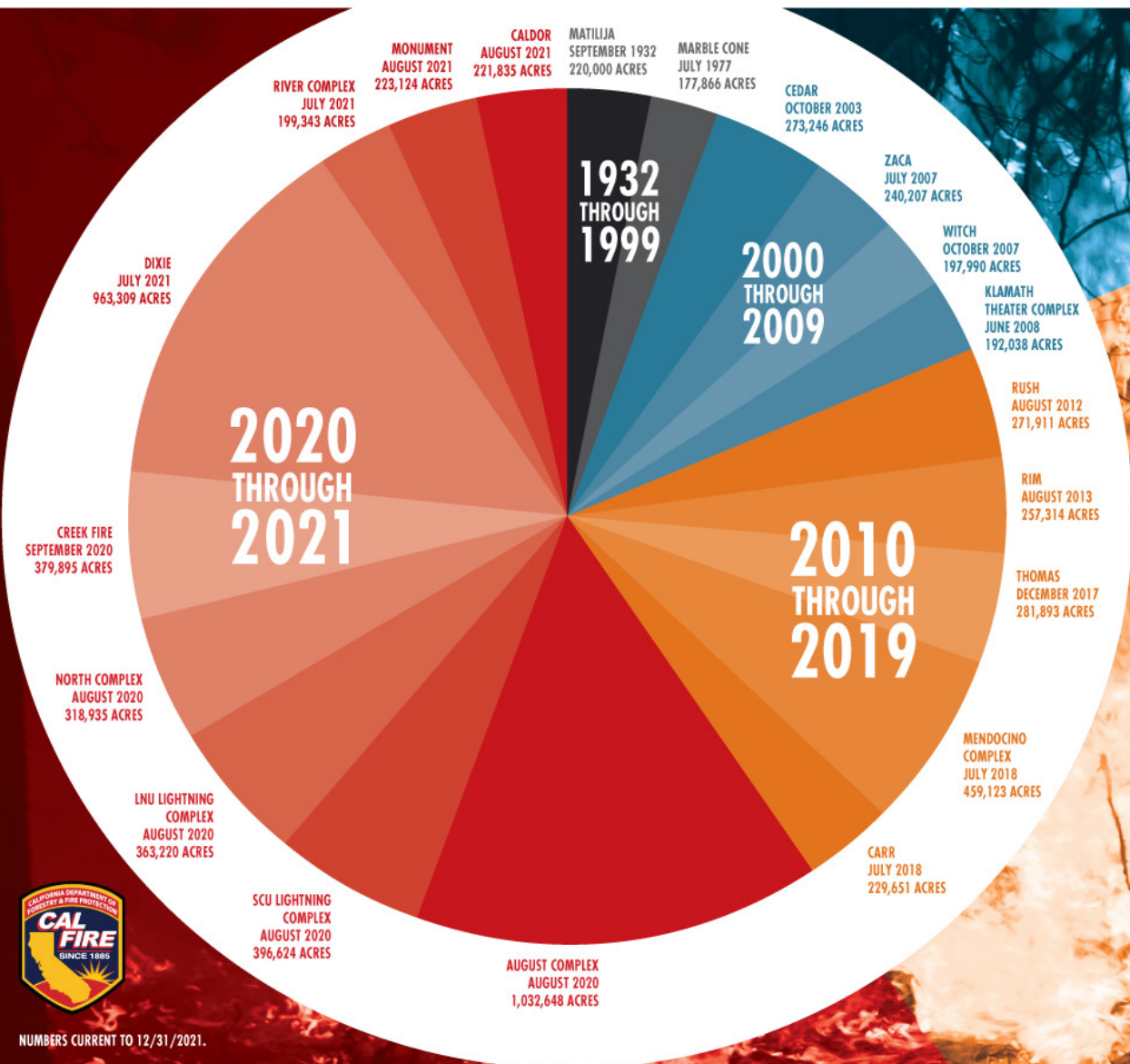
These historical photos show how an initially open forest (with management activity) has become increasingly vegetated. Historically, such a site had a fire every decade or so that maintained the forest in an open “park like” condition.

The Hazard – Extreme Weather



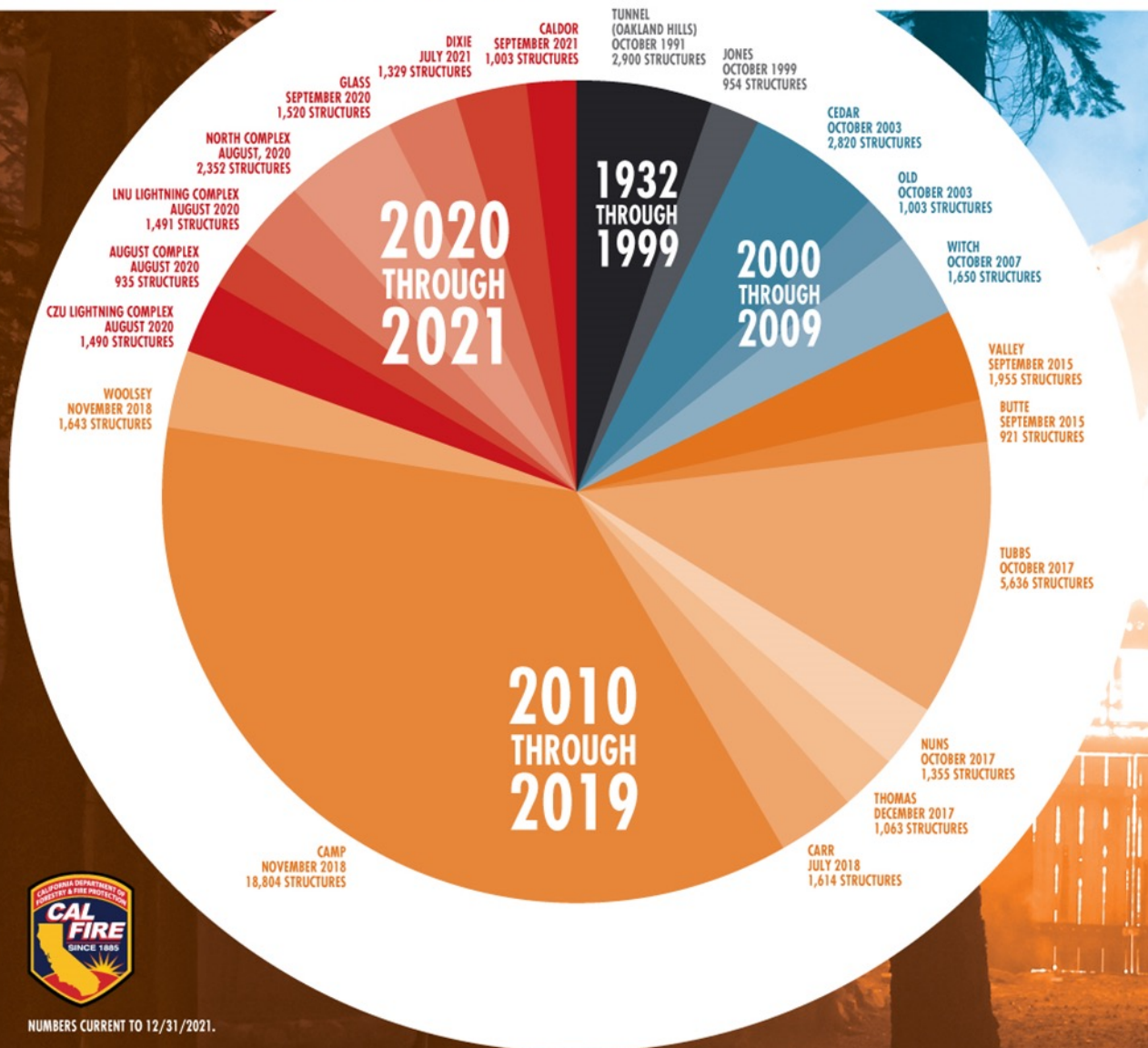
The Risk – Large Destructive Wildfires

TOP 20 LARGEST CALIFORNIA WILDFIRES



NUMBERS CURRENT TO 12/31/2021.

TOP 20 DESTRUCTIVE CALIFORNIA WILDFIRES



NUMBERS CURRENT TO 12/31/2021.

The Risk – Destructive Wildfires

2014 -2021

Category of Damage	Structure Type						Total	% of Residential Structures Damaged and Destroyed	% of All Structures Damaged and Destroyed
	Single Family Residences	Multifamily Residences	Mixed Residential Commercial	Nonresidential Commercial	Other Minor Structures	Infrastructure			
Destroyed	34642	313	100	1756	14630	81	51522	92.21%	91.93%
Major	194	8	1	31	216	22	472	0.53%	0.84%
Minor	524	15	4	78	262	15	898	1.42%	1.61%
Affected	2140	72	3	210	686	39	3150	5.84%	5.62%
TOTAL	37500	408	108	2075	15794	157	56042	100.00%	100.00%

- 70% of all structures destroyed are residential structures
All permanent structures greater than 120 sq. ft.

The Risk – Destructive Wildfires

Total	2014		2015		2016		2017		2018		2019		2020		2021		Since 2014	
Structures Destroyed	240	96.7%	3141	96.6%	1223	94.4%	10922	90.6%	22704	93.7%	555	69.2%	9494	89.4%	3243	91.4%	51522	91.9%
Structures Damaged	8	3.3%	112	3.4%	72	5.6%	1139	9.4%	1523	6.3%	247	30.8%	1127	10.6%	292	8.3%	4520	8.1%
Total	248		3253		1295		12061		24227		802		10621		3535		56042	

- 90 - 95% of all structures that catch fire will be destroyed

All permanent structures greater than 120 sq. ft.

Fire Triangle

- Fire Triangle – The 3 elements a fire needs to ignite and sustain combustion
 - Oxygen
 - The air we breathe contains 21%
 - Approximately 16% is required for combustion
 - Heat
 - Natural
 - Human caused
 - Fuel
 - Natural
 - Other combustibles (homes)
- Removing one or more of these elements will cause the fire to go out



Wildfire Behavior Triangle

- Fire Behavior Triangle – The 3 components of the wildland fire environment

- Topography

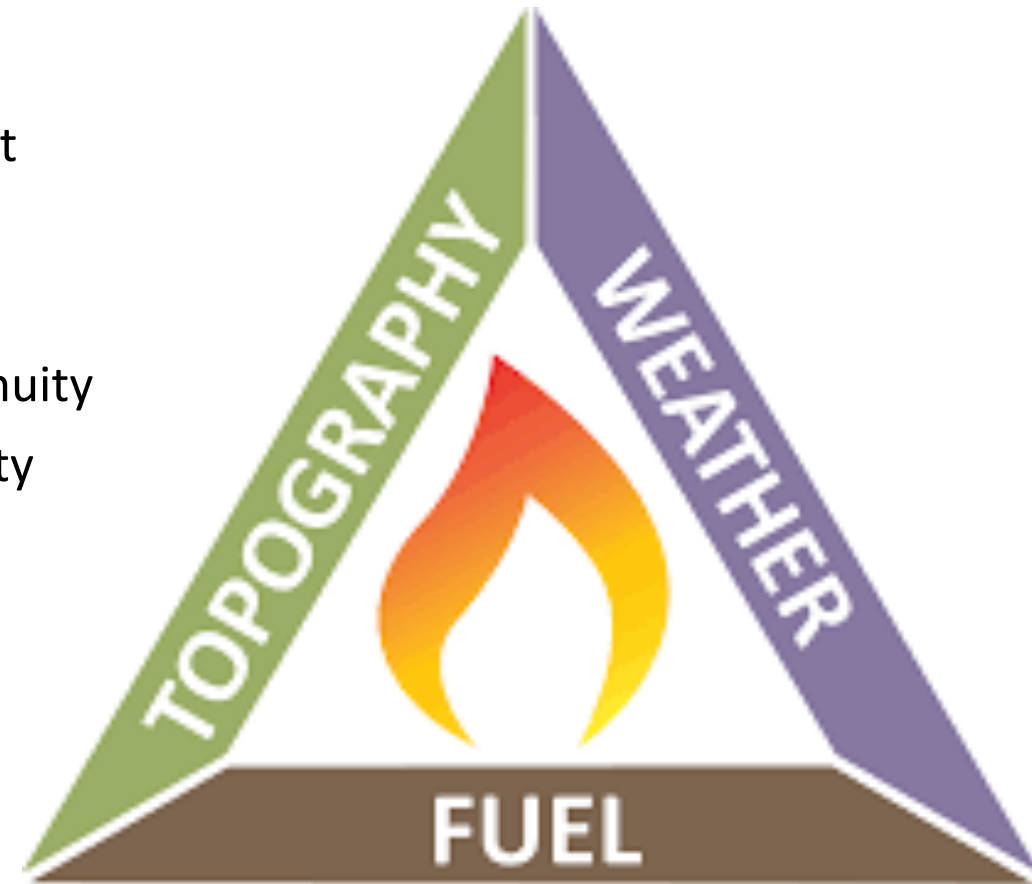
- Elevation
- Position on Slope
- Steepness of Slope
- Aspect
- Shape of the land

- Weather

- Temperature
- Relative Humidity
- Atmospheric Stability
- Windspeed and Direction
- Precipitation

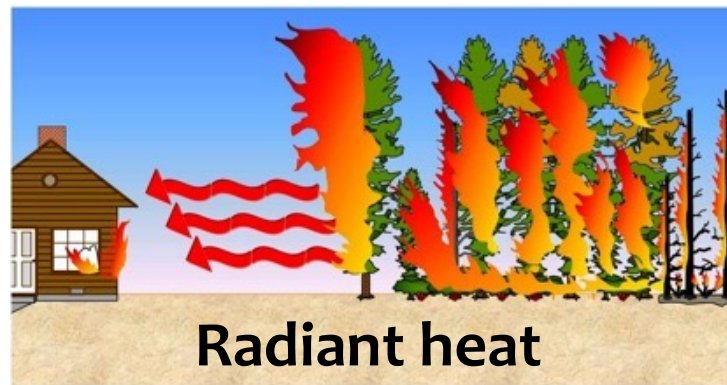
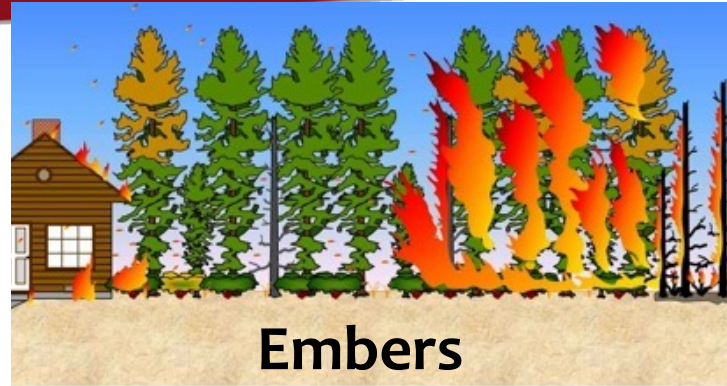
- Fuel

- Type of Fuel
- Chemical Content
- Fuel loading
- Size and Shape
- Horizontal Continuity
- Vertical Continuity



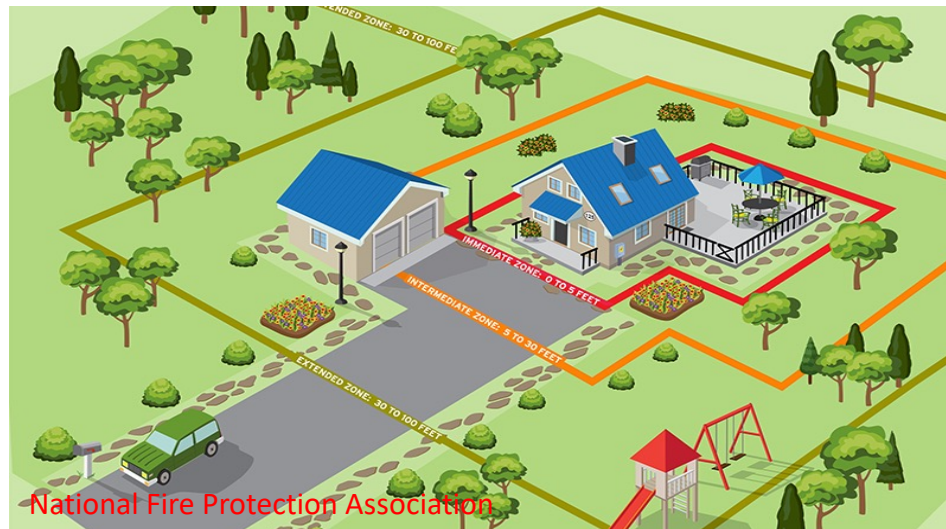
Structure Exposure from Wildfire

- How structures are exposed to wildfire
 - Embers – Responsible for more than 60% of home ignitions and IBHS estimates that can be as high as 90% of home and business ignitions
 - Direct
 - Indirect
 - Direct Flame Contact
 - Radiant Heat



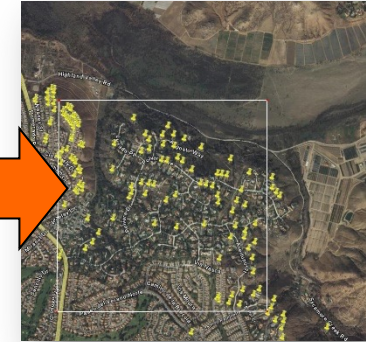
Hazard Mitigation Methodology

Low Density Housing



Home Hardening and Fuels Displacement Works

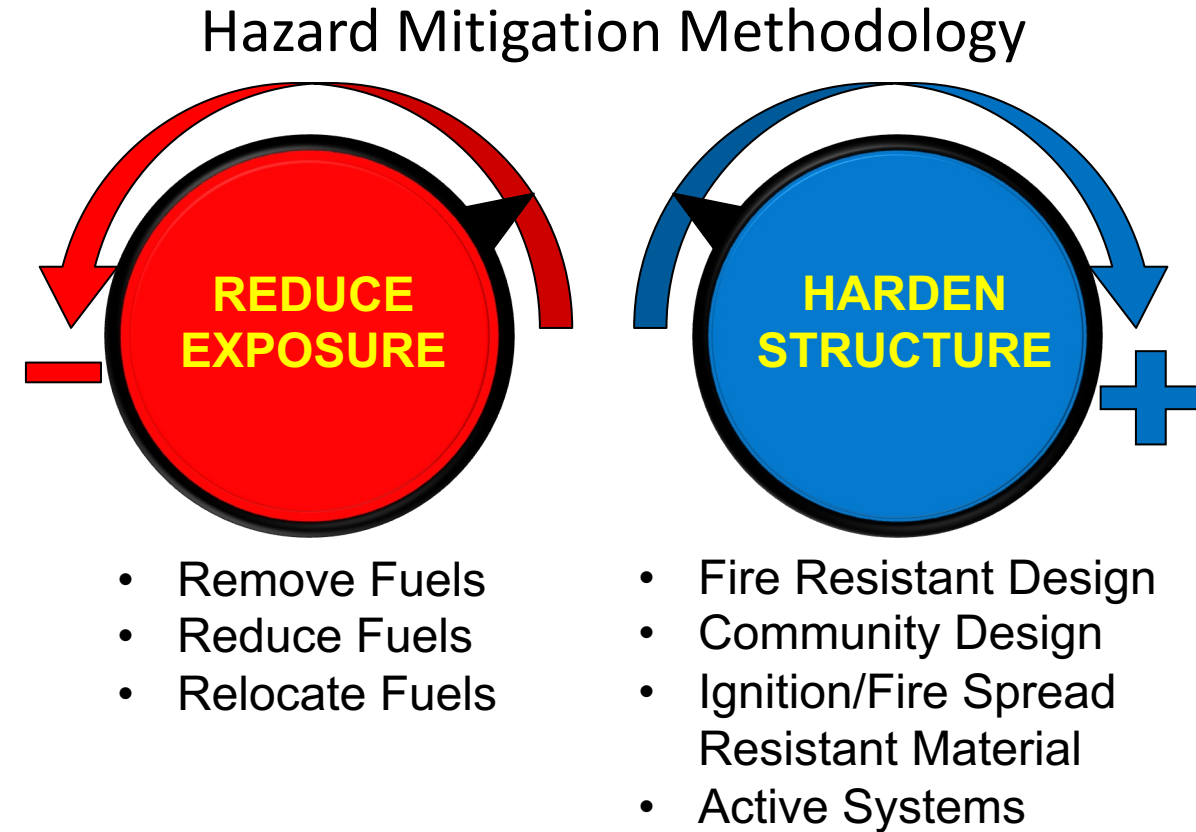
High Density Housing



Fuels Removal is necessary

Hazard Mitigation Methodology

- Uncoupling the pathways of exposure
 - Land Use Planning
 - New communities
 - Pre-Fire Planning
 - Existing communities
 - Community WUI Fire Hazard Evaluation
 - New Home Construction
 - CBC Chapter 7A
 - Defensible Space
 - PRC 4291, GC 51182, local ordinance
 - Retrofitting Existing Structures
 - California Wildfire Mitigation Program



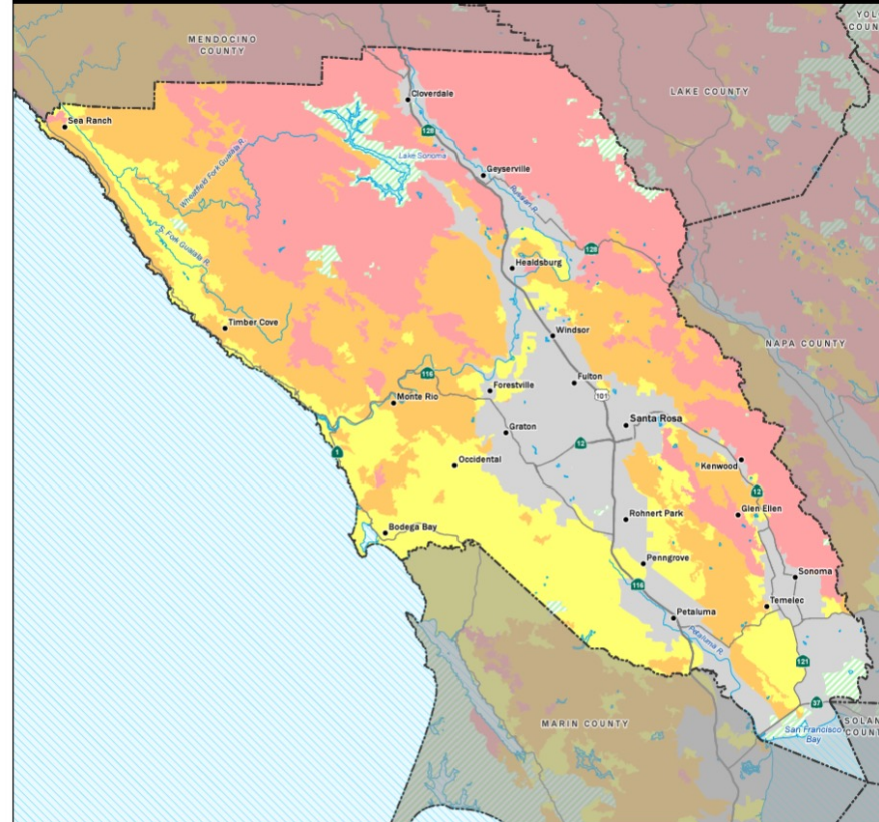
Sonoma County Fire Hazard Severity Zones

SONOMA COUNTY



State Responsibility Area Fire Hazard Severity Zones

June 15, 2023



Fire Hazard Severity Zones in State Responsibility Area (SRA)

Very High	324,610 Acres
High	273,229 Acres
Moderate	196,218 Acres

Fire Protection Responsibility Areas (non-SRA)

Federal Responsibility Area (FRA)
Local Responsibility Area (LRA)
Waterbody



Projection: NAD 83 California Teale Albers
Scale: 1:405,000 at 11" x 17"

Public Resources Code 4201-4204 directs the California Department of Forestry and Fire Protection (CAL FIRE) to map fire hazard within State Responsibility Areas (SRA) based on fuel loading, slope, fire weather, and other relevant factors present, including areas where winds have been identified by the department as a major cause of wildfire spread. These zones, referred to as Fire Hazard Severity Zones (FHSZ), classify a wildland zone as Moderate, High, or Very High fire hazard based on the average hazard across the area included in the zone.

Access PDF versions of the maps at <https://osfm.fire.ca.gov/fhsz-maps>. For more information, please visit the Frequently Asked Questions document for the 2023 Fire Hazard Severity Zones at <https://osfm.fire.ca.gov/fhsz> or scan the QR code at right. If you have further questions, please call 916-633-7655 or email FHSZcomments@fire.ca.gov.



Scan or click the QR code for more information and to visit the interactive FHSZ viewer.

The State of California and the Department of Forestry and Fire Protection make no representations or warranties regarding the accuracy of data or maps. Neither the State nor the Department shall be liable under any circumstances for any direct, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of data or maps. Obtain FRAP maps, data, metadata, and publications at <https://frap.fire.ca.gov>. For more information, please call 916-633-7655 or email FHSZcomments@fire.ca.gov.

Gavin Newsom, Governor, State of California
Wade Crowfoot, Secretary for Natural Resources,
California Natural Resources Agency
Doreen Bennett, Acting State Fire Marshal,
California Department of Forestry and Fire Protection

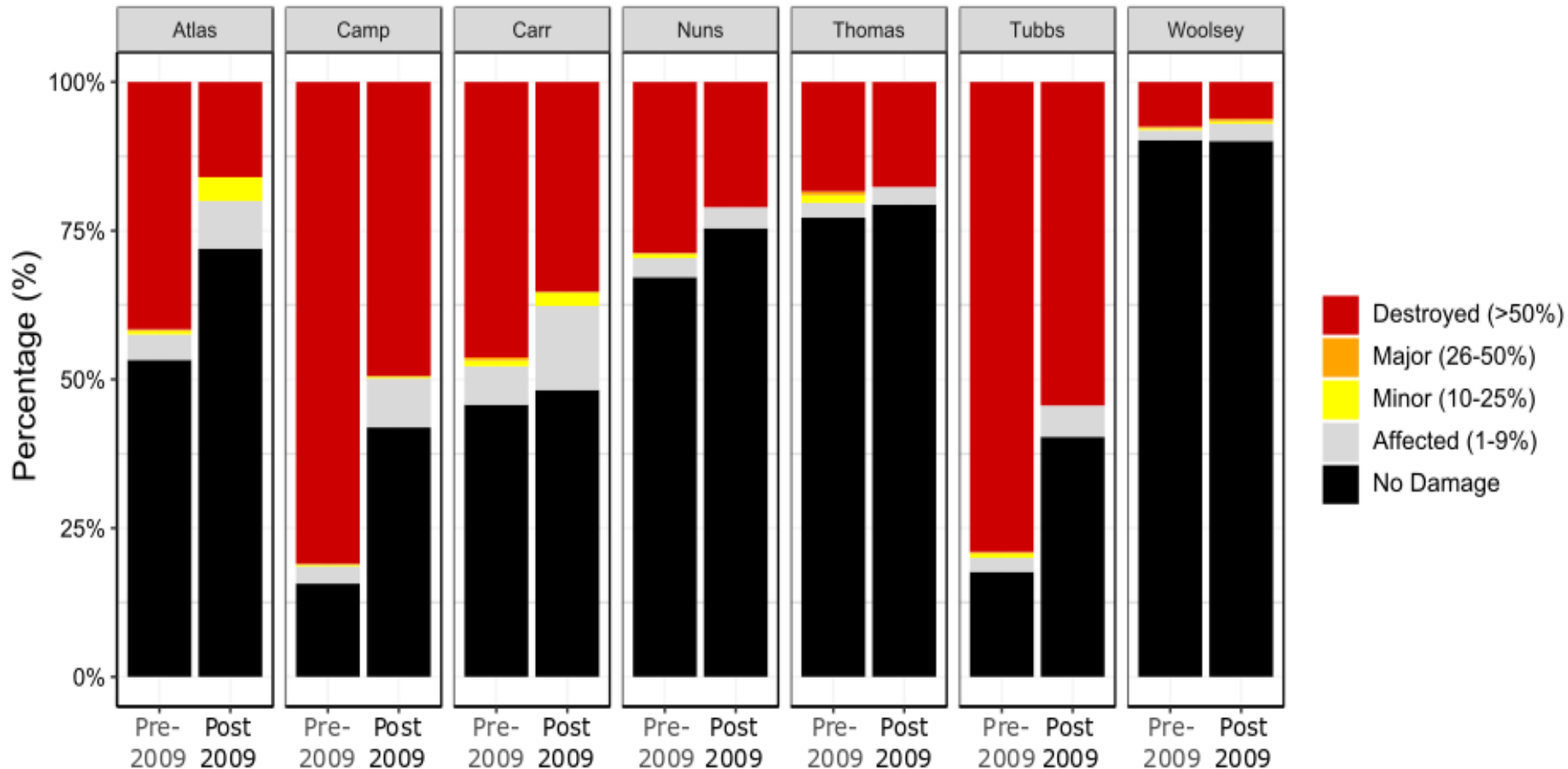
Data Sources:
CAL FIRE Fire Hazard Severity Zones (FHSZSRA_23_2)
CAL FIRE State Responsibility Areas (SRA23_2)

Glass Fire - 2020



CAL FIRE Statistics and Analysis

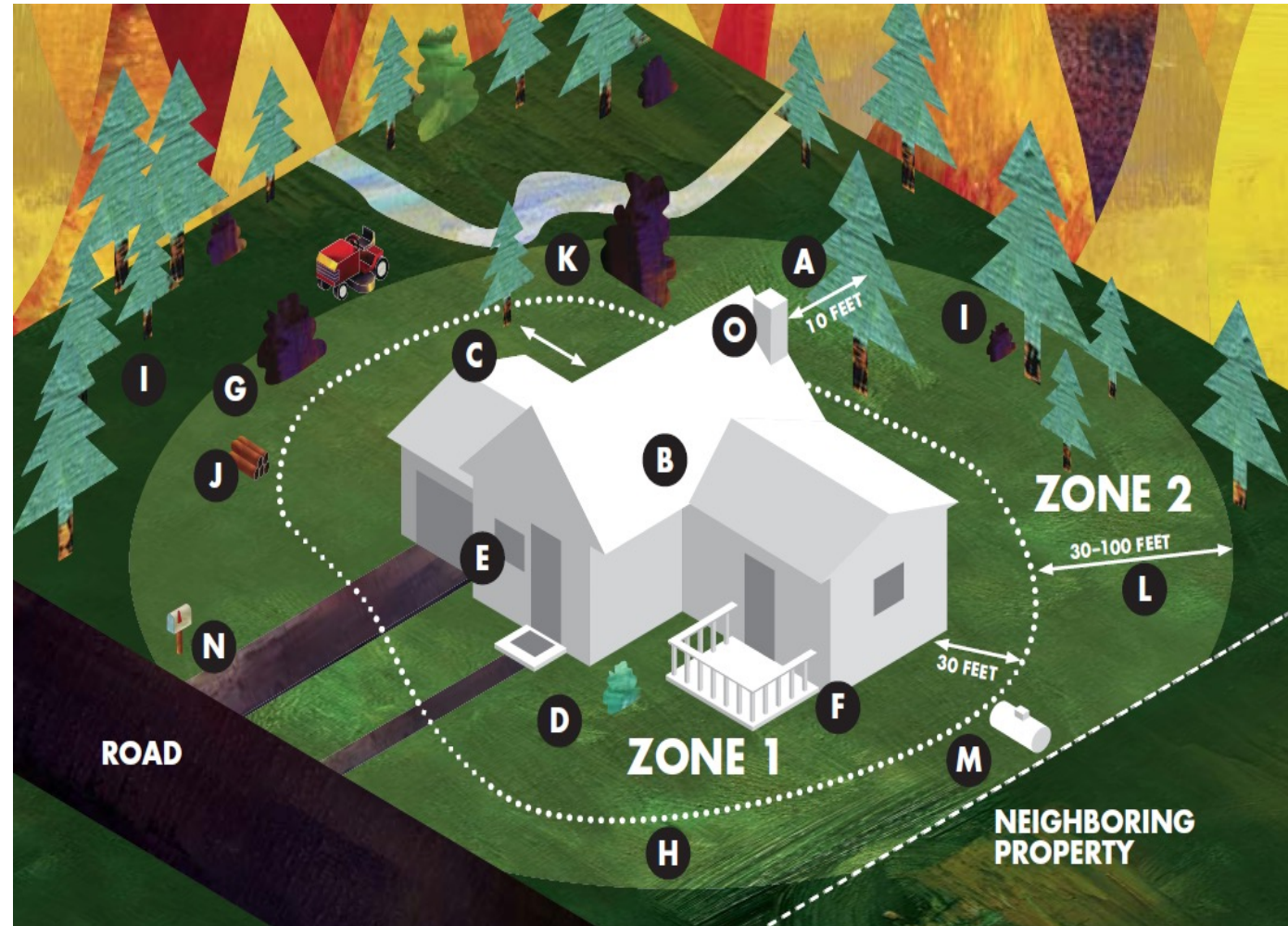
Percentage of structures by damage category inside or within 100 meters of the fire perimeter of the seven largest wildfires in 2017 and 2018



- California Building Code Chapter 7A is making a difference
- Variability between fires
- Many factors influence the survivability of a home

Defensible Space

- Fuel modification within 100' of a home
- Codes
 - SRA – [PRC 4291/14 CCR § 1299](#)
 - LRA VHFHSZ – [GC 51182](#)
 - Local ordinance equal to or more stringent than GC 51182



Defensible Space

Defensible space reduces the exposure to the structure from embers, direct flame contact, and radiant heat from burning vegetation and other nearby combustibles. Defensible space IS NOT 100' to bare soil.

Defensible space by itself DOES NOT guarantee that the structure will not burn during exposure to wildfire.

Home hardening / retrofitting the exterior materials and components of a home to be noncombustible or ignition-resistant is also critical.

It is the “coupled” approach of defensible space and home hardening that give the home the best chance of surviving a wildfire.

Defensible Space – Glass Fire



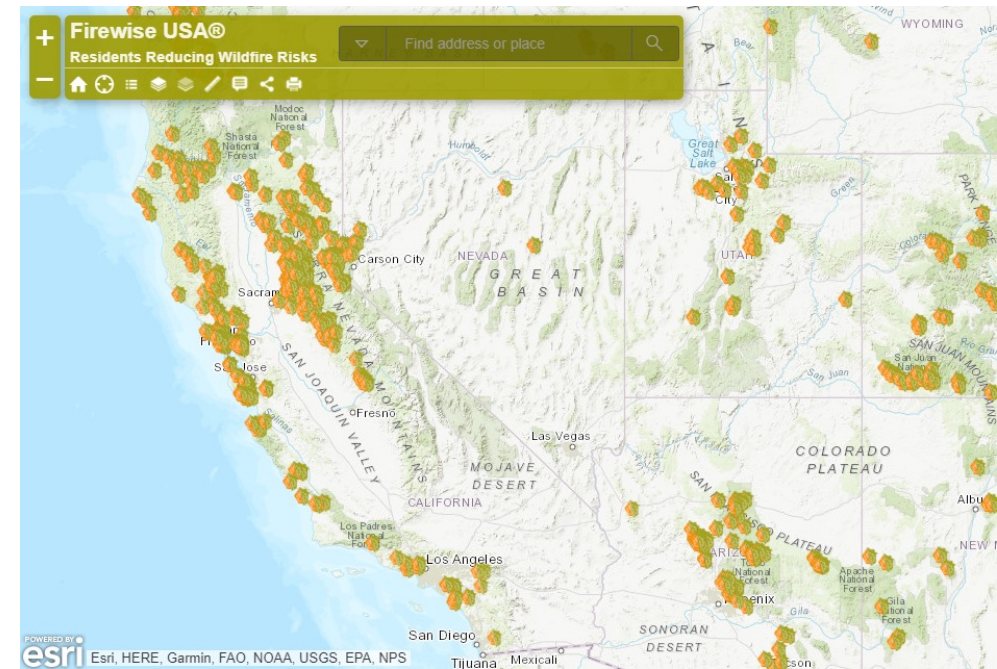
Land Use Planning

- NFPA Firewise USA®



FIREWISE USA®
RESIDENTS REDUCING WILDFIRE RISKS

- CAL FIRE is the California state liaison for the Firewise USA recognition program
- Land Use Planning Program staff can assist the local communities in navigating the application and community wildfire risk assessment process
- A self-directed, community-oriented program (8-2,500 dwelling units) that teaches people how to prepare for wildfire
- Starts with a Community Wildfire Risk Assessment
 - Fire both strengths and weaknesses
 - Free assistance from fire professionals
- Then decide what to do about it
 - Lay out a multi-year hazard mitigation plan
 - Get the community involved



Land Use Planning

- Benefits of being Firewise USA recognition
 - Gain insights into community wildfire risks
 - Findings from Community Wildfire Risk Assessment
 - Improve awareness of wildfire safety issues and best practices
 - Public education is emphasized
 - Work towards reduced wildfire risks
 - Projects to create a more wildfire prepared community
 - Reduced hazards to you and your community
 - Demonstrate commitment to insurance carriers
 - Improves standing for grant applications
 - May reduce fire insurance premiums – USAA and FAIR Plan



■ VEGETATION MANAGEMENT

1. HOME IGNITION ZONES

To increase your home's chance of surviving a wildfire, choose fire-resistant building materials and limit the amount of flammable vegetation in the three home ignition zones. The zones include the **Immediate Zone** (0 to 5 feet around the house), the **Intermediate Zone** (5 to 30 feet), and the **Extended Zone** (30 to 100 feet).

2. LANDSCAPING AND MAINTENANCE

To reduce ember ignitions and fire spread, trim branches that overhang the home, porch, and deck and prune branches of large trees up to 6 to 10 feet (depending on their height) from the ground. Remove plants containing resins, oils, and waxes. Use crushed stone or gravel instead of flammable mulches in the **Immediate Zone** (0 to 5 feet around the house). Keep your landscape in good condition.

■ FIRE RESISTIVE CONSTRUCTION

3. ROOFING AND VENTS

Class A fire-rated roofing products, such as composite shingles, metal, concrete, and clay tiles, offer the best protection. Inspect shingles or roof tiles and replace or repair those that are loose or missing to prevent ember penetration. Box in eaves, but provide ventilation to prevent condensation and mildew. Roof and attic vents should be screened to prevent ember entry.

4. DECKS AND PORCHES

Never store flammable materials underneath decks or porches. Remove dead vegetation and debris from under decks and porches and between deck board joints.

5. SIDING AND WINDOWS

Embers can collect in small nooks and crannies and ignite combustible materials; radiant heat from flames can crack windows. Use fire-resistant siding such as brick, fiber-cement, plaster, or stucco, and use dual-pane tempered glass windows.

■ BE PREPARED

6. EMERGENCY RESPONDER ACCESS

Ensure your home and neighborhood have legible and clearly marked street names and numbers. Driveways should be at least 12 feet wide with a vertical clearance of 15 feet for emergency vehicle access.

- Develop, discuss, and practice an emergency action plan with everyone in your home. Include details for handling pets, large animals, and livestock.
- Know two ways out of your neighborhood and have a predesignated meeting place.
- Always evacuate if you feel it's unsafe to stay—don't wait to receive an emergency notification if you feel threatened from the fire.
- Conduct an annual insurance policy checkup to adjust for local building costs, codes, and new renovations.
- Create or update a home inventory to help settle claims faster.



**TALK TO YOUR LOCAL FORESTRY AGENCY
OR FIRE DEPARTMENT TO LEARN MORE
ABOUT THE SPECIFIC WILDFIRE RISK
WHERE YOU LIVE.**



VISIT [FIREWISE.ORG](https://www.firewise.org) FOR MORE DETAILS

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Order a Reducing Wildfire Risks in the Home Ignition Zone checklist/poster at [Firewise.org](https://www.firewise.org)

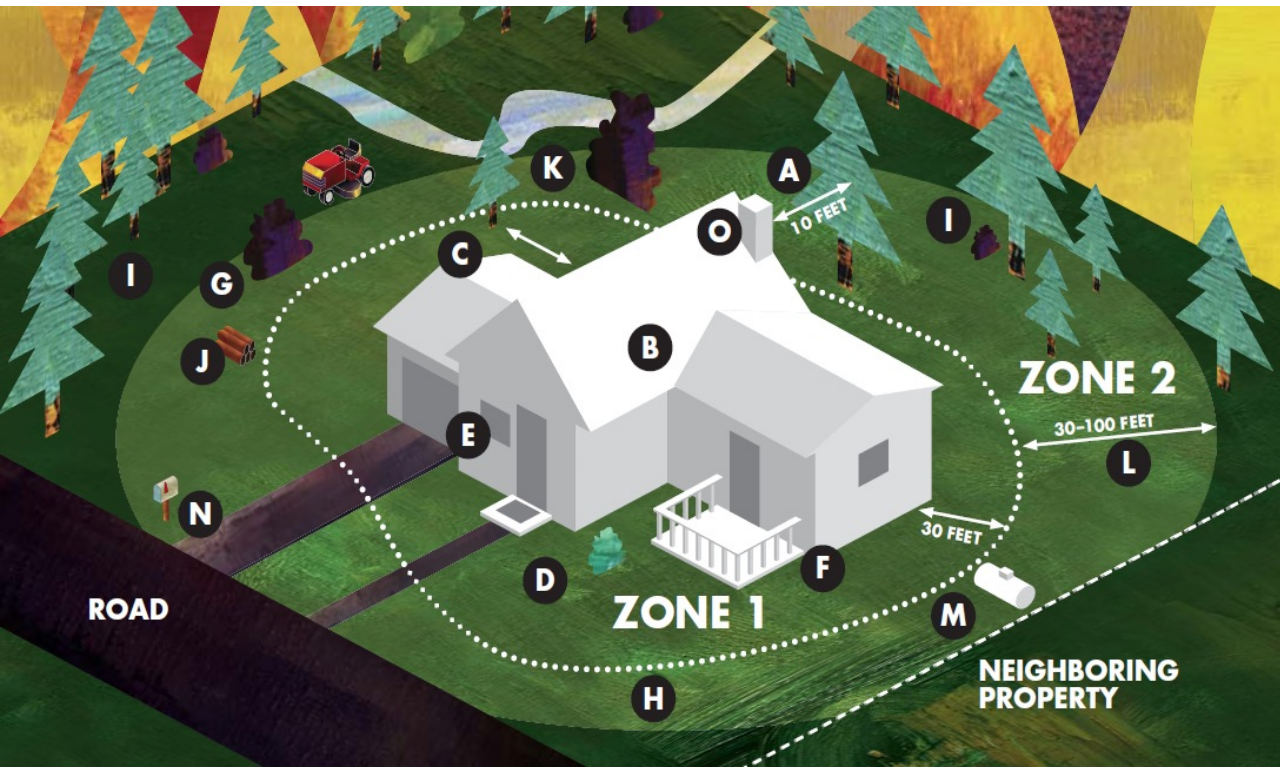
Retrofitting Existing Structures

Hardening a home from wildfire is a coupled approach including defensible space and retrofitting. They **MUST** be done together to give a home the best chance of surviving a wildfire.

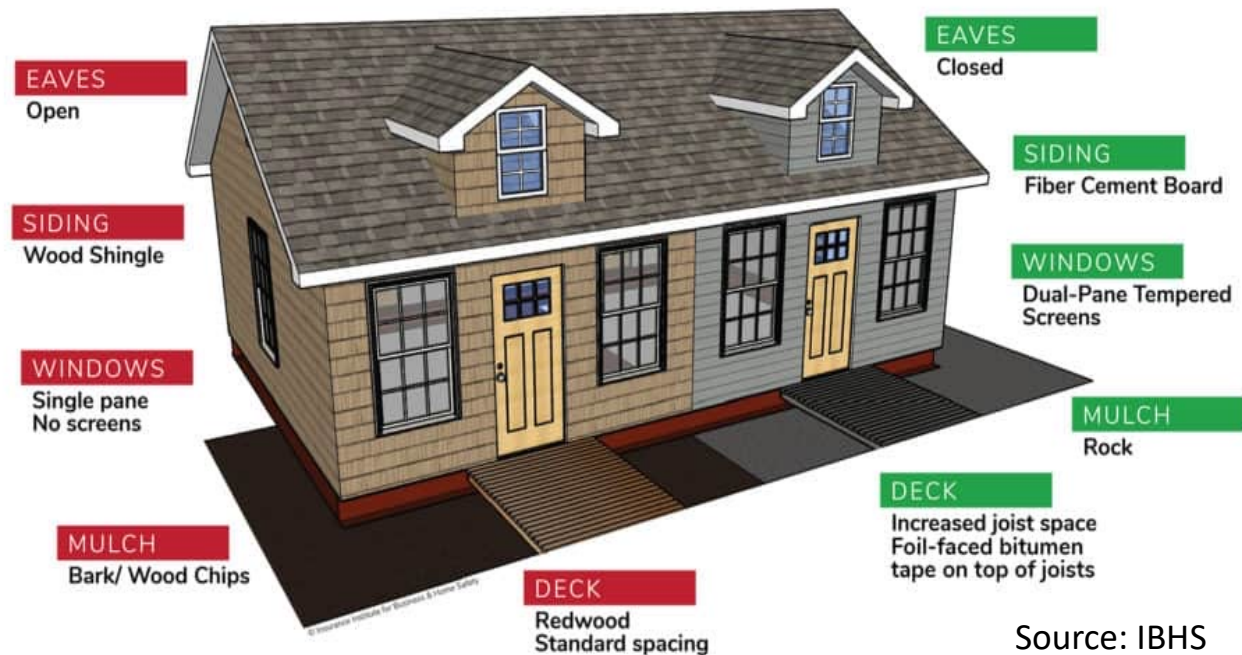
Defensible Space

AND

Home Hardening



Wildfire-Resistance: Make the **“RIGHT”** Choices



Other Issues of Note:

- Land Management Issues
- Evacuation Practices
- Insurance
- Codes/Regulations
- Trades:
 - Architects
 - Landscape Architects
 - Contractors
 - Landscape Retailers/Maintenance Workers

The End!

Thank You!!!

Staff Chief David Shew, Retired

CAL FIRE / Office of the State Fire Marshal

WILDFIRE DEFENSEWORKS

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