



Wildfire Science: From Lab to Field

*Making Homes and Communities
More Survivable and Insurable*

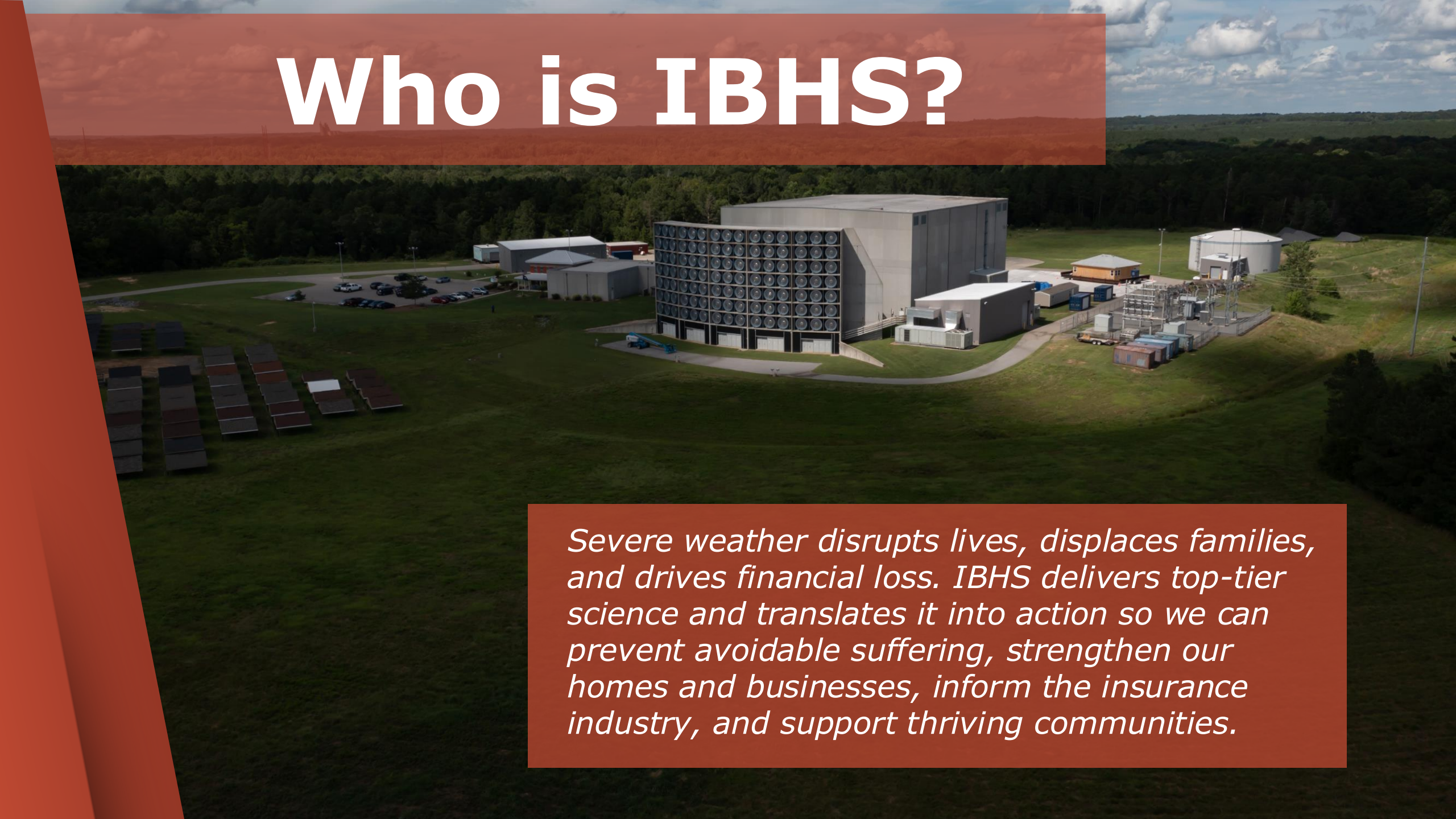
Steve Hawks

Senior Director for Wildfire

Insurance Institute for Business & Home Safety



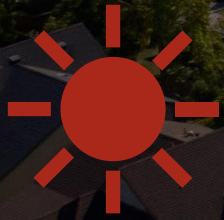
Who is IBHS?

An aerial photograph of a large, modern research facility, likely the IBHS research center. The main building is a large, light-colored structure with a prominent section featuring a grid of circular windows. To the left of the main building is a parking lot with several cars. In the foreground, there are rows of solar panels. To the right of the main building, there are various smaller structures, including a large white cylindrical tank and a complex of electrical equipment. The facility is surrounded by green grass and trees, with a clear blue sky in the background.

Severe weather disrupts lives, displaces families, and drives financial loss. IBHS delivers top-tier science and translates it into action so we can prevent avoidable suffering, strengthen our homes and businesses, inform the insurance industry, and support thriving communities.

Top 25 US Most Destructive Fires Since 1990											
#	Fire	State	Year	Acres	Structures	#	Fire	State	Year	Acres	Structures
1	Camp	CA	2018	153,336	18,804	13	Witch	CA	2007	197,990	1,650
2	Eaton	CA	2025	14,021	9,413	14	Woolsey	CA	2018	96,949	1,643
3	Palisades	CA	2025	23,707	6,833	15	Carr	CA	2018	229,651	1,614
4	Tubbs	CA	2017	36,807	5,636	16	Glass	CA	2020	67,484	1,520
5	Tunnel	CA	1991	1,600	2,900	17	LNU Lightning	CA	2020	363,220	1,491
6	Cedar	CA	2003	273,246	2,820	18	CZU Lightning	CA	2020	86,509	1,490
7	Almeda Drive	OR	2020	3,200	2,659	19	Nuns	CA	2017	54,382	1,355
8	North Complex	CA	2020	318,935	2,352	20	Dixie	CA	2021	963,309	1,311
9	Lahaina	HI	2023	2,170	2,154	21	Beachie Creek	OR	2020	192,873	1,288
10	Chimney Tops 2	TN	2016	17,140	2,066	22	Marshall	CO	2021	6,080	1,091
11	Valley	CA	2015	76,067	1,955	23	Thomas	CA	2017	281,893	1,063
12	Bastrop Complex	TX	2011	34,068	1,673	24	Caldor	CA	2021	221,774	1,003
						25	Old	CA	2003	91,281	1,003

Wildfires become **CATASTROPHES**
when they move into a
COMMUNITY and an **URBAN**
CONFLAGRATION unfolds.



Drought



Wind



People

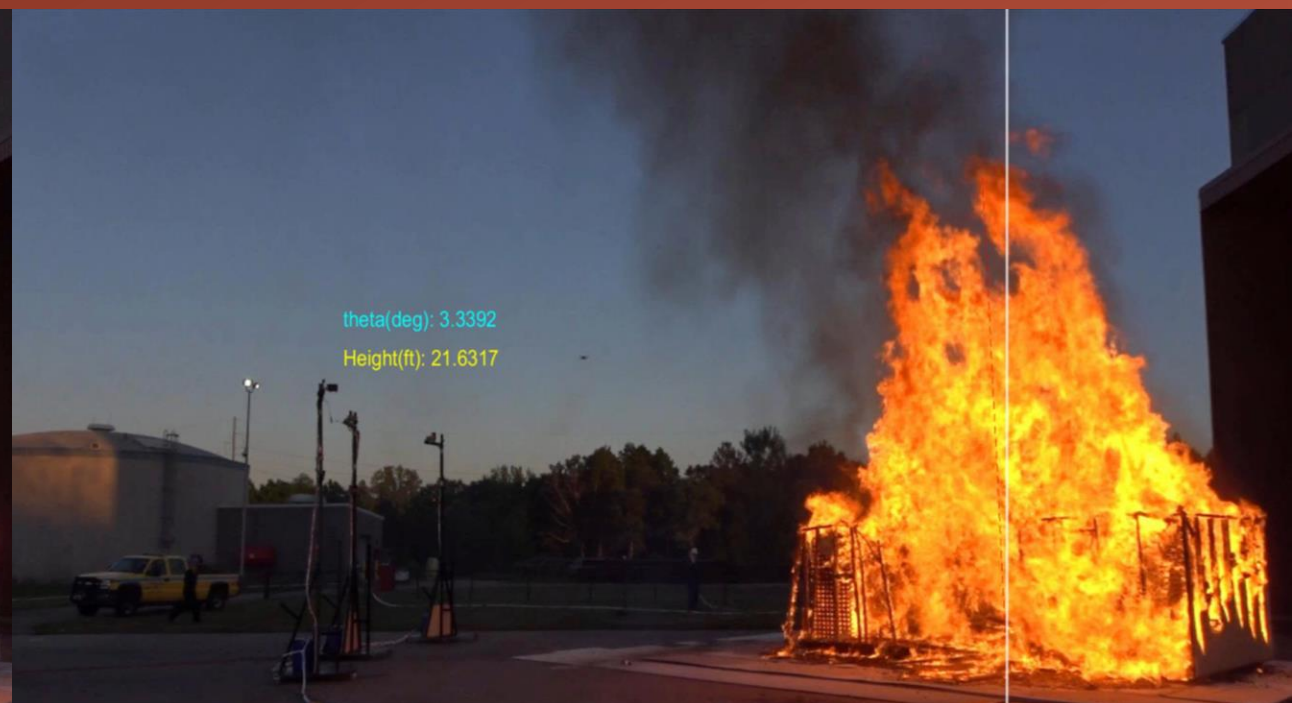
Conflagration

The uncontrolled
spread of fire within
a community leading
to large structure
loss.

IMPACT OF ***WIND***



WIND



NO WIND





Wildfire = Wildland fuels

Embers

Flame Contact

Radiant Heat

FROM START TO CONFLAGRATION



Wildfire = Wildland fuels

Embers

Flame Contact

Radiant Heat

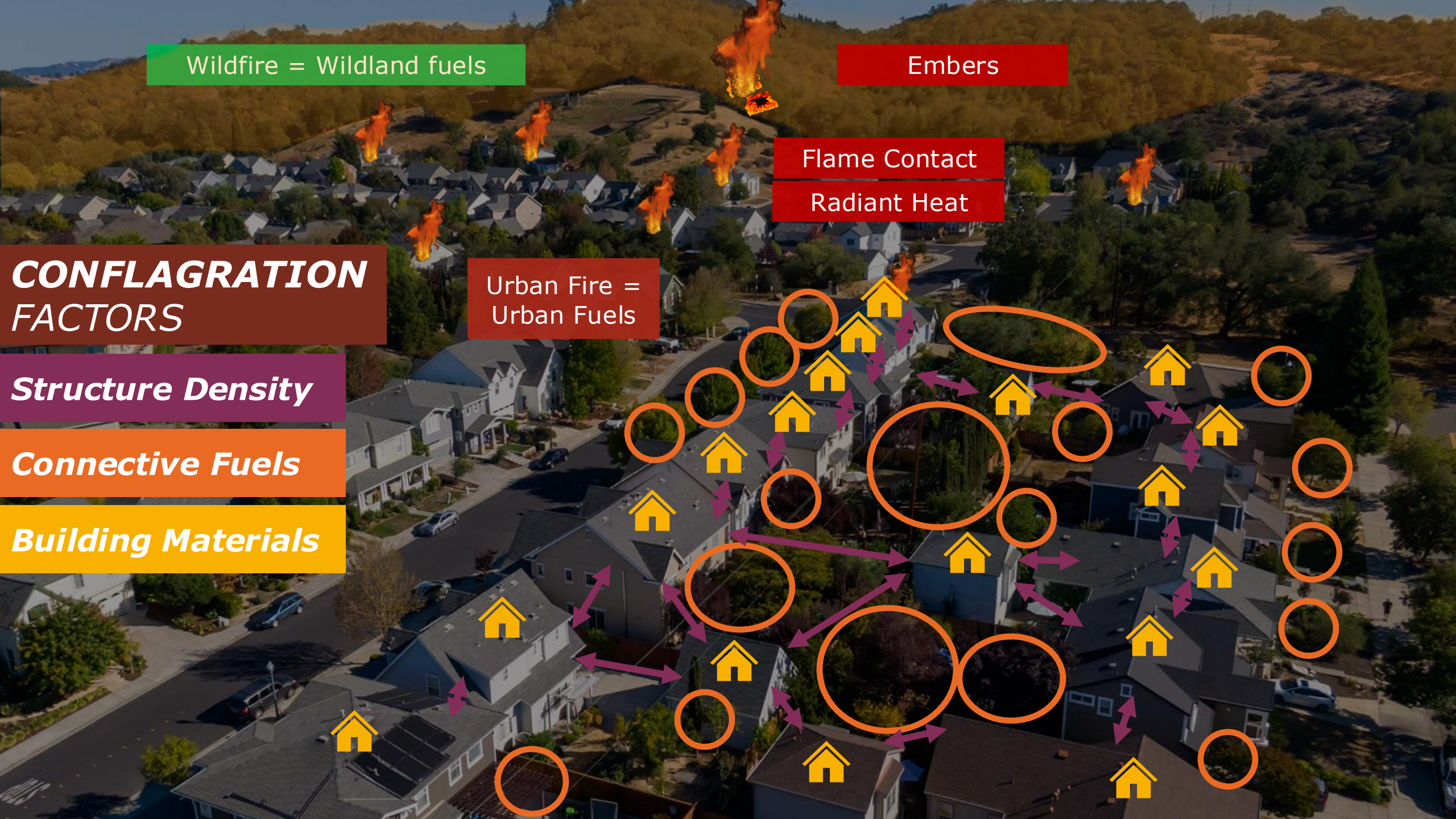
CONFLAGRATION FACTORS

Structure Density

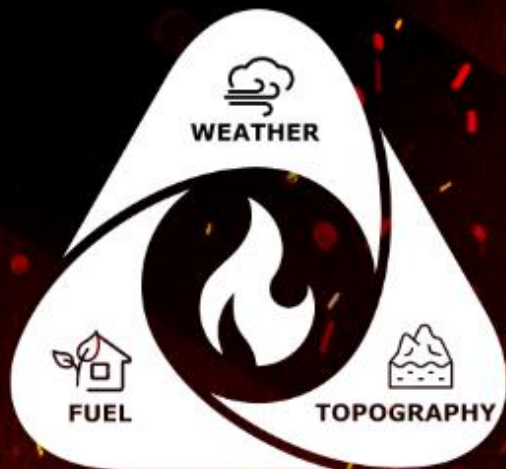
Connective Fuels

Building Materials

Urban Fire =
Urban Fuels



Severe Wildfire Conditions



1. Ignition Source

2. Extreme fire behavior
High intensity, fast growth

3. Residential fires
Ignitable structures, proximity,
many ignitions

4. Fire protection resources
Number of ignitions +
environment overwhelms resources

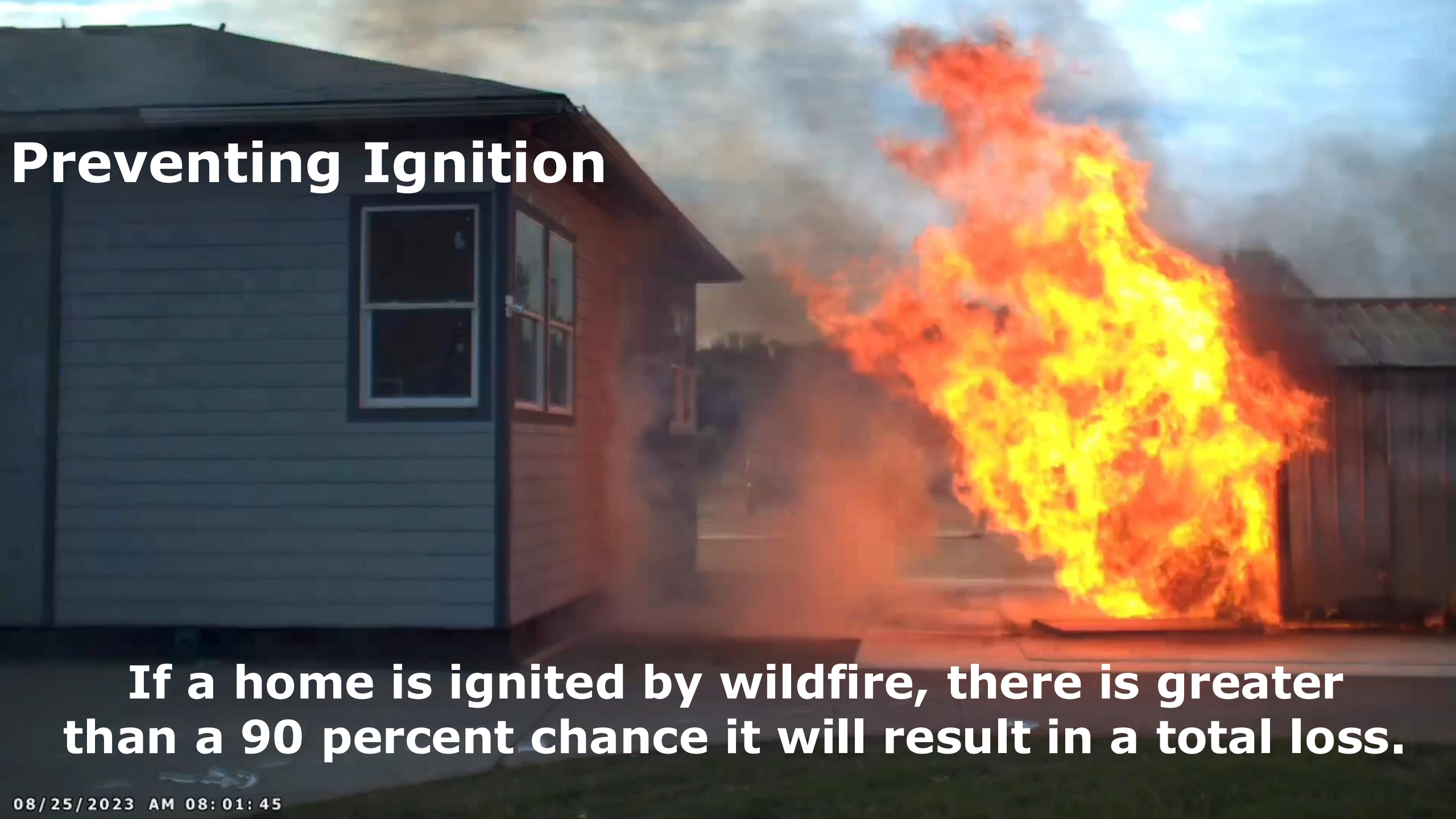
5. Fire protection effectiveness
Reduced or nonexistent

6. Suburban
Conflagration
Catastrophe

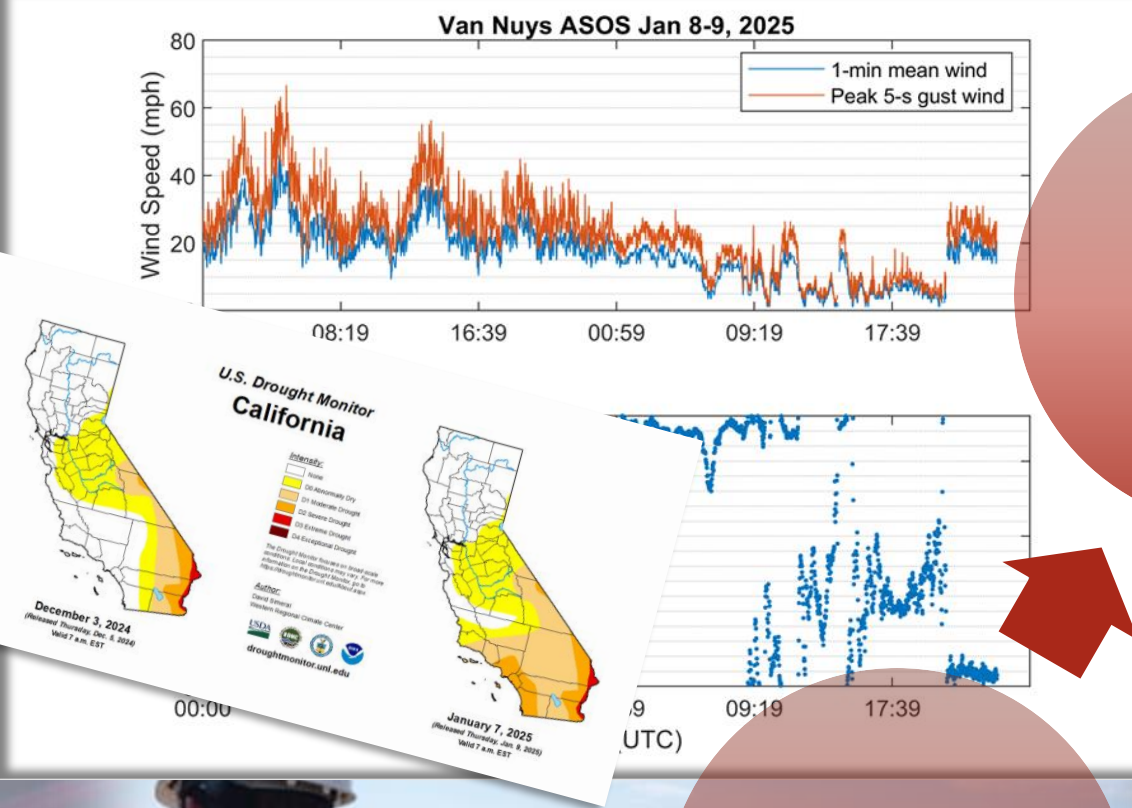


Exposure

Preventing Ignition

A photograph of a single-story house with light blue horizontal siding and dark trim around the windows. To the right of the house, a large, intense wildfire fire is burning, with bright yellow and orange flames reaching high into the air. Thick black smoke is rising from the fire. The sky is overcast with grey clouds. The scene is set during the day, with some light visible through the clouds.

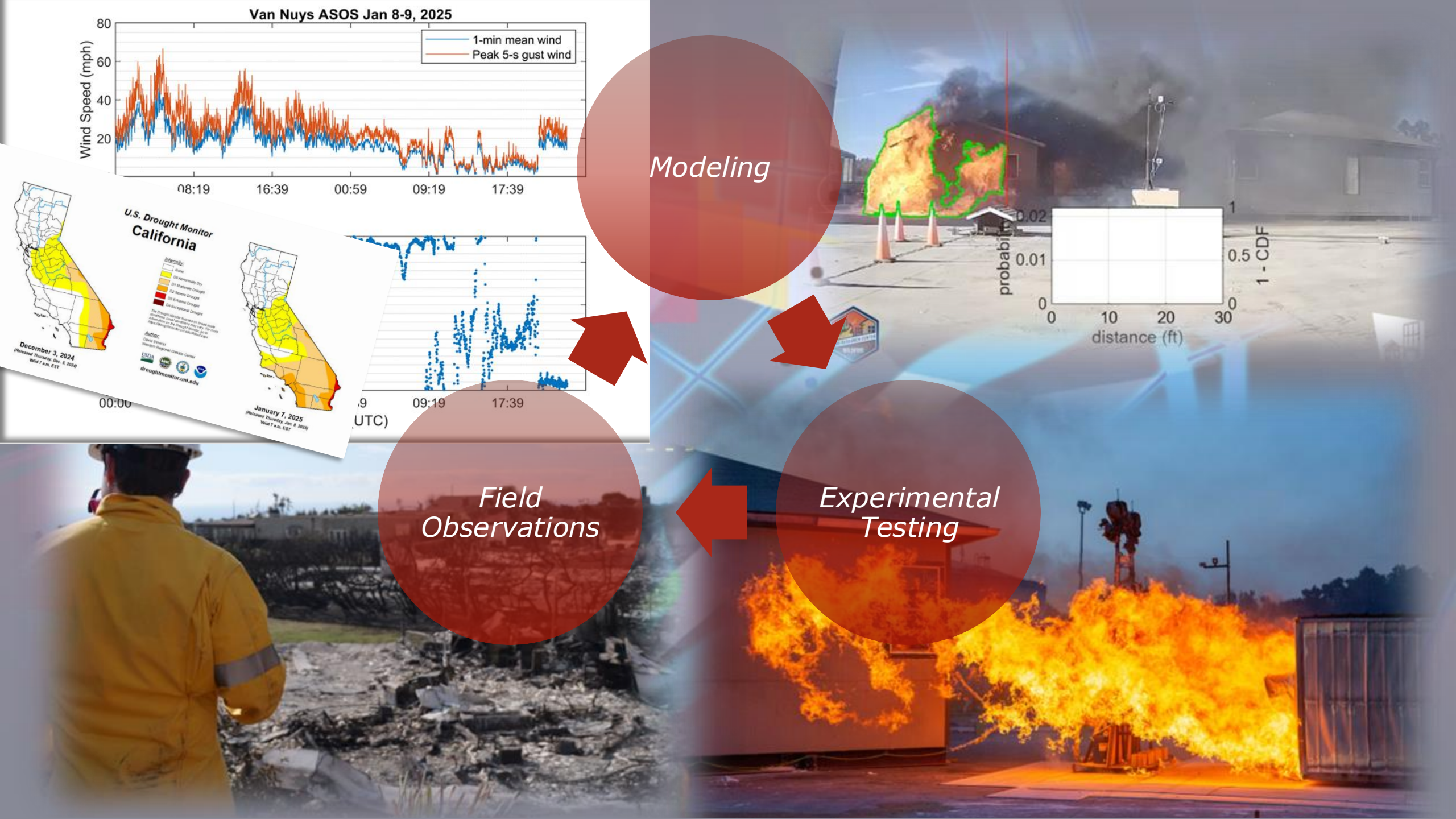
If a home is ignited by wildfire, there is greater than a 90 percent chance it will result in a total loss.

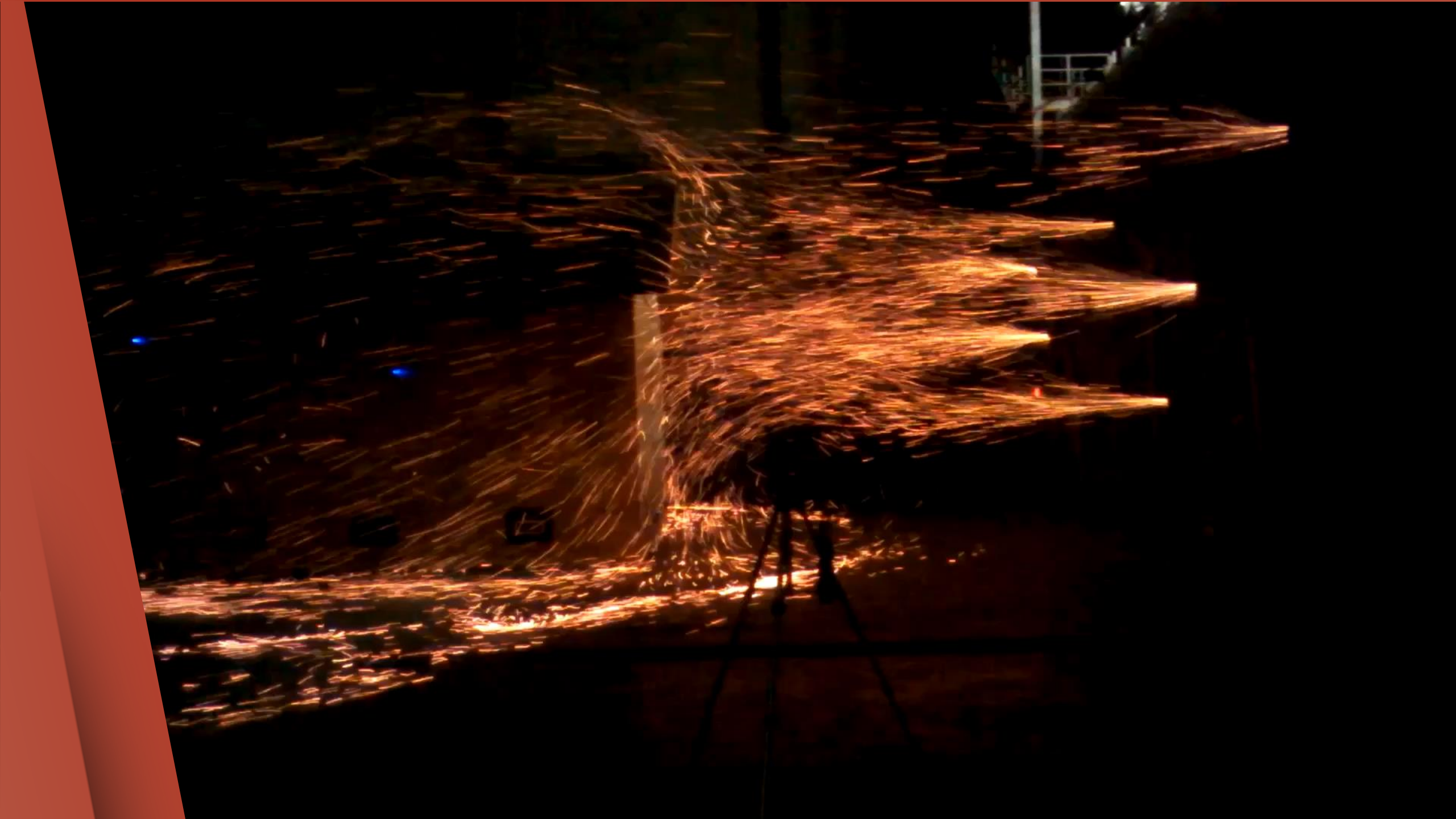


Modeling

Experimental Testing

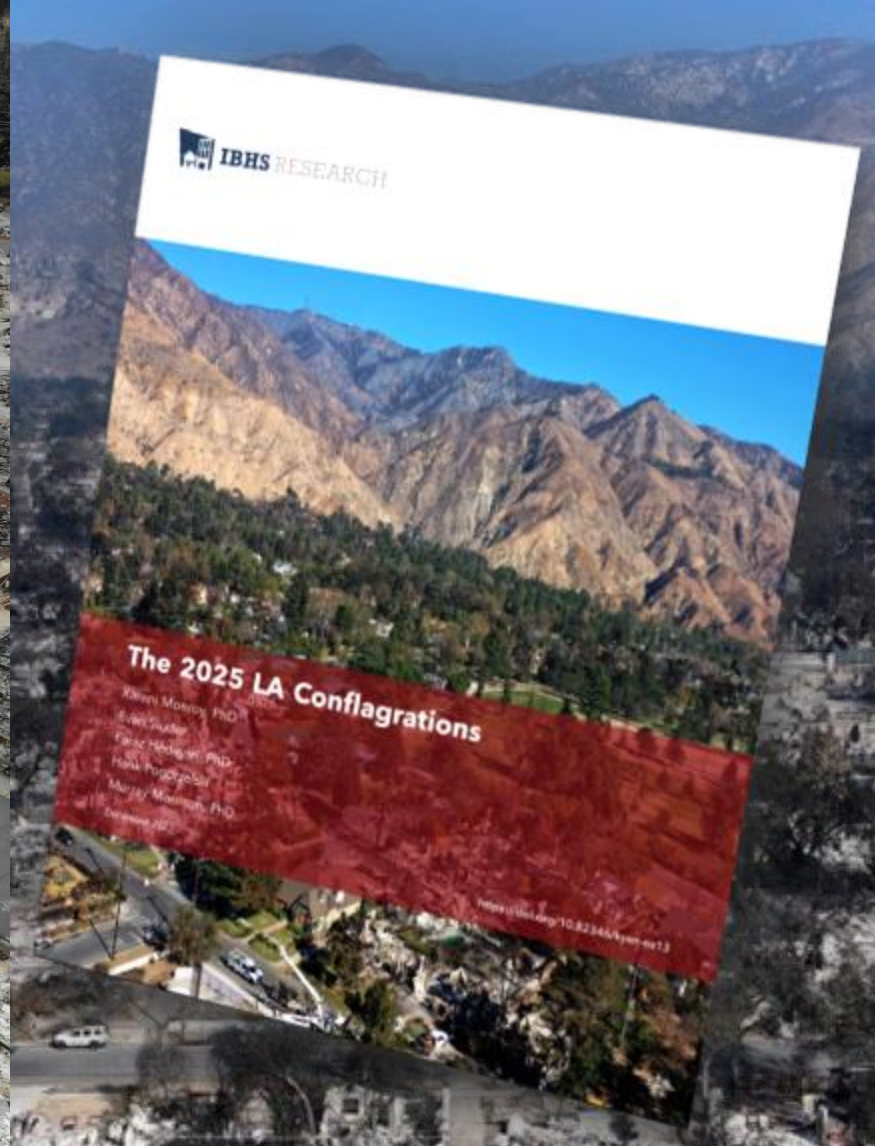
Field Observations



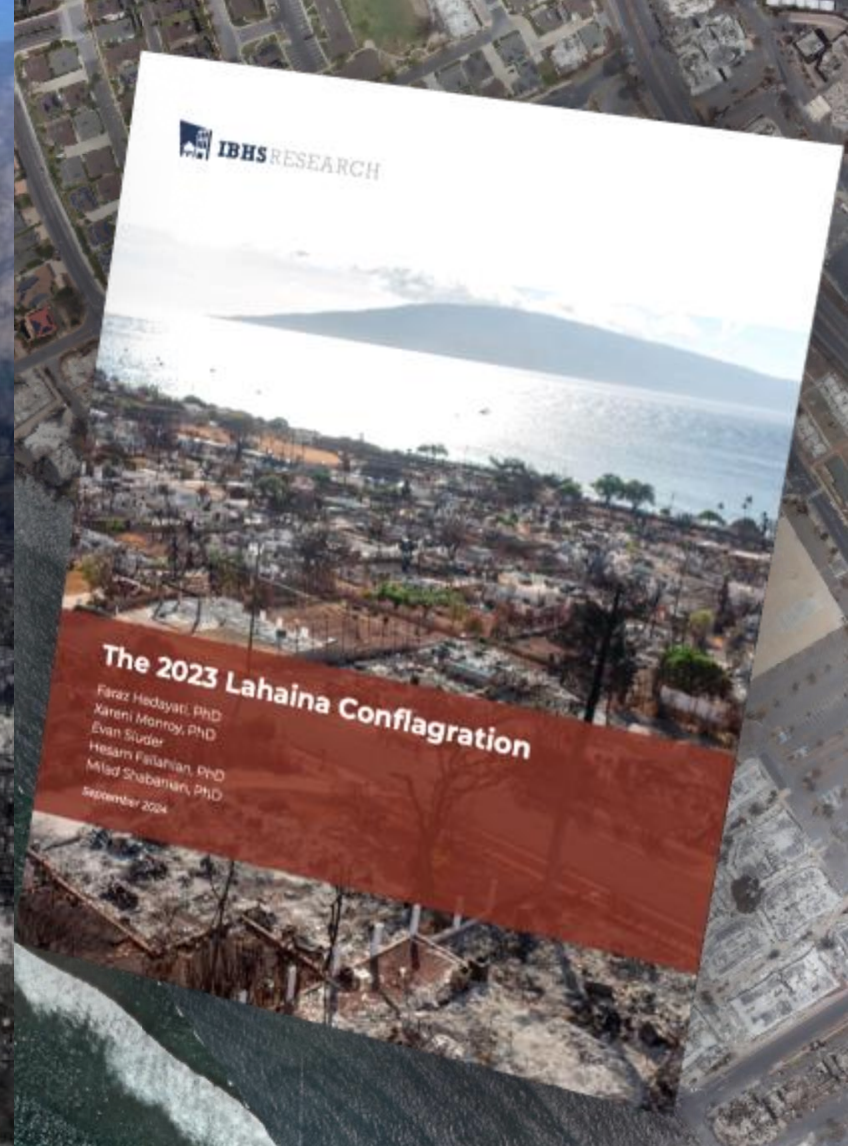




Camp Fire
Paradise, CA



LA Fires
Los Angeles, CA



Lahaina Fire
Lahaina, HI

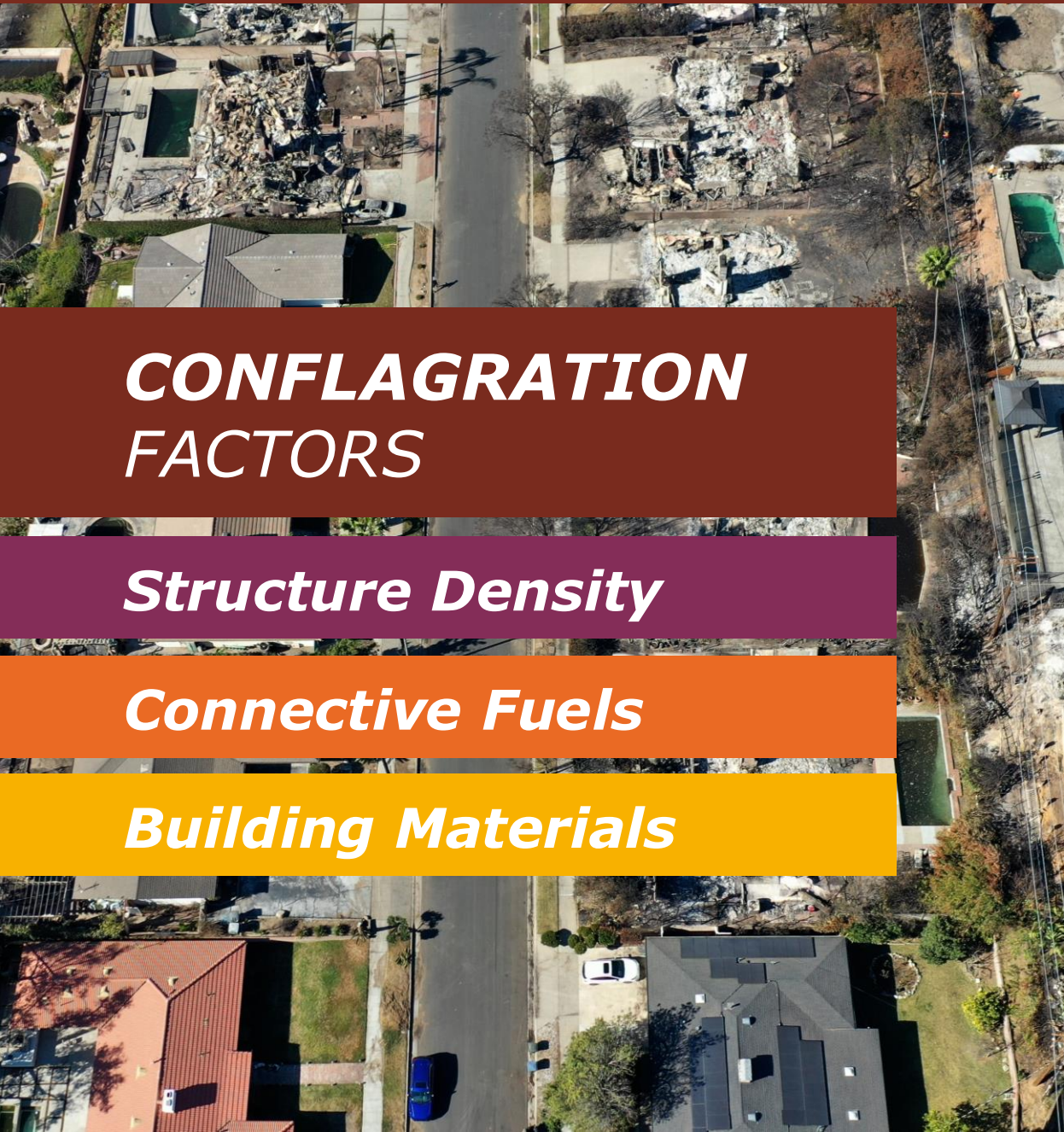
LA County



**IBHS
Research**



POST-FIRE FIELD INVESTIGATION



CONFLAGRATION FACTORS

Structure Density

Connective Fuels

Building Materials

KEY DATA COLLECTED

EXPOSURE	STRUCTURE DENSITY	CONNECTIVE FUELS	Structure spacing	
			Urban fuels	
			Fuel coverage in 0-5' and 5-30' Zones	
RESILIENCE	BUILDING MATERIALS	Roof	Siding	
		Gutters	Windows	
		Eaves	Doors	
		Vents	Decks	



The 2025 LA Conflagrations

Xareni Monroy, PhD
Evan Sluder
Faraz Hedayati, PhD
Hank Pogorzelski
Murray Morrison, PhD

December 2025

<https://doi.org/10.82346/kyxn-ns13>

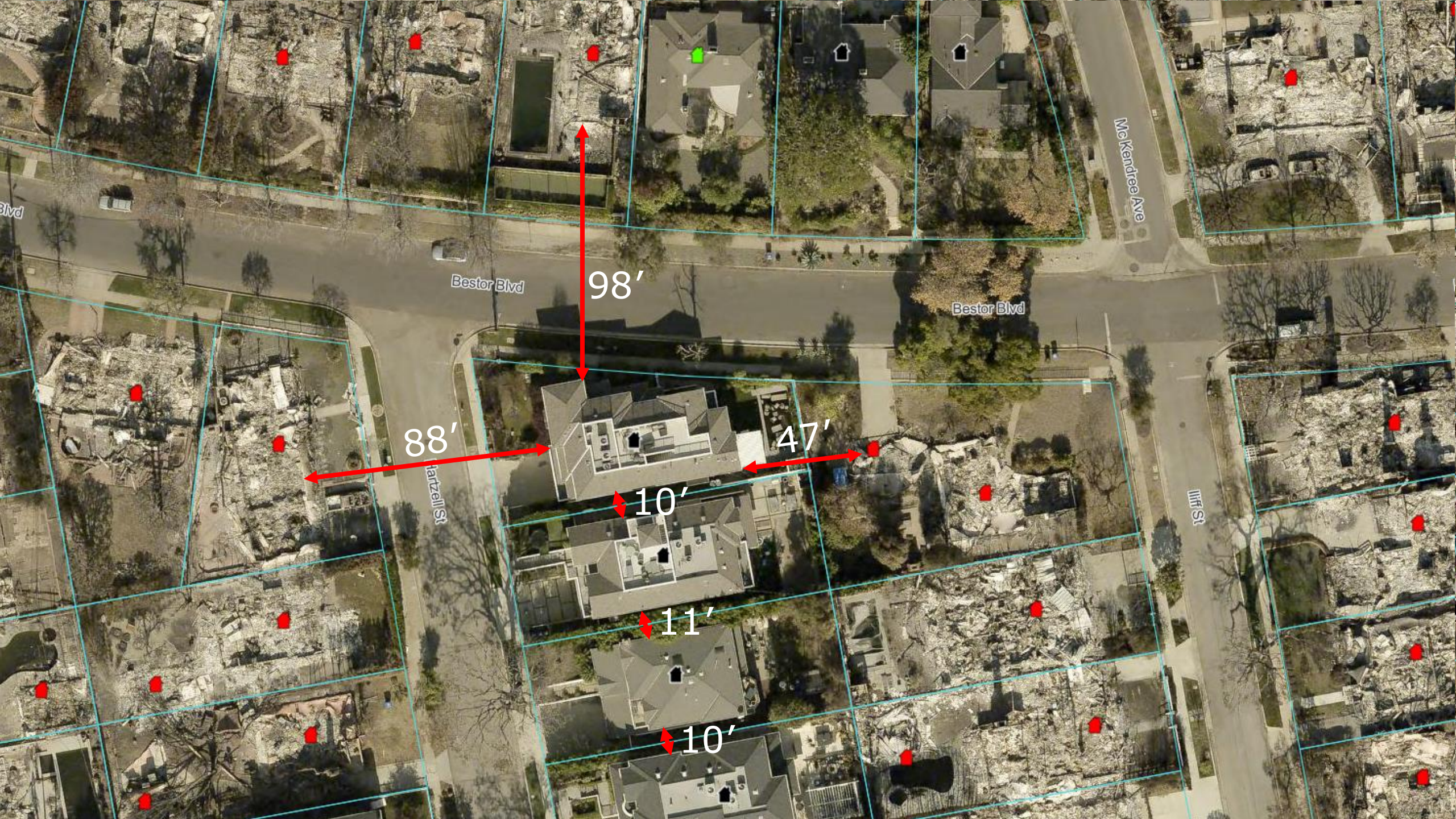


CONFLAGRATION FACTORS

Structure Density

Structure separation is one of the **most critical factors** in wildfire resilience.

At 10-foot spacing, even **well-hardened structures** can experience substantial damage/loss.



Blvd

Bestor Blvd

McKendree Ave

Bestor Blvd

88'

Hartzell St

98'

47'

10'

11'

10'

11th St

Cold Flow
Measurement

No-wind
Shed
Burns

Modeling
Shed
Burns

With Wind
Shed
Burns

Modeling
ADUs

ADU Burns

Wind-driven building-to-building fire spread



NIST





The 2025 LA Conflagrations

Xareni Monroy, PhD
Evan Sluder
Faraz Hedayati, PhD
Hank Pogorzelski
Murray Morrison, PhD

December 2025

<https://doi.org/10.82346/kyxn-ns13>



CONFLAGRATION FACTORS

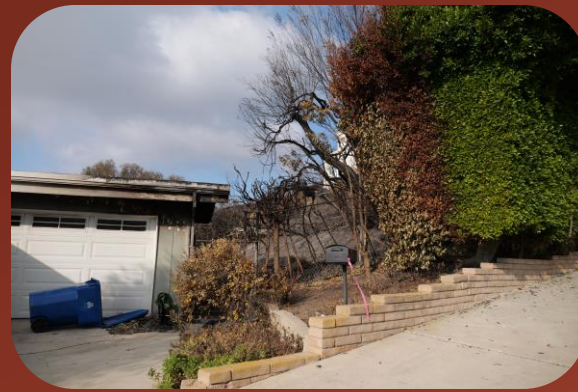
Connective Fuels

More than 25% fuel coverage in the 0-5' Zone pushed the risk of damage or destruction to nearly **90%**.

More than 25% fuel coverage in the 0-5' Zone reduces the effectiveness of the 5-30' Zone fuel reduction.

CONNECTIVE FUELS

**FIELD OBSERVATIONS:
LA COUNTY**



**Bushes
Privacy Hedges**



Trash Cans



Hot Tubs



Fences



Fence w/Veg



Decks



Pergola



Vehicles



Sheds

CONNECTIVE FUELS: PRIVACY HEDGES

FIELD OBSERVATIONS: LA COUNTY



VIDEO: CAL FIRE



The 2025 LA Conflagrations

Xareni Monroy, PhD
Evan Sluder
Faraz Hedayati, PhD
Hank Pogorzelski
Murray Morrison, PhD

December 2025

<https://doi.org/10.82346/kyxn-ns13>



CONFLAGRATION FACTORS

Building Materials

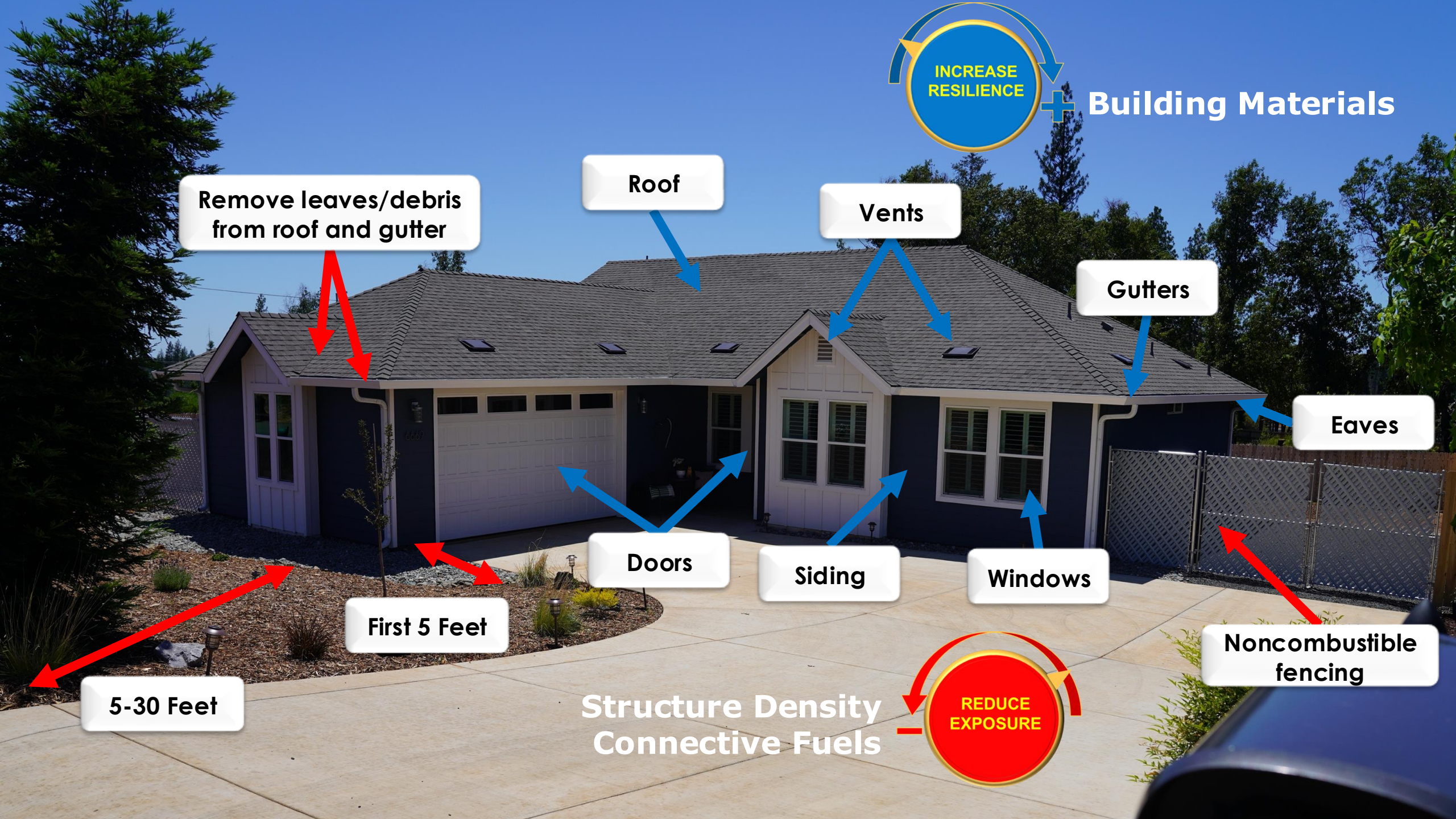
Homes with four hardening features — Class A roof, noncombustible siding, double-pane windows and enclosed eaves.

Had a **54%** chance of avoiding **damage**, compared to **36%** when only a single mitigation was in place.

BUILDING MATERIALS

FIELD OBSERVATIONS: LA COUNTY





+ Building Materials

**Remove leaves/debris
from roof and gutter**

Roof

Vents

Gutters

Eaves

Doors

Siding

Windows

First 5 Feet

5-30 Feet

**Noncombustible
fencing**

**Structure Density
Connective Fuels**





A ***WILDFIRE PREPARED HOME AND MULTIFAMILY*** CAN REDUCE IGNITIONS FROM **EMBERS, FLAMES, AND RADIANT HEAT** BY INCREASING THE RESILIENCE OF THE HOME WITH FIRE-RESISTANT BUILDING MATERIALS AND REDUCING THE EXPOSURE IN THE AREA SURROUNDING THE HOME.

A ***WILDFIRE PREPARED NEIGHBORHOOD*** CAN REDUCE IGNITIONS AND SLOW *THE PROGRESSION OF FIRE* INSTEAD OF ACCELERATING FIRE SPREAD, **INCREASING THE EFFECTIVENESS OF FIRE RESPONSE** UNDER EXTREME CONDITIONS.

WILDFIRE PREPARED

— HOME —

ENHANCED MITIGATIONS AGAINST FLAMES

- ✓ Cover gutters.
- ✓ Enclose eaves.
- ✓ Install noncombustible siding.
- ✓ Upgrade windows & doors.
- ✓ Upgrade to a noncombustible deck.

- ✓ Move accessory structures at least 30 feet away.
- ✓ Remove back-to-back fencing.

INCREASE
RESILIENCE

Building Materials

REDUCE
EXPOSURE

Structure Density
Connective Fuels

ESSENTIAL
MITIGATIONS
AGAINST EMBERS

ROOF

- ✓ Ensure the roof covering is Class A fire-rated & maintained clear of debris.
- ✓ Choose noncombustible gutters & downspouts.

BUILDING FEATURES

- ✓ Install flame- and ember-resistant vents or 1/8-inch metal mesh vents.
- ✓ Ensure 6-inch vertical noncombustible clearance at base of exterior walls and decks.
- ✓ Clear & maintain the underdeck area; enclose low-elevation decks.

0-5 FOOT NONCOMBUSTIBLE ZONE

- ✓ Establish a **0-5 Foot Noncombustible Zone** around the home and decks; remove overhanging branches; replace combustible fences within 5 feet.

5-30 FOOT DEFENSIBLE SPACE ZONE

- ✓ Maintain yard with spaced vegetation, structures, & other connective fuels; clear debris; remove firewood.
- ✓ Move structures at least 10 feet away & maintain a 0-5 Foot Noncombustible Zone around them.



Reducing risk, reduces ignitions.

“Wildland-urban fires are a structure ignition problem, not a wildfire problem” Jack Cohen

Reduces the likelihood of conflagration.

An aerial photograph of a suburban neighborhood. A multi-lane highway runs along the left side of the frame. The houses are mostly single-story with light-colored roofs. In the background, there are large, dark, rocky mountains under a clear blue sky.

SURVIVABILITY

kb
HOME

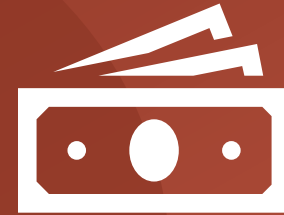
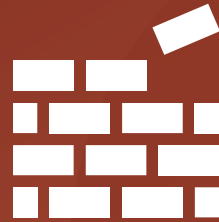
***BUILDING A WILDFIRE
PREPARED NEIGHBORHOOD***

INSURABILITY

SCALABLE RESILIENCE



Insurance Pricing



**State & Fed
Grants, Low
Interest Financing,
& Tax Incentives**

Consumers

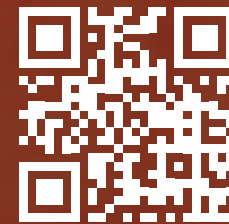




Steve Hawks

Senior Director for Wildfire

shawks@ibhs.org



➔ ibhs.org



🐦 [IBHS_org](https://twitter.com/IBHS_org)