CATASTROPHE MODELLING, CLIMATE CHANGE AND INSURANCE REGULATION

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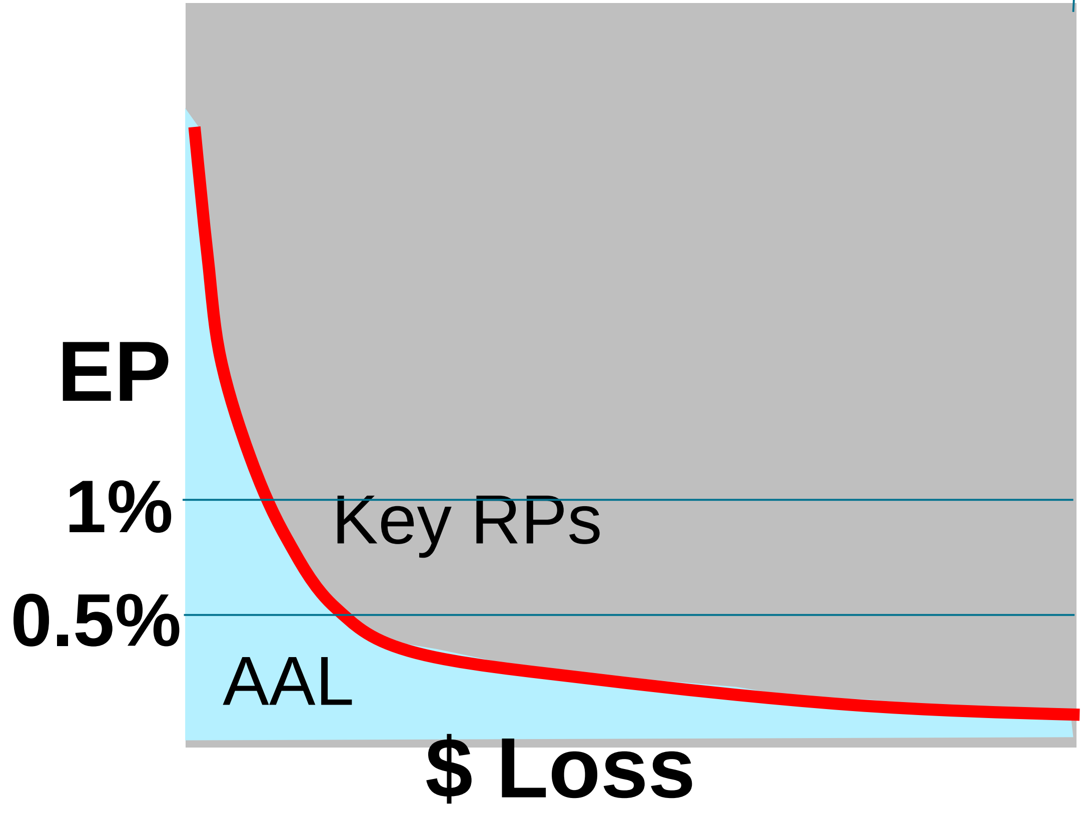
TO DEMONSTRATE CAPITAL ADEQUACY AND INSURANCE RATING WE NEED A PROBABILISTIC CATASTROPHE MODEL



Since 2014, there has been approximately US $18 billion in North America wildfire cat event losses

Key Features of 2018 model

- Probabilistic Wildfire HD model
- **Coverage:** United States and Canada
- **Realistic fire footprints** developed at 50 m resolution
- Includes surface fuels, topography, weather conditions, moisture, suppression, and spotting
- **Underwriting Data:** Wildfire Hazard Data and Risk Score Data products

Some key differentiators

- Explicit ember and smoke simulations to detail impacts beyond the fire perimeters
- Mitigation and Suppression measures developed with leading experts
- Includes fires spreading into urban areas
- Able to represent spatial and temporal reinsurance terms

CONTRIBUTIONS FROM EMBERS

- Without the presence of a flaming fire front, embers still attack and ignite structures.
- Unique view of risk in that there is no radiant heat component

https://s3-us-west-2.amazonaws.com/assets.www.wenatcheeworld.com/media/img/photo/2015/06/29/a031652068-fire-spreads.jpg.960x720_q80.jpg

Ember attack beyond flaming front in evacuated community

http://www.yakimaherald.com/photos_and_videos/news_photos/aerial-views-show-the-damage-caused-by-wenatchee-fire/collection_8c7e082e-1eb4-11e5-b423-af0885fd85cb.html

THE FIRE SPREAD ‘PHASE CHANGE’

WILDLAND FIRE

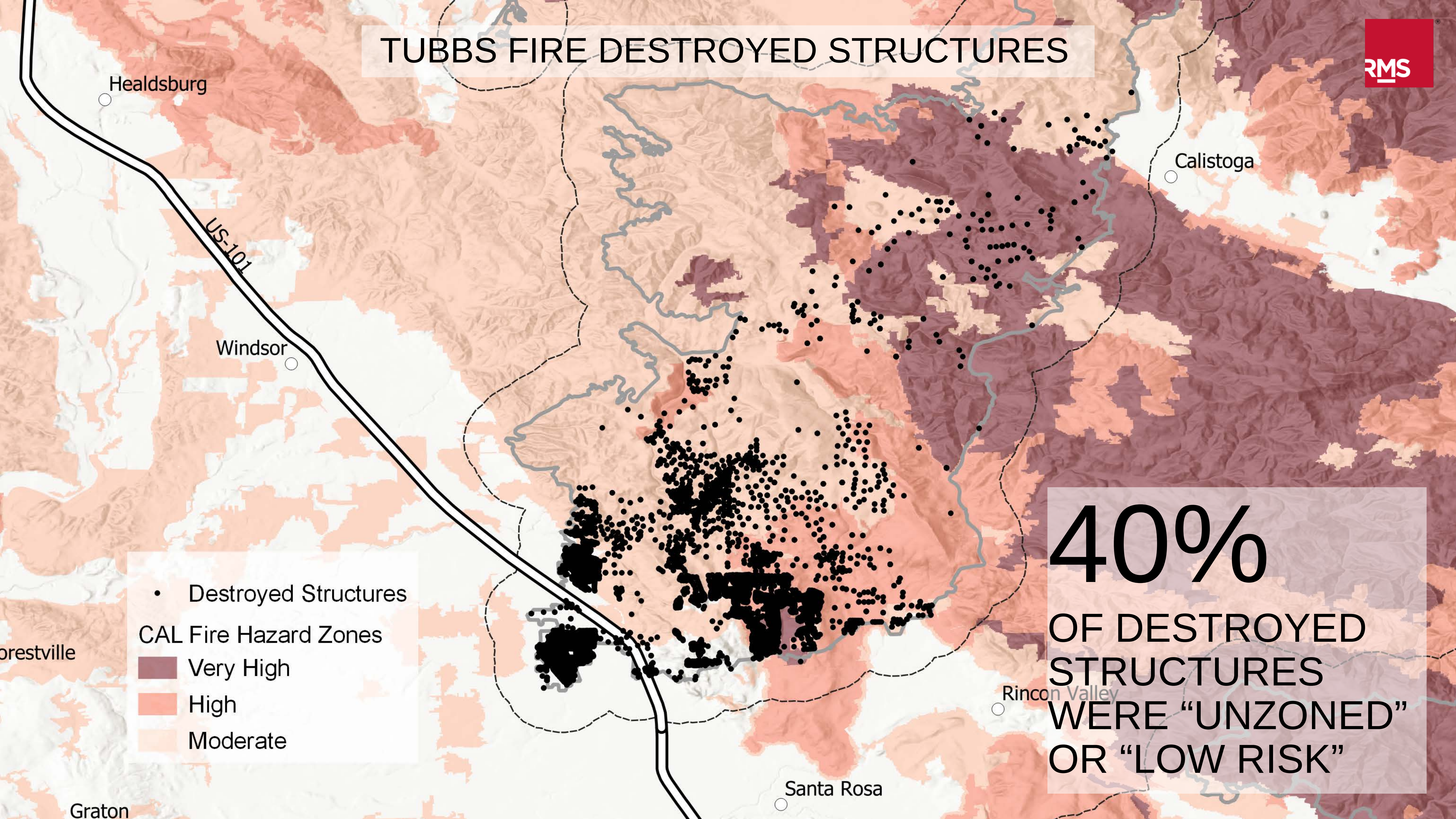
- **Fuel:**
  - Dry vegetation & trees
- **Spread:**
  - Tree to tree
- **Mitigation:**
  - Fire-proof envelope
  - Separation of buildings from vegetation

Transition through windblown embers

URBAN CONFLAGRATION

- **Fuel:**
  - Wooden buildings, their oil and gas supplies
- **Spread:**
  - Building to building
- **Mitigation:**
  - Fire proof envelope
  - Building separation

TUBBS FIRE DESTROYED STRUCTURES



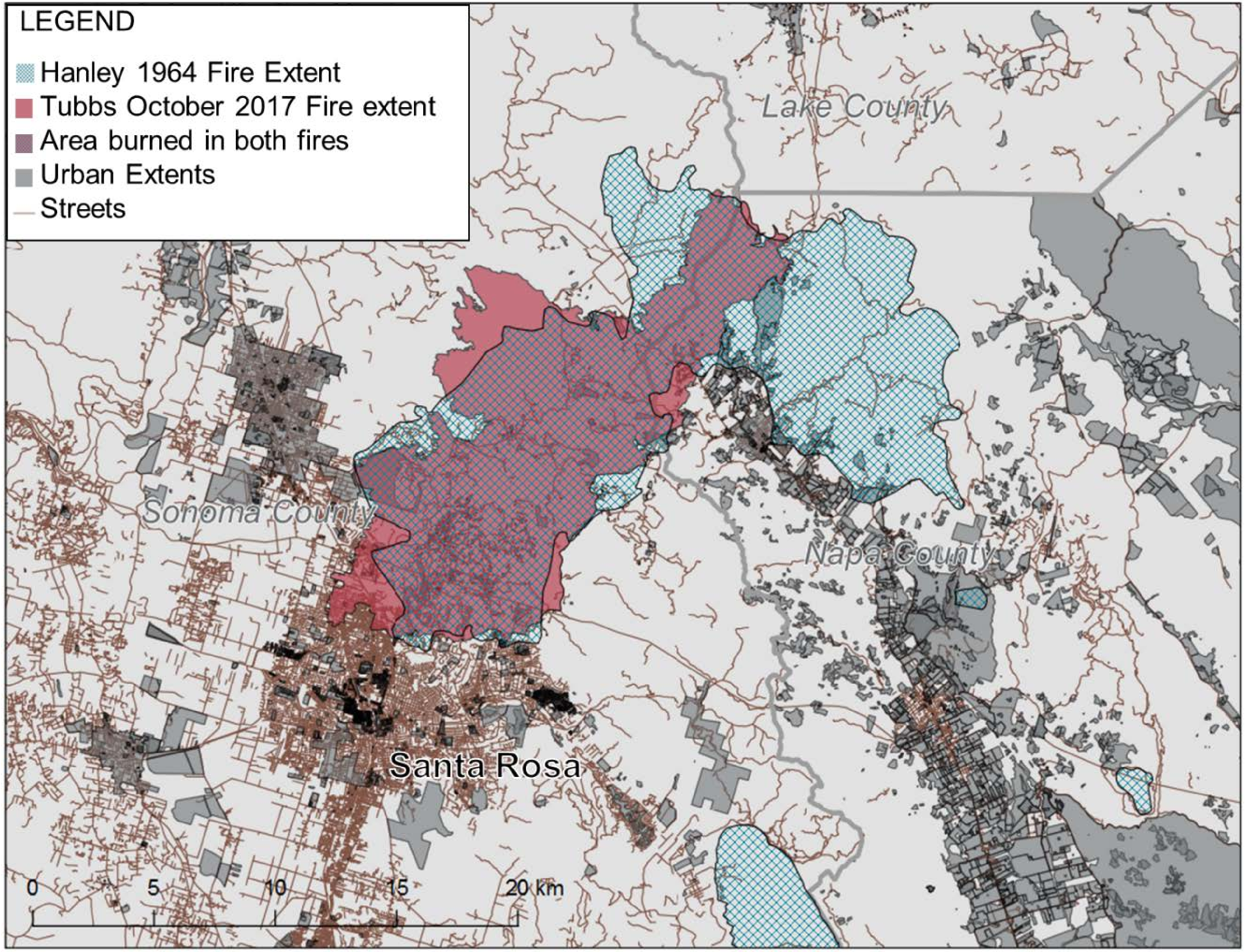
40%

OF DESTROYED STRUCTURES WERE “UNZONED” OR “LOW RISK”

The 2017 Tubbs Fire was a repeat of the 1964 Hanley Fire

Different ignition but same meteorology, vegetation and topography leading to near identical footprint

Residential risk cost for northern Santa Rosa = c 2%?



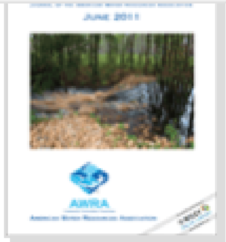
THE CHALLENGE OF PARAMETERIZING A CLIMATE HAZARD CATASTROPHE MODEL IN A TIME OF CHANGE

If Stationarity is Dead, What Do We Do Now?†

Gerald E. Galloway

First published: 1 June 2011 Full publication history

DOI: 10.1111/j.1752-1688.2011.00550.x View/save citation



View issue TOC
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† Paper No. JAWRA-10-0068-P of the *Journal of the American Water Resources Association* (JAWRA).**Discussions are open until six months from print publication.**

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Abstract

Galloway, Gerald E., 2011. If Stationarity Is Dead, What Do We Do Now? *Journal of the American Water Resources Association* (JAWRA) 47(3):563-570. DOI: 10.1111/j.1752-1688.2011.00550.x

Abstract: In January 2010, hydrologists, climatologists, engineers, and scientists met in Boulder, Colorado, to discuss the report of the death of hydrologic stationarity and the implications this might have on water resources planning and operations in the United States and abroad. For decades planners have relied on design guidance from the Interagency Advisory Committee on Water Data Bulletin 17B that was based upon the concept of stationarity. After 2½ days of discussion it became clear that the assembled community had yet to reach an agreement on whether or not to replace the assumption of stationarity with an assumption of nonstationarity or something else. Hydrologists were skeptical that data gathered to this point in the 21st Century point to any significant change in river parameters

nature climate change

ARTICLES

https://doi.org/10.1038/s41558-018-0140-y

Increasing precipitation volatility in twenty-first-century California

Daniel L. Swain[1,2]*, Baird Langenbrunner[3,4], J. David Neelin[3] and Alex Hall[3]

Mediterranean climate regimes are particularly susceptible to rapid shifts between drought and flood—of which, California's rapid transition from record multi-year dryness between 2012 and 2016 to extreme wetness during the 2016–2017 winter provides a dramatic example. Projected future changes in such dry-to-wet events, however, remain inadequately quantified, which we investigate here using the Community Earth System Model Large Ensemble of climate model simulations. Anthropogenic forcing is found to yield large twenty-first-century increases in the frequency of wet extremes, including a more than threefold increase in sub-seasonal events comparable to California's 'Great Flood of 1862'. Smaller but statistically robust increases in dry extremes are also apparent. As a consequence, a 25% to 100% increase in extreme dry-to-wet precipitation events is projected, despite only modest changes in mean precipitation. Such hydrological cycle intensification would seriously challenge California's existing water storage, conveyance and flood control infrastructure.

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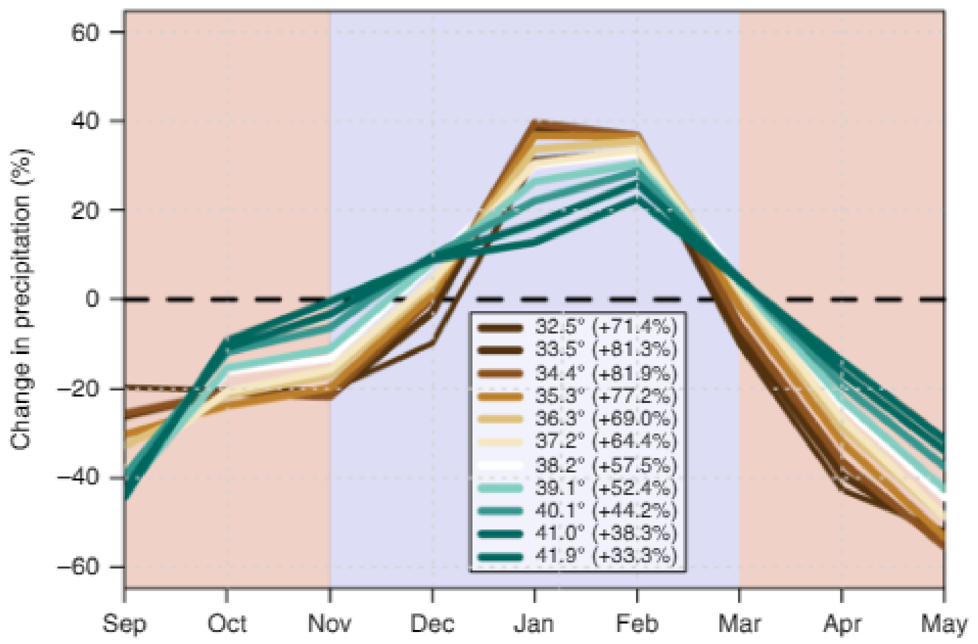

Fig. 5 | Shifts in precipitation seasonality. Relative changes in CESM-LENS monthly mean precipitation at the end of the twenty-first century (2070–2100) as a percent of the PIC climatology for each calendar month for a range of latitudes spanning the California coast. Percentages in the legend denote relative changes in mean 'seasonal sharpness' at each latitude, defined as the ratio between precipitation falling during the core rainy season (November–March; blue background shading) to that cumulatively falling during the marginal rainy season (September–October, April–May; red background shading). Curves are colour coded by latitude (and therefore by mean seasonal precipitation, which increases monotonically with latitude). Dashed black horizontal line denotes zero change in magnitude.

HOW DO WE CALIBRATE THE MODEL IN A TIME OF CHANGE?