Getting Granular to Find Lower-Risk Properties Amid Wildfire Perils

Even as California moves to address regulatory obstacles to fair, actuarially sound insurance underwriting and pricing, the state's risk profile continues to evolve in ways that underscore the importance of risk-based insurance pricing and investment in mitigation and resilience.

Much of California's challenge is related to a 1988 measure – Proposition 103 – that constrains insurers' ability to profitably insure property in the state. In a dynamically evolving risk environment that includes earthquakes, drought, wildfire, landslides, and damaging floods, Proposition 103 has made it hard for some insurers to offer coverage in the state. In some cases, this has led to insurers deciding to limit or reduce their business in the state.

With fewer private insurance options available, more Californians are resorting to the state's FAIR Plan, which offers less coverage for a higher premium. For many, this "insurer of last resort" has become the insurer of first resort. This isn't a tenable situation for the state or its policyholders. California's insurance availability/affordability challenges will require a multi-pronged approach, and underlying every component is the need for granular, high-quality, reliable data.

Underwriting profits can't keep up with losses

Insurers' underwriting profitability is measured using a "combined ratio" that represents the difference between claims and expenses insurers pay and the premiums they collect. A ratio below 100 represents an underwriting profit, and one above 100 represents a loss.

As the chart at the right shows, insurers have earned healthy underwriting profits on their homeowners business in all but two of the 10 years between 2013 and 2022. However, the claims and expenses paid in 2017 and 2018 – due largely to wildfire-related losses – were so extreme that the average combined ratio for the same period was 108.1.

California Homeowners Direct Combined Ratio
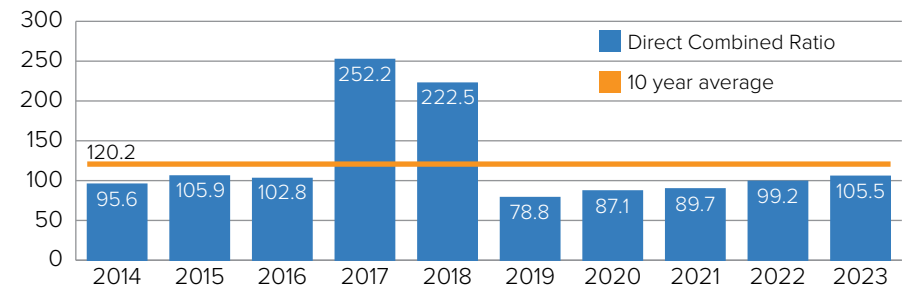
Source: Triple-I analysis of NAIC Annual Statements available through S&P Global Market Intelligence.

Underwriting profitability matters because that is where the money comes from to maintain "policyholder surplus" – the funds insurers set aside to ensure that they can pay future claims. Integral to maintaining policyholder surplus is risk-based pricing, which means aligning underwriting and pricing with the cost of the risk.

The role of Proposition 103

Unlike in most other states, insurers in California have not been allowed to price catastrophe risk prospectively. Instead of letting insurers use the most current data and advanced modeling technologies to inform their pricing, Proposition 103 has required them to price coverage based on historical data alone. It also has restricted accurate underwriting and pricing by not allowing insurers to incorporate the cost of reinsurance into their pricing. Insurers use reinsurance to maximize their capacity to write coverage, and reinsurance rates have been rising for many of the same reasons as primary insurance rates. If insurers can't reflect reinsurance costs in their pricing – particularly in catastrophe-prone areas – they must pay for these costs from policyholder surplus, reduce their market share in the state, or do both.

State efforts to address the problem

In a move toward protecting California consumers and address the pressing challenges posed by climate change, Insurance Commissioner Ricardo Lara in 2023 released the state's Sustainable Insurance Strategy – an ambitious plan aimed at safeguarding the health of the insurance market while ensuring long-term sustainability. A key component of the plan is a requirement that insurers writing homeowners coverage in the state write no less than 85 percent of their statewide market share in areas identified as "under-marketed" by the Insurance Commissioner.

Analysis by Guidewire – a provider of software solutions to the insurance industry – has shown that wildfire mitigation and home hardening can reduce the risk of wildfire damage by as much as 70 percent. But identifying insurable lots in such areas is no easy task.

HazardHub's Wildfire Score

The HazardHub Wildfire Score uses granular geographical data, updated vegetation data, proximity to fire hydrants and fire stations, historical wildfire data, and environmental factors to provide a detailed and accurate assessment of wildfire risk. These assessments can be highly useful to insurers seeking insurable properties in the midst of elevated exposure to wildfire.

Triple-I has used the HazardHub Wildfire Score to take a closer look at a handful of areas in California that have been designated as under-marketed. These areas were selected based on their specific geographic and demographic characteristics to illustrate how taking a more granular view can expose features that improve the accuracy of underwriting beyond what traditional modeling can provide.

Looking at the data

As shown on the map, these areas are differentiated by location and topography. They also vary – as described in each case study – according to population, income, weather conditions, and proximity to other communities.

Undermarketed ZIPs identified by CDI

The areas under consideration are:

Los Angeles – ZIP Code 90210

Mendocino – ZIP Code 95490

El Dorado – ZIP Code 95667

Every property being assessed for wildfire risk is unique; therefore, it's important to subject as many relevant variables as possible to analysis. For example, proximity of structures to fuel is important – but to be more predictive it helps to know more: What kind of fuel? Is there potential for a wind-driven event? Is the property on a hill? If so, is it north-facing?

The model presented here includes standard variables, such as slope, aspect, wildfire history, wind, and the amount of nearby vegetation. It also includes some key differentiators, including type of vegetation and fire-suppression success rate.
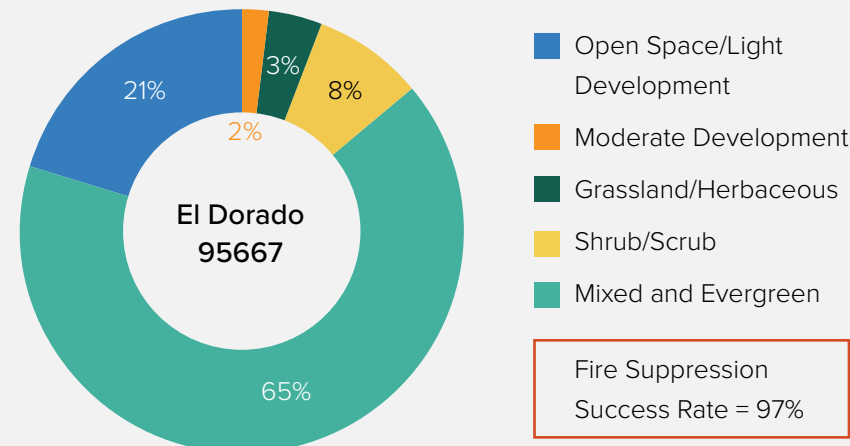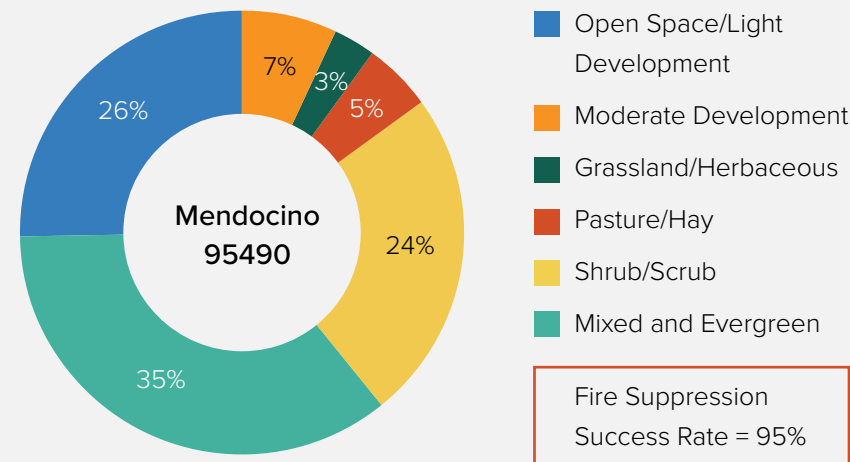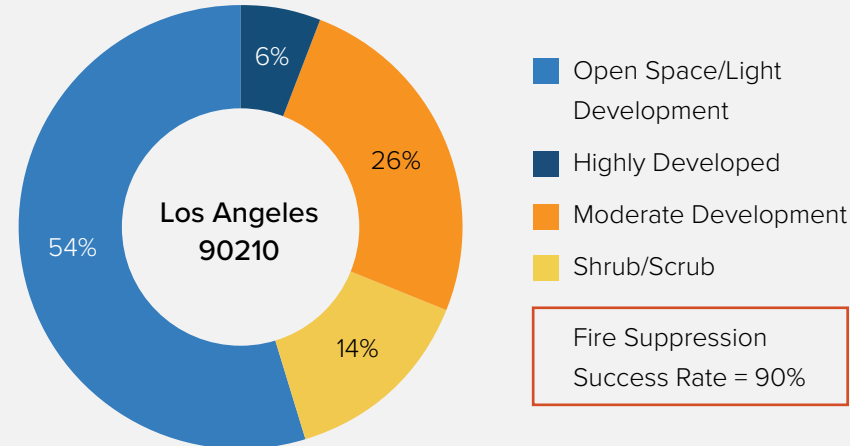
The charts to the right provide HazardHub's breakdown of the fuel characteristics for the ZIP Codes under consideration. Some model providers would report vegetation types for both 95667 and 95490 as the most prominent – mixed / evergreen – and 90210 would be considered as open space with light urban development. Others would use the most hazardous fuel type, in which case all of these study areas may be considered shrub / scrub.

HazardHub determines the weighted average fuel type according to the amount of each fuel type in the area. Consequently, we can consider the entire pie chart for each study area as one component of the model, allowing for a more granular analysis.

The fire-suppression success rate for each area under consideration is determined by counting the number of wildfires that were extinguished before they reached 10 acres in size. At 10 acres, the wildfire becomes a potential threat to life and property that may overwhelm local resources and ultimately require aerial support or the assistance of CalFire and/or other fire resources from outside the area. This is then divided by the total number of wildfires for that region.

The case studies provide the opportunity to evaluate the model from two perspectives. From a statewide perspective, how do the communities compare to each other? This can help carriers decide where to target marketing efforts or where to place new agents for strategic growth that won't hurt the bottom line.

Each study area also demonstrates the granularity of the model differentiating risk levels within each community. This can help carriers be strategic about the properties they write in at-risk areas to satisfy the regulatory minimum market share in wildfire areas.

Los Angeles 90210

- 6% Highly Developed
- 26% Moderate Development
- 14% Shrub/Scrub
- 54% Open Space/Light Development

Legend:
- Open Space/Light Development
- Highly Developed
- Moderate Development
- Shrub/Scrub

Fire Suppression Success Rate = 90%

Mendocino 95490

- 7% Moderate Development
- 3% Grassland/Herbaceous
- 5% Pasture/Hay
- 24% Shrub/Scrub
- 35% Mixed and Evergreen
- 26% Open Space/Light Development

Legend:
- Open Space/Light Development
- Moderate Development
- Grassland/Herbaceous
- Pasture/Hay
- Shrub/Scrub
- Mixed and Evergreen

Fire Suppression Success Rate = 95%

El Dorado 95667

- 3% Grassland/Herbaceous
- 8% Shrub/Scrub
- 2% Moderate Development
- 21% Open Space/Light Development
- 65% Mixed and Evergreen

Legend:
- Open Space/Light Development
- Moderate Development
- Grassland/Herbaceous
- Shrub/Scrub
- Mixed and Evergreen

Fire Suppression Success Rate = 97%
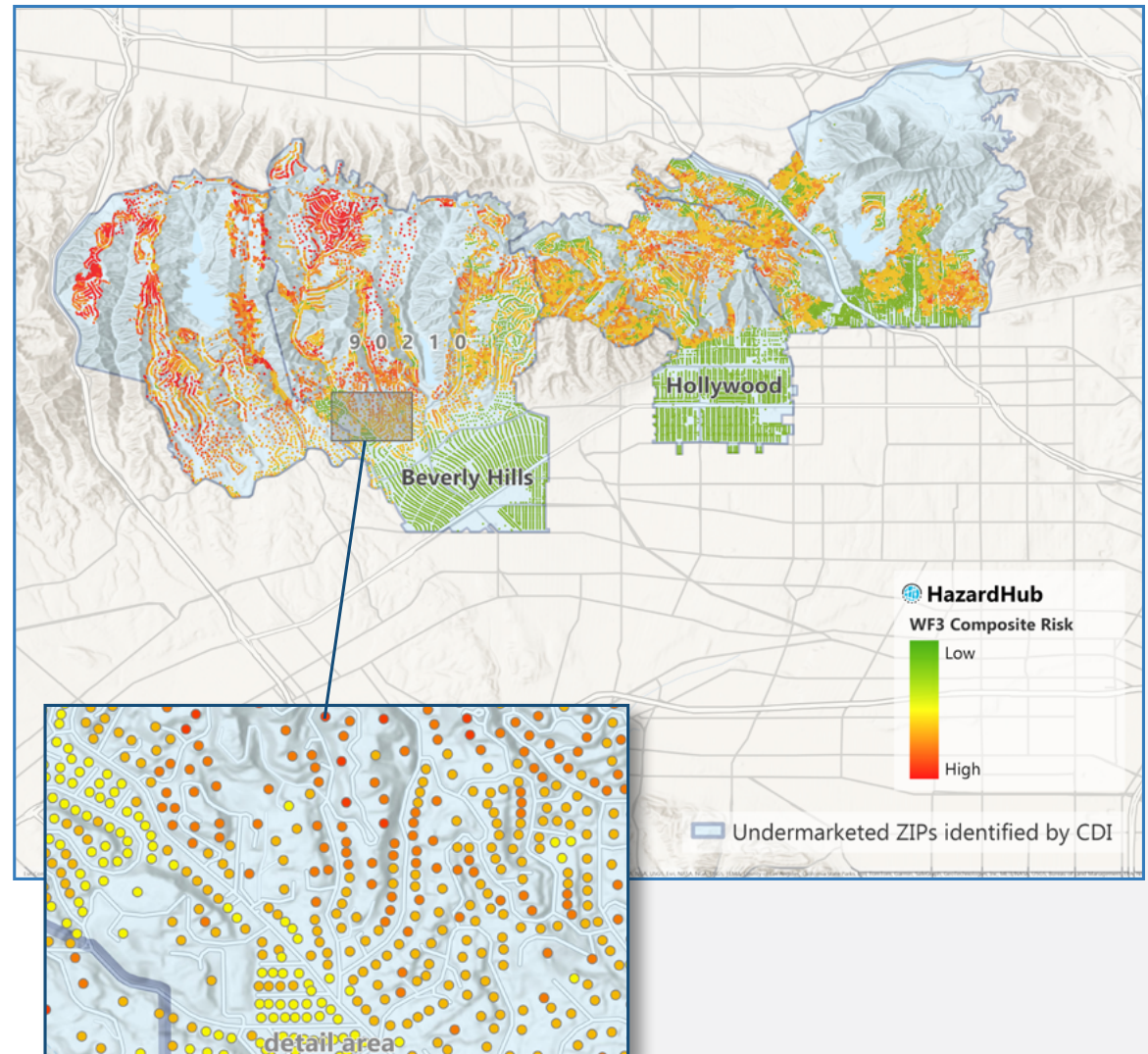
Los Angeles County Case Study

Beverly Hills and the Hollywood Hills, while not generally known as affordable places to live, are an example of how the wildfire problem in California affects the rich as well as the poor. The wildland-urban interface in this case is a place where people have built homes as an escape from the urban sprawl of Los Angeles while remaining close enough to eat out or get groceries in the flatlands. The City of Beverly Hills has some experience with wildfire, and has been proactive about assessing the community for wildfire risk and in working on building safer escape routes.

90210 in particular has around 21,000 residents, and has a median home value of more than $2 million, according to the U.S. Census Bureau ($4.9 million according to Zillow), but residents still struggle to obtain wildfire insurance. The entire community north of Sunset Boulevard is classified in the Very High category of the Fire Hazard Severity Zone (FHSZ) established by the California Department of Forestry and Fire Protection.

Los Angeles County, near Beverly Hills, where risk levels are much lower, is surrounded by undeveloped land with steep terrain that make fire suppression operations more dangerous and more difficult.

We compare a Tower Road property with composite score of 30 to a property on Tower Lane with a composite score of 7. The relatively risk-free Tower Lane location is north-facing with a modest slope of 3 degrees, while the Tower Road property is on a steeper grade at 23 degrees and faces west.

HazardHub

WF3 Composite Risk

Low

High

Undermarketed ZIPs identified by CDI

GUIDEWIRE

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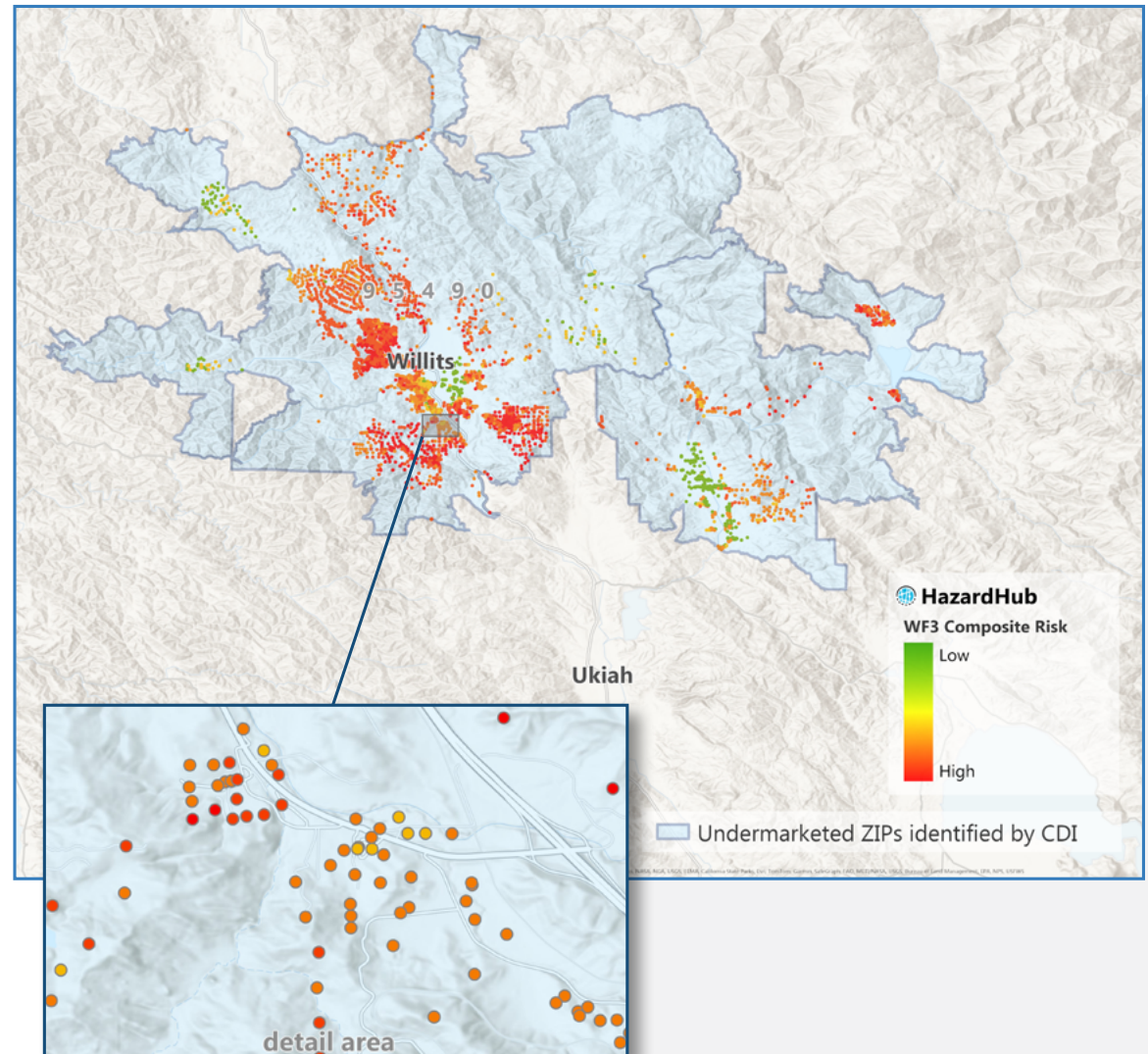
Mendocino County Case Study

Willits is a quieter community located among the trees adjacent to the northern expanse of California's wine country near Ukiah and Hopland. Homes are much more affordable here, with a median home value of $360,000 in the 95490 ZIP code, and residents typically work in forestry, vineyards, or local institutions. The relative isolation is probably why this region has so little population, being 2.5 hours from San Francisco.

Willits and Ukiah are on the rain-shadow side of a coastal mountain range, which means that while towns like Fort Bragg and Mendocino are typically too wet to burn, wildfires are common around Willits.

The 2018 Mendocino Complex Fire, the largest wildfire in California history at the time, and the 2020 August Complex Fire, the current largest, both burned in a similar landscape elsewhere in Mendocino County.

In Mendocino County near Willits, there are some properties with composite scores as high as 222. However, the average composite score here is half that of El Dorado County's. The wind risk here is also half of the wind risk in the first case study.

We compared a property on Main St with a composite score of 42 to a neighbor on Hollands Lane with a composite score of 184. The latter property consists of mixed/evergreen fuels and slope of 23 degrees, while the former is relatively flat with shrub/scrub, which burns faster and can be wholly consumed before radiant heat can damage property.

HazardHub

WF3 Composite Risk
Low
High

Undermarketed ZIPs identified by CDI

GUIDEWIRE

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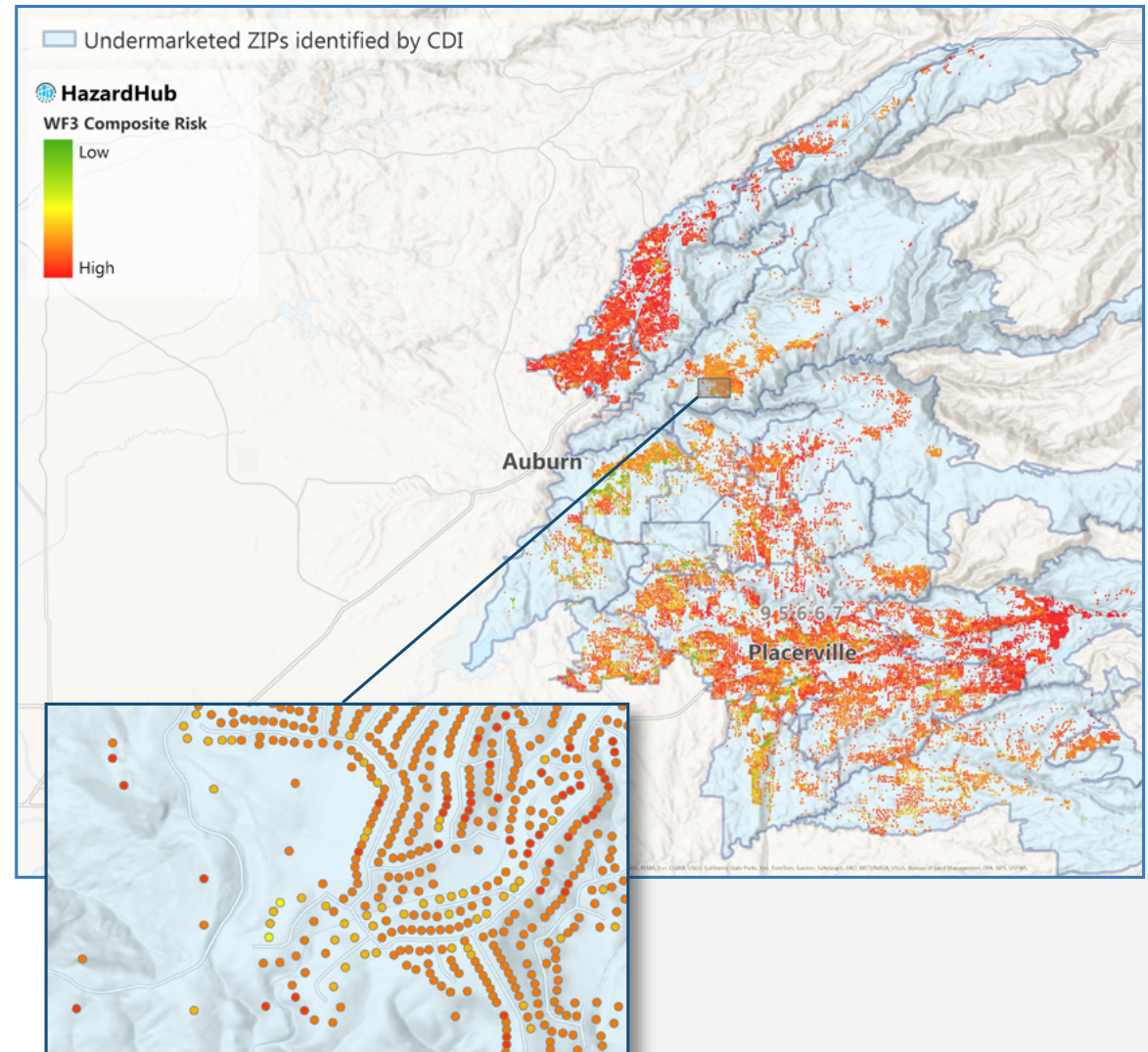Affiliated with The Institutes

El Dorado County Case Study

The towns of Placerville in El Dorado County and Auburn in Placer County are sort of a hybrid of the Mendocino and Beverly Hills examples in that they are relatively affordable places to live in a calmer, more forested environment outside the busier state capital of Sacramento. ZIP 95667 in Placerville has a population of 37,283 and a median home value of $485,000.

Given that and the pleasant weather of the Sierra Nevada foothills (Placerville isn't quite high-altitude enough to get the worst of the mountainous winter), it makes for a comfortable place to live. Towns like Placerville and Auburn had been growing rapidly until 2020, but have been slowly declining in population since, as the commutability to Sacramento has become less of a draw. The 2021 Caldor Fire was the most severe in recent memory in this area, and destroyed 1,005 structures.

The El Dorado County study area has a maximum score of 320 and an average of 204. This area has the highest wildfire risk and the highest wind risk of the areas under consideration. Consequently, it has had four times more incidents than either of the other study areas over the past 25 years.

We compared two locations on Pleasant Valley Rd. with composite scores of 152 and 238. The highest risk location is south-facing with steeper slopes than its north-facing counterpart. In the northern hemisphere, southern slopes are drier and hotter, so vegetation ignites and spreads faster.

Undermarketed ZIPs identified by CDI

HazardHub
WF3 Composite Risk
Low
High

Auburn

95667

Placerville

GUIDEWIRE

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Conclusions

The increasing frequency of high-severity natural catastrophes — wildfires, floods, hurricanes, and other climate-related risks — have underscored the need for insurers to use risk-based pricing strategies grounded in high-quality, forward-looking data.

Traditional regulatory frameworks that restrict insurers to historical loss data limit their ability to reflect current and future risks accurately, leading to market imbalances where insurers either reduce their exposure or exit high-risk regions entirely. This creates a growing reliance on residual market mechanisms, such as state-backed insurance pools or agencies, which often provide more limited coverage at higher costs, posing long-term market sustainability challenges.

To ensure market stability and continued insurance availability and affordability for homeowners, insurers must leverage more granular and dynamic risk models that account for real-time environmental conditions, mitigation measures, and property-specific characteristics. Innovations in risk assessment — such as hazard scoring for wildfires that incorporates vegetation type, fire suppression success rates, and predictive climate modeling — allow insurers to refine underwriting strategies, enabling more accurate pricing and risk segmentation. Additionally, integrating mitigation efforts into risk models and incentivizing mitigation can help reduce exposure, improve insurance availability, and promote proactive loss prevention.

A sustainable property/casualty insurance market — which serves the best interests of homeowners, insurers, communities, and governments — relies on the ability to align premiums with actual risk. This approach ensures that insurers remain financially viable while continuing to provide coverage where it is needed. Achieving this requires use of — and regulatory policies that support — advanced modeling techniques, enabling insurers to incorporate real-time data into pricing decisions. By leveraging these tools, insurers can better identify lower-risk pockets in higher-risk areas, price coverage more accurately, and incentivize proactive mitigation efforts — rather than retreating from high-risk markets.

Ultimately, the future of risk modeling in P&C insurance will be shaped by collaboration between insurers, regulators, and policyholders. Investing in data-driven underwriting, resilient infrastructure, and proactive mitigation strategies will not only improve insurance availability but also strengthen the industry's ability to manage catastrophic risks effectively. By embracing these advancements, insurers can create a more competitive, sustainable, and responsive insurance market — one that protects policyholders while maintaining financial stability in an era of escalating climate-driven risks.