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Wildfire resilience has always been the goal. Now it's a number

For the first time, a land manager in Oregon, a county planner in California or a federal agency in Alaska can look up a single number — the Wildfire Resilience Index (WRI) score — for any community, watershed, congressional district or management unit in western North America, and see exactly where resilience to wildfire is high, where it is dangerously low, and why.

Developed by researchers at the National Center for Ecological Analysis and Synthesis (NCEAS) at UC Santa Barbara and a team of experts, the Wildfire Resilience Index is the first tool to measure both social and ecological wildfire resilience simultaneously, at 90-meter resolution, across more than 700 million pixels spanning the western U.S. and Canada, and Alaska. It is free, open-access and available today at wildfireindex.org.

“Fire is a natural part of many western ecosystems,” said project lead Caitlin Fong. “The real issue is that our communities, infrastructure and policies haven’t kept pace with that reality. The WRI helps pinpoint where misalignments are greatest.”

One of the most striking results that emerged from the maps is that communities are significantly better at recovering from wildfire than they are at withstanding it in the first place. “No one wants to lose their home to wildfire, or have their livelihood disrupted, and then have to build it back, yet that is that is the state of most of our communities,” Fong noted. Building systems more resistant to wildfire rather than

relying on post-fire recovery is an area of urgent need of investment, particularly where human systems that are not yet aligned with fire-adapted landscapes.

Eight domains, one shared framework

The WRI scores resilience across eight domains of value to people and communities: infrastructure, communities, livelihoods, sense of place (iconic places and species), species, habitats, water and air. Each domain is scored on a scale of 0 to 100. Critically, the index separates each domain into two components: resistance (the ability to withstand fire) and recovery potential (the ability to regain function afterward). Most existing indices collapse these into a single score, making it impossible to know whether to invest in pre-fire hardening or post-fire support. The WRI shows both.

Scores can be aggregated to match any decision-making context: the dashboard at wildfireindex.org allows users to look up resilience scores for over 19,000 pre-computed geographies, including census tracts, counties, congressional districts and states.

What the data shows

The index draws on nearly 100 publicly available datasets spanning satellite imagery, census data, building code records, species range maps, air quality monitoring and hydrological assessments.

Scores across western North America averaged 73 out of 100, but that average conceals striking variation. Resilience scores are lowest in interior Alaska and rural communities throughout the West. They are highest in remote protected natural areas and, notably, in wealthier urban neighborhoods — a pattern that reflects the deep entanglement of wildfire resilience with economic inequality.

The weakest domains overall are Water (55 out of 100) and Infrastructure (60). Effective building codes, sufficient financial resources to address wildfire preparedness and response, and well-designed water governance are the biggest gaps that, if addressed, could substantially increase scores. They are also among the most actionable levers of change. States and localities with stronger building codes for fire-resistant materials scored substantially higher, so strengthening those

standards is one of the clearest paths to improving resilience for entire regions at once.

The strongest domains are Species (86) and Sense of Place (82), reflecting that many native species in the West are fire-adapted and that sustained public investment in iconic places like national parks, wilderness areas and heritage landscapes pays off. “But even high average scores mask localized vulnerability,” said Fong. “In some areas, one in five species faces extinction threat, and extinction is irreversible.”

Resilience is not distributed equally

The WRI shows that wildfire resilience tracks closely with wealth because communities differ in their ability to prepare for, withstand and recover from it. Communities with lower incomes, fewer homeowners and limited access to federal and state disaster programs score lower on recovery, even when local social networks are strong. The index is designed to help direct limited resources toward these communities first, providing a defensible, data-driven basis for equity-focused investment.

“The index doesn't prescribe a single approach to building resilience. It identifies where the gaps are, by domain and by place, so that interventions can be targeted," said project co-lead Ben Halpern, director of NCEAS and professor at the Bren School of Environmental Science & Management at UCSB. "Both social and ecological actions are often necessary. The index helps reveal what matters most to people and the trade-offs that may arise with different paths forward."

The framework is designed to be updated over time, tracking how resilience changes as management interventions, climate conditions and policies evolve. It’s also freely available and open-source: all data and code are publicly available for download, enabling researchers, analysts and agencies to run their own analyses. “We want scientists, managers, and really everyone, to dive into the maps and data and see for themselves where things stand,” said Halpern. “Armed with this information, we can start planning for a better future, one where we co-exist with fire in healthy, resilient ways.”

The Wildfire Resilience Index was led by Caitlin R. Fong and Benjamin S. Halpern at the National Center for Ecological Analysis and Synthesis (NCEAS) at UC Santa

Barbara. The research team included experts from the Bren School of Environmental Science and Management (UC Santa Barbara), the Cary Institute of Ecosystem Studies, USDA Forest Service, Stanford University, and Oregon State University. Funding was provided by the Gordon and Betty Moore Foundation.

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