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New map shows Bay Area locations with highest risk of ember-driven wildfires

Recent deadly firestorms highlight danger of smoldering fragments spread by winds

Embers fly in the high winds as a firefighter battles the Franklin Fire in Malibu, Calif., on Tuesday, Dec. 10, 2024. Embers can send spot fires far ahead of a main blaze, ignite yard plants, and transport fire to houses. (AP Photo/Ethan Swope)

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On a new Bay Area wildfire-risk map that gauges the threat of wind-driven embers, Lars Guntvedt's neighborhood in the hills above Los Gatos sits in the highest-danger zone.

Like many of his of Aldercroft Heights neighbors, and plenty of residents around the Bay Area, the 58-year-old school administrator felt confident he had slashed the danger to himself, his wife and their wooden home by

Based on NASA satellite imagery, the map shows where vegetation is most likely to produce dangerous, fire-spreading embers during high winds and low humidity, threatening homes far from main blazes.

Lars Guntvedt, a resident of the Aldercroft Heights neighborhood, discusses wildfire risk in the area during an interview on June 5, 2025, in the Santa Cruz Mountains, south of Los Gatos, Calif. (Dai Sugano/Bay Area News Group)

Recent firestorm catastrophes, including the deadly 2017 razing of Santa Rosa suburb Coffey Park after bits of burning debris from the Tubbs Fire floated over six lanes of Highway 101, and the devastating Los Angeles fires earlier this year have highlighted the role of embers in dramatically speeding and spreading wildfires.

Embers can send spot fires far ahead of a main blaze, igniting yard plants and transporting fire to houses.

“The fire can be down the hill or across the valley and you’re going to get embers falling on your property,” said Craig Clements, director of San Jose State University’s Wildfire Interdisciplinary Research Center. “One or two embers get in the attic and that’s what sets off the fire and the house starts burning down.”

The map, a collaboration between NASA's Ames Research Center and the fire-protection non-profit Santa Clara County FireSafe Council, shows areas where the types and densities of vegetation would be expected to generate embers, also known as firebrands, that could ride winds to new locations.

"When it comes down, it has a very high chance, if it's a dense ember, very hot in the middle, to more or less explode, and spew flames out of it, which can ignite other vegetation or even a structure," said Christopher Potter, an earth scientist at NASA Ames who leads the map project.

Click to enlarge. Ember risk, based on plant types and denseness of growth of living, dying and d
shown on this map. Deep red represents the highest threat, and white the lowest, with gradation
light pink depicting areas deemed to be at risk of producing embers from burning vegetation tha
speed the spread of wildfires. (Courtesy of NASA Ames)

The redder the area on the map, the higher the chance it could launch a barrage of dense firebrands, Potter said.

The map comes as climate change increases the frequency and severity of wildfires in California — four out of five of California's most-destructive wildfires and nine of the 10 largest have occurred since 2017. Fire experts say the map provides a valuable new layer of information for Bay Area fire officials and residents.

Among the most ember-vulnerable communities in the South Bay region, fire experts said, are Saratoga, Los Gatos, Los Altos Hills, Morgan Hill, Gilroy, and in San Jose, Almaden and Coyote Valley, along with Willow Glen, which Potter described as "a perfect example of a place where a fire could rip through there, burn house after house, if it came out of the hills."

The Oakland and Berkeley hills, San Leandro, Orinda, Moraga and Pleasanton in the East Bay, Woodside and Portola Valley on the Peninsula, and the Ross valley in Marin County also are vulnerable, experts said.

Bay Area downtowns, where concrete dominates, are generally considered safe from wildfire, but many of their outskirts and suburbs are not.

A view of the Aldercroft Heights neighborhood on June 5, 2025, in the Santa Cruz Mountains, south of Los Gatos, Calif. (Dai Sugano/Bay Area News Group)

High-risk areas on the ember map are often identified in other maps, including Cal Fire's. But the new firebrand-focused map shows areas considered engines of wildfire spread that menace surrounding neighborhoods and landscapes.

"During the conditions that generate a lot of embers you're going to get heavy ember casts out to one or two miles," said Michael Wara, senior research scholar at Stanford University's Woods Institute for the Environment.

Jared Lewis, manager of environmental planning and natural resources at San Jose Water, the utility that owns and manages much of the Los Gatos Creek watershed, said the ember map's "higher level of detail and

To produce the map, satellite imagery is analyzed to show the landscape by categories of vegetation — forest, shrub and grasses — and how thickly they grow.

That imagery is combined with data showing which vegetation species tend to produce dense embers that can travel long distances without burning out, plus additional mapping by NASA and the U.S. Department of Agriculture of where plant species grow around the Bay Area, Potter said.

Many plants common in the Bay Area can produce dangerous embers, including coyote brush, chamise, broom, eucalyptus, manzanita, pampas grass, acacia, bay, many pines, and Douglas fir, Potter said.

The map is intended to guide work to cut fire risk through controlled burns, fire breaks, and thinning and trimming of firebrand-prone trees and other vegetation, particularly in locations close to residential and commercial areas “where these embers don’t have to travel far to cause a conflagration,” said Seth Schalet, CEO of the Santa Clara County FireSafe Council. The map also will provide a compelling tool to persuade local authorities and private landowners to take on that work or contract with the council to have it done, Schalet added.

Stanford’s Wara noted that once large numbers of houses catch fire, “they’re generating plenty of embers all on their own.” He favors extensive prescribed burns, including “right around houses.”

The FireSafe Council is working to add layers of information on top of the new map, including which areas have the worst routes in and out, and which communities — like Aldercroft Heights — have many older homes less resistant to fire, Schalet said. He would like to see ember-risk maps statewide.

NASA Ames is looking at wind patterns during past fires to add another layer, to determine, for example, that “not only is this a really bad ember production place but it also routinely gets winds at 60 mph during the dry periods of the year,” Potter said.

Up in Aldercroft Heights, Guntvedt’s neighbor Garry Howard, a 67-year-old retired electronics entrepreneur, keeps grasses and brush cut down to dirt

Garry Howard, a resident of the Aldercroft Heights neighborhood, discusses wildfire risk in the area during an interview on June 5, 2025, in the Santa Cruz Mountains, south of Los Gatos, Calif. (Dai Sugano/Bay Area News Group)

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