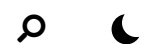


2011 - 2021
10
YEARS



Smoke plume seen rising from the Tunnel Fire in Oakland, Calif. on Oct. 20, 1991. (Courtesy of East Bay Regional Park District)

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Thirty years after the Tunnel Fire: In many ways, Oakland Hills are more vulnerable today



By **Nik Wojcik**

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East Bay Regional Park District

Aftermath of the Tunnel Fire in Oakland, Calif. on Oct. 20, 2021. (Courtesy of East Bay Regional Park District)

Thirty years ago, a 5-acre grass fire in the East Bay hills rekindled the day after it was thought to be extinguished. Fueled by dry Diablo winds, the blaze on Oct. 20, 1991 became the most devastating California fire of the time. The densely populated areas in the Berkeley and Oakland hills wildland-urban interface are in many ways more at risk today than they were then. While many operational issues that plagued the response in 1991 were ironed out after the tragic Tunnel Fire, climate change has exacerbated the area's vulnerability to wildfire.

Background

It all started when a seemingly innocuous 5-acre grass fire sparked on private property along Buckingham Boulevard in the Berkeley Hills. The Oakland Fire Department, along with mutual aid from state and East Bay Regional Parks District firefighters, extinguished the blaze – or so they thought. Smoldering embers lay underneath the unturned duff overnight.

The next morning, warm northeasterly Diablo winds blew in through the canyon. With gusts reaching upward of 65 mph, the fire quickly grew from reignition to inferno in what we now know as the Oakland Tunnel Fire, or Oakland Firestorm, of 1991.

Fueled by the strong wind and accumulation of dry autumn vegetation, the fire destroyed hundreds of buildings and homes in less than an hour, with temperatures reported to have reached 2,000 degrees fahrenheit in some places.



As homes were engulfed and destroyed by flames, embers spread the disaster down the southern Berkeley hills into a housing development, an

apartment building and across Highway 24 and Highway 13, jumping a collective 12 traffic lanes. The burn area would ultimately stretch across portions of Oakland, Montclair, Rockridge, Berkeley and Piedmont, leaving in its wake smoldering skeletons of what were once homes, municipal buildings, infrastructure and vehicles.

In the end, 25 people were killed and another 150 injured. Nearly 3,500 homes and apartment units were destroyed, and thousands of vehicles scorched across approximately 1,500 acres. It is still considered one of the state's most costly wildfires, with damage totaling \$2.6 billion, adjusted for today's inflation.

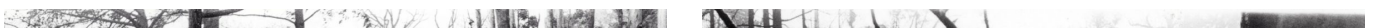
Many of the same climate factors that drove the severity of the Camp and Tubbs fires are present yearly in the hills. Current conditions and ongoing drought have *already* affected the area in ways that could make the next major fire much worse than it was in 1991. Which raises the question: Are the Oakland and Berkeley hills ready for a second firestorm?

Many signs point toward no.

Risks and response then and now

Diablo Winds

It's impossible to say what will ignite the next major fire in the Oakland Hills (although lightning strikes **account for 40 percent** of ignitions in the West), but we can say that it will most likely be between late September and early November when drought conditions are at their peak and Diablo wind events are most dangerous.





After ignition, it's a race between firefighters and the wind. If fire crews are not able to quickly reach containment, strong Diablo winds will fan fires, adding oxygen and driving them forward. The Oakland Hills topography is uniquely beautiful, but incredibly precarious in fire situations.

The wind “funnel” effect makes the narrow canyon especially vulnerable during high wind events.

Jack Kenny, former East Bay Regional Park District firefighter, said:

“It’s just like a blow torch going through there, so that anything that is smoldering or on fire, it just gets amplified.”

The Diablo winds were the single largest contributing cause to the fire’s spread and severity with gusts in excess of 65 mph, according to a Federal Emergency Management Agency report published in 1992. Without the wind event, the fire may still have reignited, but it wouldn’t have developed into the disaster we remember today.

According to the nonprofit environmental research and policy group ***Earth.org***, Diablo winds caused six of the 20 most destructive California

wildfires: Camp Fire (2018), Tubbs Fire (2017), Tunnel Fire (1991), Nuns Fire (2017), Atlas Fire (2017) and Redwood Valley Fire (2017).

The Oakland Fire Department improved many processes after the Tunnel Fire, but it can't change wind behavior, so readiness is key. Due to the extreme risk Diablo winds pose, firefighters are now pre-placed on alert in the Oakland Hills during Red Flag Warning days so they are positioned to swiftly react.

According to David Weise and Robert Martin in the 1994 "Biswell Symposium: Fire Issues and Solutions in Urban Interface and Wildland Ecosystems," two Remote Automated Weather Stations (RAWS) were installed after 1991 in strategic locations around the Oakland Hills. Those stations continuously provide the Fire Department with weather condition updates, so when wind speed and temperature rises and humidity drops, they preemptively deploy engine companies to locations around the high fire hazard areas and increase response. There are now minimum equipment response plans for different hazard levels.

This worked on Oct. 25, 2020. On a Red Flag day, with PG&E Public Safety Power Shutoffs in effect, a privately-owned generator overloaded and started a **two-structure fire**. Crews quickly responded and prevented the fire from becoming a major event.



Oakland Fire Department (CA)
@OaklandFireCA



The fire in 6200 block of Crown Ave is UNDER CONTROL as of 1127 AM. Preliminary cause of this fire is an overloaded generator. 8 people displaced. Moderate winds and an aggressive fire attack by over [#OFD](#) 30 firefighters responding confined this incident to two structures.



It worked again on Sept. 9 of this year when lightning sparked a small roadside fire on Grizzly Peak, which is emblematic of the increased role lightning strikes play in fire ignitions across the state.

Late summer lightning strikes in 2020 ignited about 600 fires that burned more than 2 million acres in Central and Northern California, and **scientists project** the frequency of strikes will increase nationwide by as much as 12 percent for every degree Celsius of global warming.



Alameda County Fire Department

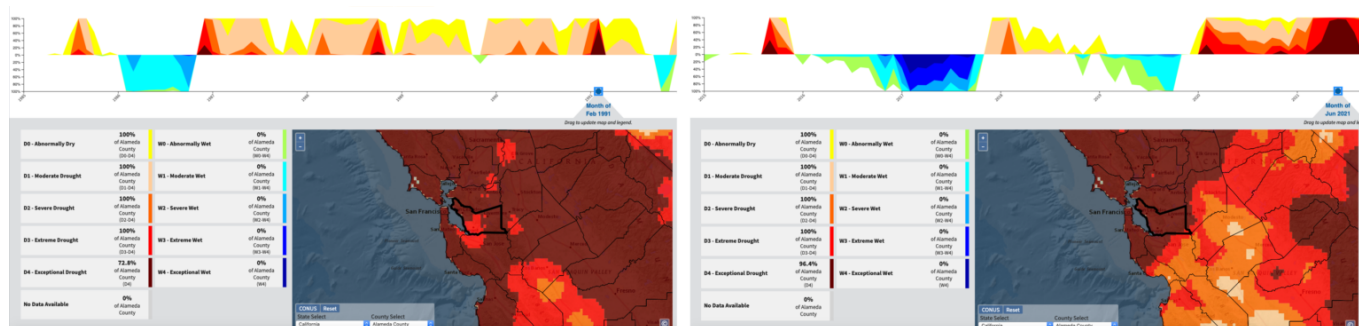
An air drop helps control fire spread from the SCU Lightning Complex in Dublin, Calif. on Saturday, Aug. 29, 2020.

Gov. Gavin Newsom has made substantial investments in the state's wildfire preparedness, including a recent \$2 billion that helped secure 12 additional Cal Fire aircraft. If fire breaks out in the Oakland Hills in isolation, it's likely response and containment will be rapid. But the real danger lies in periods when the state is faced with several large fires burning simultaneously and both crews and equipment are limited, an all too common occurrence since 2017.

Vegetation Fuel

If fire isn't quickly suppressed, any wind present will start driving flames that then consume readily available vegetation fuel.

In a Natural Disaster Survey Report published in April 1992, the National Weather Service described the various colliding circumstances present during the Tunnel Fire as being “one of the most dangerous wildland fire situations.” A record arctic outbreak in the prior winter damaged or killed large swaths of vegetation in the Oakland Hills. According to NWS, ornamental species, natural brush, Monterey pine and eucalyptus trees were most impacted by the frigid winter. The specific tree species “become highly flammable and extremely volatile when dead, dormant, or under moisture stress.” In the fall of 1991, the state was in the midst of a five-year drought, which only compounded the fire's volatility.



Nik Wojcik

Comparison of drought periods between 1985-1991 and 2015-2021 for Alameda County, Calif.
(Courtesy of U.S. Drought Monitor)

While the arctic freeze issue is not at play in the hills most years, there is another silent and growing problem of dire concern. If you look around the Oakland Hills today, you'll notice hundreds of trees with dry browned leaves, sequestered in patches surrounded by still-green hills.

Matteo Garbelotto, University of California, Berkeley professor and one of the state's leading tree pathologists, was contacted this year by the U.S Forest Service and the San Francisco Public Utility Commission and asked to conduct an investigation. He was basically told:

“You got to stop everything you’re doing and you’ve got to work on this.”

The agencies were urgently concerned with a surge of tree death in the Bay Area. While eucalyptus trees were being impacted, Garbelotto found a “much greater mortality” in acacias.

What he observed across the state were two already identified native, or naturalized, fungi that grew rampant as a result of the abnormally wet 2017 winter. The “opportunistic organisms” have infected non-native, invasive acacias, which are already stressed by drought and high propagation rates..He believes the infection may be spreading to eucalyptus as well.

But Garbelotto discovered a third fungus unique to the Leona Heights neighborhood in the Oakland Hills, which compounds morality in that area.

He explained that drought acts as a trigger, or stressor, but that the pathogens are already present and killing the tree from within, doing the “dirty job,” as he puts it. When we finally get years of increased precipitation, the fungi thrive and spread further. This puts trees in the East Bay hills between a rock and a hard place with negative impacts from both drought and rain.

Second Fuels

If fire is left to burn, it will eventually impact surrounding structures, including homes.

Russ Reed, a photographer for The Oakland Tribune, told the New York Times in 1970:

“We saw several fire storms flashing up the mountain. One hit seven homes at once. It was just ‘Boom’ and they were gone.”

Most home hardening preparation focuses on maintaining 100 feet of defensible space from fuels around the home, with fire resistant shingles and fireproof surfaces within 5 feet to protect against falling embers. But many residents don't have the luxury of that amount of space between them and the next house.

Cheryl Miller, Executive Director of the Diablo Firesafe Council and co-author of *Managing Fire in the Urban Wildland Interface* said:

“Usually, if it's house-to-house combustion, it's not coming in through the roof. The heat from the house next door is enough to start igniting stuff inside your home. It may not even blow out your windows. ... Now, you know, if you have, if you have a stucco house and double- or triple-paned windows, there's less chance of that heat coming through, but there's still opportunities.”

At the height of the 1991 fire as it was burning home-to-home, firefighters lost water.

Water availability became a major problem as firefighters struggled to contain the inferno. According to the Biswell report, power outage hindered the district's ability to pump water from the lowlands "at the height of the fire." Many residents left hoses and sprinklers running in an effort to protect their own properties. As flames consumed homes and damaged water lines, the precious commodity began freely flowing into streets. Supply tanks and reservoirs at the top of the hill ran empty at a time when an estimated 20 million gallons were required to suppress a fire of that nature.

East Bay Municipal Utility District has since invested in generators at pressure stations throughout the hills, which enables continued function and needed pressure during power outages. Now, when NWS issues a Red Flag Warning, EBMUD immediately begins pumping water up the hills to ensure they can provide the standard fireflow of 1,500 gallons per minute for a two-hour period.

Unfortunately, there is no fix for the free flow that occurs when a substantial number of residential water lines are damaged, which will again leave firefighters looking for alternative resources.

Evacuation

While there were many lessons learned and organizational issues addressed after the 1991 Tunnel Fire – training city crews in wildland firefighting practices, fixing communication breakdowns, facilitating mutual aid responses, establishing vegetation management inspections and increasing firefighter response on extreme-risk days – some of the most

fundamental problems that existed then have gone unimproved, namely evacuation.

It has been estimated that 10,000 people were evacuated during the large Sunday fire. They were forced to frantically navigate narrow roads with little visibility due, and in competition with fire engines attempting to ascend the same roads, as pointed out in the Biswell report.

First responders now rely on an app-based system known as Zonehaven, which generates evacuation route maps specific to each location where an order is issued and provides real-time updates shared with agencies and the public. The problem, however, is that if power goes out, so do many of the app's data functions.

Miller said that the area is at the mercy of existing and inadequate evacuation routes since any improvements would have had to have been made during rebuilding efforts after 1991. In order to improve evacuation routes now, you'd have to remove parcels to connect cul de sacs and tear up people's yards to widen roads, which wouldn't be practical.



Aerial photograph of the Berkeley and Oakland hills after the Tunnel Fire of Oct. 20, 1991. (Courtesy of FEMA)



Aerial photograph of the Berkeley and Oakland hills before the Tunnel Fire erupted on Oct. 20, 1991. (Courtesy of FEMA)

She said:

“The routes aren’t going to change. What’s got to change is people’s expectation and their preparedness and willingness to not stay in the Hills. ... Our street grid was laid out so long ago, and we’ve continued to fill it up and put more and more cars in.”

She added:

“We have a long way to go, and we really have kind of picked up on the evacuation topic much more since the Camp Fire.”

Miller explains that evacuation has been more of a discussion among professionals, especially since the Camp Fire, but that public engagement is “still in its infancy.”

Technology enables residents to receive county emergency alerts and monitor real-time evacuation updates through the Zonehaven app. Temporary evacuation routes are only activated on the service during active fire events. However, that access is moot if cell phones aren’t charged and home computers are inaccessible during power outages. As Miller reiterated, people now assume cell phone coverage is reliable when, unfortunately, that is not always the case.

The best precaution at this point is early evacuation on Red Flag Warning days, but many residents are resistant to leave before a direct threat is imminent.

Conclusion

The Tunnel Fire changed the game. It was the first of its kind in many ways, at the time it was the largest mutual aid response in California’s history. Due to the many organisational issues in 1991, the state developed a more robust response system in its aftermath.

Historically, a major fire erupts in the Oakland Hills every 20 to 30 years, and with conditions aligned, the area is primed for another massive event. There are fires in the Oakland Hills every year – we know the risks. The question is whether we are prepared to stop the next substantial fire from becoming as, or more, destructive.



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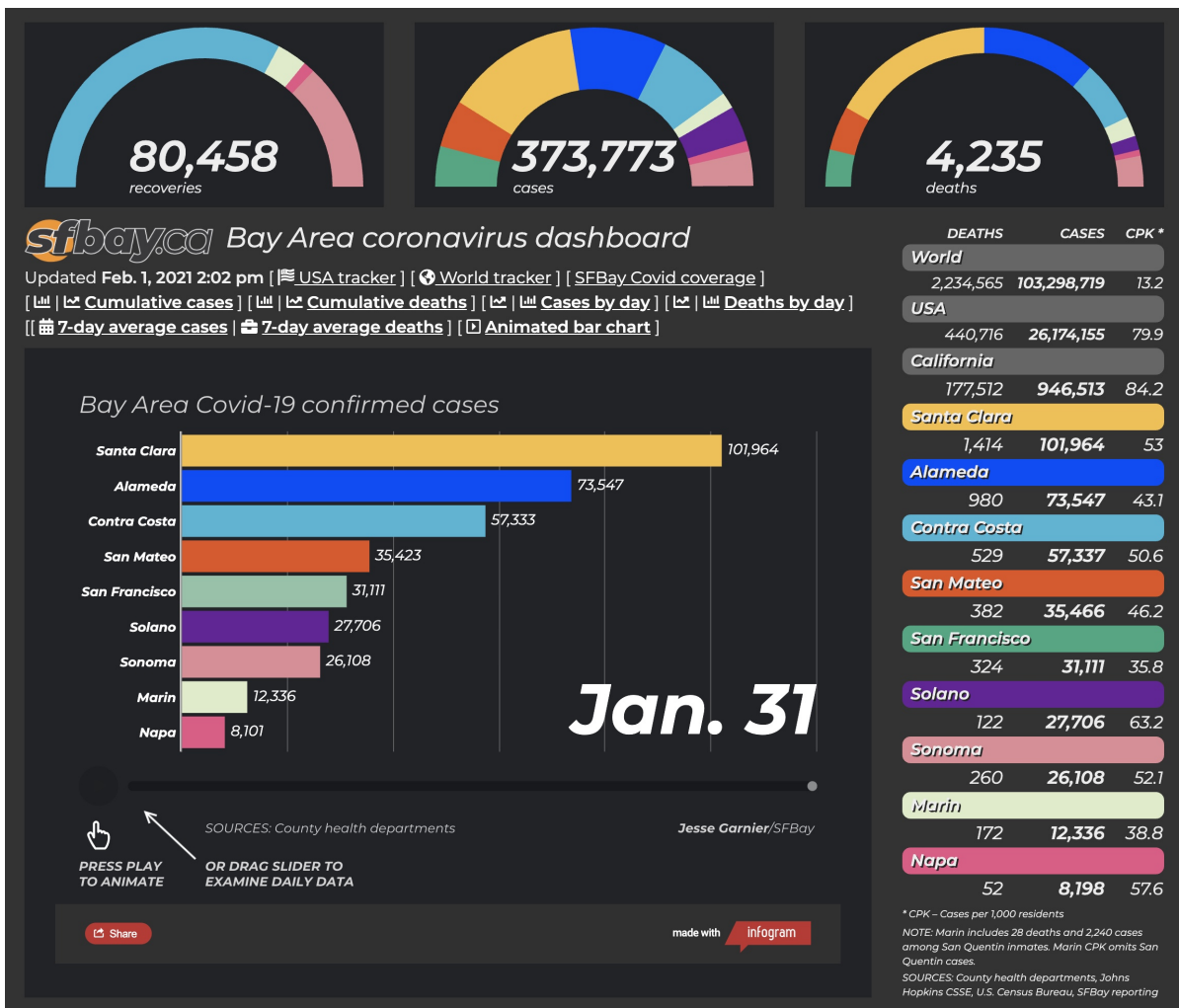
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