# Toxic Ashes and Charred Forests Threaten Water After North Bay Fires

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The fires that burned wildlands and urban areas in Northern California this month now pose a threat to water quality, humans and wildlife as crews work to contain unstable hillsides and keep toxic debris from entering waterways.

In some urban areas, such as this part of Santa Rosa hit by the wildfire on October 13, 2017, ashes are knee deep and contain remains of paint, plastics and rubber.*Tayfun Coskun/Anadolu Agency/Getty Images*

For many homeowners in Sonoma and Napa counties, nothing could have been more welcome than the splashing of rain that fell on Northern California last Thursday – the first significant precipitation in about five months. The rain helped put an end to the fires burning in the area, which first ignited on October 8, and have wreaked hellish destruction on Santa Rosa and other communities.

However, the recent rain – and the precipitation to come in the months ahead – will bring considerable environmental impacts of their own, especially to the waterways, and even water treatment plants, downstream of destroyed forests and incinerated neighborhoods.

More than 245,000 acres burned during California's most disastrous firestorm, turning around 8,400 structures into ash heaps and killing at least 42 people. Now, in the immediate aftermath, numerous agencies, nonprofits and volunteers are collaborating to assess the scope and intensity of the damage and identify areas most vulnerable to post-fire erosion.

"We're concerned about landslides, debris flows and ash-laden runoff," said Jay Jasperse, chief engineer and director of groundwater management with the Sonoma County Water Agency.

Impacts will vary from one burned acre to the next, and urban and wildland areas face different threats to water quality.

"In some of these areas, the fires did what fire is supposed to do," said Brock Dolman, a watershed ecologist with the Occidental Arts and Ecology Center in Sonoma County. That is, the fires burned at relatively low temperatures, leaving adult trees alive while clearing underbrush from fuel-loaded woodlands and cracking seedpods of certain fire-adapted plants, which will allow them to germinate. "So next year we'll see mushrooms and wildflower blooms," Dolman added.

In fact, most of the burned wildlands were hardly devastated, according to Caitlin Cornwall, the research program manager at the Sonoma Ecology Center.

"It appears that in a lot of the mixed forests the fires burned mostly in the understory," said Cornwall, whose organization helps communities manage the health of the Sonoma Valley's wildlands and watersheds.

But in some locations, the fires were hot and destructive, driven by powerful winds and destroying almost every bit of vegetation in their paths. Adult trees burned away from roots to canopy, along with shrubby undergrowth and grasses. With the root networks that help hold soil together incinerated, the risk of mudslides will increase when heavy rains fall.

The watershed of Mark West Creek, one of the Russian River's most important Coho salmon spawning tributaries, was hit especially hard as the Tubbs Fire swept across the pocket of hills several miles northeast of Santa Rosa. Here, rainfall could wash vast amounts of debris into creeks and smother the gravel beds where the endangered salmon lay and fertilize their eggs each winter.

Waterways in the valleys to the east will be similarly impacted – especially Sonoma Creek, where a remnant population of endangered steelhead trout still spawns, and the Napa River, habitat for several salmonids, including Chinook salmon, according to Matt St. John, an executive officer of the North Coast Regional Water Quality Control Board.

He says soil erosion doesn't just affect streambeds. "Especially when they contain ash of burnt vegetation, soils have high levels of nutrients, both nitrogen and phosphorus," St. John noted. "The increased nutrient load in the water can cause blooms of blue-green algae that produce cyanotoxins."

The fallout from the urban destruction will be of a different nature. In the burned-out ruins of some Santa Rosa neighborhoods, for example, the knee-deep ashes contain remnants of paint, solvents, pesticides, plastics and rubber. Heavy metals and hydrocarbons will pose serious and direct threats to people and wildlife for months to come.


Smoke and flames shoot up as a wildfire surges through the Santa Rosa area on October 10, 2017. (Tayfun Coskun/Anadolu Agency/Getty Images)

"After these fires, it's almost like a toxic waste dump," said Richard Halsey, director of the California Chaparral Institute, in Escondido, California. "Just think of all the materials in a house being burned. When those contaminants get into watersheds and out into the ocean, it becomes a major pollution event."

Dolman calls the contaminated ashes from the urban fires "enemy-number-one right now."

"We need to control erosion and keep that toxic ash from being delivered into creeks, especially in areas like Mark West with Coho and steelhead spawning habitat," he said.

Research has shown that smoke from inland fires can even have negative impacts on ocean chemistry and marine life when it settles offshore.

Officials with the California Department of Forestry and Fire Protection, the California Office of Emergency Services, the Federal Emergency Management Agency, the United States Army Corps of Engineers and other agencies, as well as local organizations and conservation districts, have been collaborating in the response to the fires. They are placing sandbags, straw bales and wattles alongside creeks and below impacted slopes to control erosion.

St. John says his agency, and staff from others, will likely place filtration systems in small waterways, and create small settling ponds to collect fine debris. Street sweepers, he says, are working urban roadways to collect ash and particulates. Crews specializing in toxic waste cleanup will spend months sifting through the ruins in Santa Rosa and other towns, sorting and separating refuse that can be sent to conventional landfills and hazardous materials that must be handled carefully and disposed of by more elaborate means. Sewer lines from each home will be closed off to keep ash and charred waste from entering sewer mains and municipal water treatment systems.

Private property represents an added level of complexity in upland watersheds. Cornwall says a great deal of the burned wildlands are privately owned, which she says will make it difficult to assess damage and respond accordingly. She warns against dispersing non-native grass seeds across scorched acreage – which she says is a common response among landowners hoping to regreen burned properties.

“We want to stabilize the soil but without just throwing out seeds that will become the fuel for next year’s fires,” she said.

Cornwall recommends that owners of burned properties with streams on their land line the banks with downed wood and logs, sandbags or coir, or coconut fiber and netting. She says most conventional straw usually contains seeds from grasses – generally non-natives. She suggests rice straw as a safe alternative.

As for rain, Cornwall is eager to see it arrive – but not all at once.

“Ideally, we’ll get many small rains,” she said. “We want seeds to germinate and put roots in the ground as soon as possible so we can stabilize the soils.”