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Experts See New Normal as a Hotter, Drier West Faces More Huge Fires

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One of the deadliest wildfires in a generation vastly expanded Monday to cover more than 8,000 acres, sweeping up sharp slopes through dry scrub and gnarled piñon pines a day after fickle winds and flames killed 19 firefighters.

The gusty monsoon winds where the Colorado Plateau begins to drop off into the Sonoran Desert continued to bedevil about 400 firefighters who were defending 500 homes and 200 businesses in the old gold mining villages of Yarnell and Peeples Valley.

Scientists said those blazes and 15 others that remained uncontained from New Mexico to California and Idaho were part of the new normal — an increasingly hot and dry West, resulting in more catastrophic fires.

Since 1970, Arizona has warmed at a rate 0.72 degrees per decade, the fastest among the 50 states, based on an analysis of temperature data by Climate Central, an independent organization that researches and reports on climate. Even as the temperatures have leveled off in many places around the world in the past decade, the Southwest has continued to get hotter.

“The decade of 2001 to 2010 in Arizona was the hottest in both spring and the summer,” said Gregg Garfin, a professor of climate, natural resources and policy at the University of Arizona and the executive editor of a study examining the impact of climate change on the Southwest.

Warmer winters mean less snowfall. More of the winter precipitation falls as rain, which quickly flows away in streams instead of seeping deep underground.

The soils then dry out earlier and more quickly in May and June. “It’s the most arid time of year,” Dr. Garfin said. “It’s windy as well.”

The growing season also starts earlier, so there is more to burn.

“The fire season has lengthened substantially, by two months, over the last 30 Craig D. Allen, a research ecologist at the United States Geological Survey stat National Monument in New Mexico.

The fire potential is exacerbated by the past policy, beginning around 1900, of putting out all fires. Fires are a natural way of clearing out the underbrush. With that natural rhythm disrupted, the flammable material piled up, so when it did catch fire, it ignited a giant fire that burned hotter and wider.

This total-suppression policy began to ease as early as the 1950s, when scientists began to see fire's role in ecosystems. It was completely abandoned nearly two decades ago.

But in the 1970s, the Southwest entered a wet period, part of a climate cycle that repeats every 20 to 30 years. "That wet period helped keep a lid on fires," Dr. Allen said. "And it also allowed the forests to fluff up."

Since 1996, the climate pattern, known as the Pacific decadal oscillation, has swung to the dry end of the spectrum, and the region is caught in a long-term drought.

Stephen J. Pyne, one of the nation's leading fire historians and a professor at Arizona State University, said, "How we live on the land, what we decide we put on public and private lands, how we do things and don't do things on the land, changes its combustibility."

In many landscapes, he added, "you've enhanced the natural combustibility" by building hundreds of thousands of homes in fire-prone areas, and for years suppressing natural fires, allowing a buildup of combustible materials like the "slash" debris left behind by logging.

"The natural conditions, particularly climate, the land-use changes that interact with it and how we add or subtract fire, those are the three parts of the fire triangle. Almost all of those are pointing in the same direction — bigger, more damaging fires," he said.

While Yarnell is not a new community, and its population remained basically stable between 2000 and 2010, it is representative of the risk involved in the trend around the West for people to move into fire-prone areas in what social scientists call the "wild land-urban interface."

Those expanding communities, with rural views but more urban economies, have been the focus of concern among federal and state officials for a decade or more. While such regions are more plentiful in the East, it is in the areas west of the 100th longitude, reaching from West Texas and the Dakotas to the Pacific Ocean, where the natural aridity, increasingly exacerbated by climate change, makes fires a common threat.

In the West in the 1990s, more than 2.2 million housing units were added in these fire-prone areas, according to testimony by Roger B. Hammer, a demographer at Oregon State University and a leading authority on the issue. Speaking to a House subcommittee in 2008, he called this a "wicked problem," and predicted an additional 12.3 million homes would be built in such areas

in Western states — more than double the current numbers.

Government and scientific data show that destructive sweep of wildfires covered an annual average of seven million acres in the 2000s, twice the totals of the 1990s. Michael Kodas, who is writing a book on modern firefighting, wrote in On Earth magazine last year that scientists believe that number will rise 50 percent or more by 2020.

Yet in fiscal 2013, more than $1.7 billion, or 38 percent of the Forest Service's budget, was to be devoted to firefighting in general, with $537.8 million — a slight reduction from the previous year — specifically allocated for wildland fires. The Interior Department's appropriation for wildland firefighting was $276.5 million, a slight increase over the previous year.

But the federal budget sequester eliminated $28 million from the Forest Service budget, although Interior's remained nearly level. This occurred even though both agencies overspent 2012 budgets of similar size, and though federal firefighters are often first responders, working alongside their state colleagues during blazes like the Yarnell Hill fire.

"The Forest Service is being treated as a firefighter of last resort," Dr. Pyne said. This, he added, "is not what the agency was set up for, and it's not financed for it."

Dr. Allen said that what was different in the recent fires — hotter, more enveloping — is that they are killing far more trees. "We're seeing the size of postfire treeless patches merging into thousands of acres," he said, "sometimes many thousands of acres."

That could permanently transform much of the Arizona landscape as grasslands and shrubs fill in the empty space.

Fernanda Santos and John Dougherty contributed reporting from Prescott, Ariz., and Jonathan Weisman from Washington.

This article has been revised to reflect the following correction:

Correction: July 3, 2013

An article on Tuesday about the deadly wildfire that killed 19 firefighters misidentified, in some editions, the university where Stephen J. Pyne, one of the nation's leading fire historians, is a professor. It is Arizona State University, not the University of Arizona. The article also misspelled the surname of a contributing reporter in some editions. He is John Dougherty, not Doherty.