



Under Fire

From the Rocky Mountains to the coast of California, wildfires are burning bigger, hotter, and closer to home. Why is the West ablaze?

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The young men waded through thigh-high grass beneath the firs and ponderosa pines, calmly setting the forest on fire. They carry torches, dispensing burning droplets of gasoline and diesel fuel. With flicks of the wrist they paint the landscape in flame. The newborn fires slither through the grass and chew into the sagging branches. Every few minutes a fir ignites, flames devouring it in a rush of light, the roar of rockets. It is over in seconds. Only a smoking skeleton remains. The men, firefighters, enjoy this immensely.

"Did you kill a tree, man?"

A big grin. "Yeah."

"I love that sound."

It is 11 a.m. on a Saturday in July, and Idaho is ablaze. More large wildfires burn here now than anywhere else in the nation. Columns of smoke wash over the state, evacuation warnings following. This fire, called Lucky, burns in the Boise National Forest, a couple hours' drive north of the capital. Like many fires in the West, Lucky was started by lightning. After two weeks it has scorched some 1,400 acres. It is not the biggest fire in Idaho. But Lucky has *potential*, firefighters say, as if they were speaking of a gifted child.

For hours they light fires with torches and hand-thrown flares the size of beer cans. In theory, backburning starves an advancing wildfire by eating the fuel in its path. But fire is sly. There is almost always some way for it to spread. And backburning is risky. Tales abound of burns that swelled out of control, and the men who took the blame.

Later in the afternoon the firefighters stand around admiring their work. Blackened acres stretch before them. Suddenly, on the hillside above, a shear of noise and a shudder in the earth. A huge tree has collapsed, its roots burned through. The firefighters are unfazed. They laugh and tease and lean on their axes. Then the wind shifts. A whisper from the north. The laughing stops, the men look up. Glowing embers, little incendiary bombs, glide overhead into unburned forest.

"Damn."

They hustle into the brush, searching for new fires, hoping their names won't go down on the list of those who gambled and lost. After a while they filter back out, finding nothing, satisfied that for now they have gotten away with it.

This is how we deal with fire in America, in small wagers. Fighting fire with fire, trying to prevent the landscape from doing what even firefighters say it wants to do: burn.

Wildfire advances by transforming vegetation into fuel. As plant matter heats, it releases compounds of carbon, hydrogen, and other flammable elements, which react with oxygen to release more energy, starting a chain reaction. Air around the fire warms and rises, sometimes creating winds that fan the flames. Extremely hot fires can manufacture their own weather systems, feeding and driving themselves, covering ground far faster than a sprinting human. Sudden wind shifts have pushed fire onto firefighters who believed they were safe.

The Western wildfire season generally begins in late spring and lasts into fall. Like other seasonal disturbances—hurricanes, tornadoes, ice storms—we have learned to fear its approach. Red walls of flame, leaden pillars of smoke. But fire is the one natural event we regularly treat as though it were alive and battle vigorously as if it were an invading host. There are no hurricane fighters, no tornado-fighters.

More and more, we lose. While fire in densely populated California draws the most attention, forests and rangelands throughout the American West are burning at unprecedented rates. In 2006, wildfires burned 15,000 square miles across the country, a record nearly matched last year. Two-thirds of the burned acreage was in the West. One obvious cause is a decade of drought and warmer temperatures. Mountain snow melts earlier, and winter storms arrive later, extending the fire season in some regions by several weeks. Vast tracts of drought-weakened forest have succumbed to insects and disease, turning trees to tinder. In response, we have bolstered our fighter ranks, padded them with private contractors, provided them more hoses and axes and trucks. Annual federal spending on firefighting has leaped from \$1 billion when the recent drought began in 1998 to more than \$3 billion last year, with even greater costs forecast for the future. But the drought is only one part of the burn equation.

"The more money we spend, the worse it gets," one fire scientist told me last summer. "If that's not a condemnation of our fire policies, I don't know what is."

Historically, the American approach to wildfire has been to try to suppress it whenever and wherever it appears. This strategy is often traced to the great fires of 1910. That year, massive blazes across the West burned millions of acres and killed dozens of firefighters. Smoke drifted as far as New England, along with tales of tragedy and devastation. Gifford Pinchot, first director of the nascent U.S. Forest Service, was convinced that fire threatened the economic well-being of the nation, and as the man in charge of a huge, federally owned empire of forested land, he was in a position to turn his ideas into policy. He began a campaign to banish fire.

"We understand that forest fires are wholly within the control of man," he declared.

Under Pinchot and his successors, firefighting became a courageous struggle. We grew adept at killing fires, especially small ones. But we did not understand that fire, like rain, is necessary. Those firefighting campaigns, combined with a decline in logging and a growing conservation movement,

meant vegetation—potential fuel—began to pile up. A study published in 2005 reflects the sort of change seen across the West. Researchers at Northern Arizona University studying two patches of Arizona forest estimated that in the late 1800s they contained about 50 trees for every 2.5 acres. After nearly a century without fire, up to 1,700 trees now crowd the same area.

By stamping out small fires and allowing fuel to stockpile, our policies ensured that when conditions were right, fire would return—bigger, hotter, more destructive than ever. And the right conditions could become routine. Most climate models now strongly suggest that the recent drought is not just a temporary phenomenon but part of a long-term drying trend made worse by global warming. There comes a point where no amount of money, no measure of heroism, is enough. Far from "wholly within the control of man," fire becomes unstoppable.

Idaho's Lucky fire represents the American firefighting world in miniature. Crews from all over the West and beyond have come to fight it and a few other fires nearby. They work dawn to dusk, sleeping in tents or on bare ground. Helicopters costing up to \$80,000 a day rattle overhead, dropping water and blood-red fire retardant. In a command tent far from the fire, the bill is tallied. By July 26, nine days after the fire began, it was \$1.5 million. July 29: \$2.6 million. August 1: \$4.5 million. Dozens of fires burn elsewhere in Idaho alone.

Robert Barrett, the U.S. Forest Service firefighter in charge of battling Lucky on the ground, commands his men and women in a voice raspy from years spent sucking smoke. He is 46, slight and strong, with an easy grin and a scrub-brush goatee. He tours the fire on foot and in his pickup, divining its mood.

"Fire is cool," Barrett says. "It's cool trying to figure it out, seeing what you can do about it. It's a mental exercise. You never know what it's gonna do."

Stones ping off the truck as Barrett steers down a road that is little more than a welt of dirt between ravines. His guitar, stashed beneath the seat, twangs in its case. He coughs often in long, wet runs. The heat and storms of smoke and dust have not dulled the thrill of a good burn. "I love my job. It keeps me out of jail." A fireman's joke. Lucky has burned now for about a week. Each day Barrett wakes before dawn and makes coffee on the tailgate of his truck, thinking about his next move, and the fire's countermove. At night, most fires here "lay down," burning slower under wetter, cooler air and the suffocating lid of their own smoke. Because of this, firefighters occasionally attack fires at

night, but it is dangerous work. More commonly, they exploit fire's drowsiness in the early morning. By late morning the air generally warms and dries, and wind begins feeding the flames. At Lucky, the relative humidity can drop from 30 percent to 15 percent in a few hours. The day slides into the burning hours, when fire thrives.

More than anything, Barrett wants to keep Lucky from leaping a small river into a chunk of forest where trees stand dense and dry. He knows that Lucky, like any wildfire, has the potential to rage out of control in the span of an afternoon. He also faces another problem, one that greatly complicates wildland firefighting today. If the fire jumps the river, houses and ranches lie in its path. Since the end of World War II, people have streamed into the West, injecting houses and roads and towns into places they never existed before. In the 1990s, eight million new homes sprouted along the borders of parks and forests, where fires regularly start. The government spends exorbitantly attempting to defend property in these areas. Formally this is known as the wildland-urban interface. Some firefighters call it the stupid zone.

Just before noon on a Monday, Barrett sends another crew in to backburn. It begins well. The scent of gasoline, flares popping. The teakettle whistle of combusting wood. But just after 1 p.m., the wind shifts. The fire bends back on itself, toward vast sweeps of trees, ready fuel. The wind shift could undo a week of work, or worse. Excited voices call over the radio. Barrett tugs on his backpack to hike the fire's edge and sense it for himself. He grabs a Pulaski, the combination ax and adze that firefighters use to chop, cut, and scrape.

Lucky advances down a steep ridge, the fires torching, hot orange declarations. We hike along a shallow firebreak of bare soil. Fire hoses snake through the dirt. To our left, thick green stands. To the right, a smoking expanse, like something shelled by artillery. Flames a few feet high snarl and hiss in the wind. Smoke swallows us, burning our eyes and plugging our throats. When it clears, I see Barrett hacking at a fire that has jumped the line, smothering it with dirt. Then he stops and stares at the forest below. Four, five, a dozen new pools of flame blink in the smoke.

"I think we've lost it," he says. The wet cough. He takes a radio call and his face falls. *That damn wind.*

"I think it's gone across the river."

We retreat, following the hoses out. In places they are burned through, nicked arteries spurting water. We drift in and out of heavy smoke. I lose Barrett, glimpse him, lose him again. When we finally emerge, word comes that a crew has found and killed the fire across the river.

A few hours later Barrett sits cross-legged on a large boulder, a radio in each hand, hands resting on his knees. Still as a monk. No new fires have sprouted on the other side, and his firefighters have retaken the fire line. The turns of fortune. It might easily have gone the other way.

A helicopter passes, its orange bucket sailing overhead like a comet, mist trailing behind. Justin Bone, one of Barrett's lieutenants, watches it go and shakes his head. "We're spending millions on 1,500 acres," he says. "How many city fire departments would that pay for? They might as well be pouring dollars on the fire."

Like Barrett, Bone loves his job. And he shares with many others the belief that trying to fight all fires is a loser's game. Bone favors an alternative strategy called "wildland fire use," in which some wildfires are monitored but allowed to burn, gradually thinning the forests and clearing out fuel. It is not a new approach. Native Americans burned forests and grasslands to create game habitat and clear fields. Many plant species benefit from a periodic purging. Bone stabs a finger toward the forest, heavy with ponderosa pine. With their thick, tough bark, the trees can survive all but the most severe burns. Other pines require fire for reproduction; their seed cones are coated in a waxy resin that must be melted off by heat to free the seeds. As fire burns dead wood and live plants, it also releases nutrients into the soil. This is crucial in arid zones, where decomposition without fire would take decades. Not all fires can be left to run their course, but the ecological argument behind the idea is compelling.

"That's the future, man," Bone says. "We need to learn to let things burn."

Lucky is one star in a constellation of fire. As it burns, other fires follow lightning storms through Idaho into Montana. Some flicker and die. Others are born where the wind is right and the ground good and dry. On satellite maps the West appears cancerous, red patches spreading.

In Missoula, Montana, Mark Finney tracks them from his office at the Missoula Fire Sciences Laboratory. Finney is slim and wiry. He has worked on engine crews and might have become a professional firefighter like Barrett, but in college someone noticed he was good at math. Now he

spends a lot of time with virtual fire. The federal government has recently begun using a computer-modeling program he helped develop to try to understand how small fires grow into monsters and how we might fight them.

"You can't know fire unless you play with it," he says.

The three most important ingredients driving fire are weather, terrain, and fuel. Finney's program, called Fire Spread Probability (or FSPro), is the latest attempt to make sense of these interacting forces. It can simulate thousands of weather scenarios, based on years of records. It accounts for local topography (fire often moves faster uphill, for example) and the type of fuel: thick stands of trees, grass or chaparral, slash left by loggers. FSPro mathematically synthesizes all of these data on massive computers in Kansas and assigns burn probabilities to individual bits of land. Then it builds a map showing how a fire could advance across a landscape. The amount of data is immense. Modeling can take hours. Eventually the map emerges from Finney's printer covered with multicolored inks. A stand of drought-stricken pine near the fire might have an 80 to 100 percent chance of igniting; it appears red on the map. A wet meadow farther away might have a 5 to 20 percent chance: blue. Fires tend to grow in elliptical shapes, so the maps are blotched with rainbow rings, like tie-dyed T-shirts. FSPro can be used with other powerful programs, such as Google Earth, to create intricate maps showing the location of houses, roads, dams, even wildlife habitat—crucial information for firefighters. As a fire moves, the maps are updated and fed to commanders, helping them decide which areas are most likely to burn, where best to deploy their armies.

Up and down the fire lines, people know of Finney and his program. It is something new, something promising. But it can only give probabilities. "People really want to know the ultimate extent and shape of a fire," Finney says. "And that's just not possible."

In early August, FSPro takes on the kind of blaze it was built for: an inferno surging across a checkerboard of public and private lands, some quilled with trees, some heavily logged, some inhabited. The Jocko Lakes fire begins with a lightning strike in the brown hills of western Montana. It smolders in secret for a few days, consuming dead wood and desiccated brush. Then the wind arrives. The fire roars. By the time someone notices it on a blustery Friday, it is uncontrollable. FSPro guesses where it could go and shows the inhabited areas in the way.

But Jocko moves too quickly for the young program. Observers watch the fire burst from 10 acres to 300 in 20 minutes. By Saturday evening it runs toward the town of Seeley Lake, prompting the evacuation of an estimated 675 homes. For a time, Jocko becomes the most important patch of burning earth in America, a magnet for firefighting resources. At six days old it encompasses an area larger than Manhattan.

Outside Seeley Lake, Patricia Rerick and Ralf Schurmann have an hour to pack. They can see the flames from the deck. They fumble through the calculations of disaster.

It won't really happen. We'll be back in a few days. What should we take?

They collar their three dogs, grab dog food and a few official documents, and pile into their pickup. The house was new.

In a few days they return to a crater filled with twisted metal and rimmed with blackened nails. Their bedsprings, the cloth burned away. Shattered plates. The refrigerator shriveled and bowing toward the earth. They sift through the wreckage. It tinkles under their feet, the sound of thin ice cracking. Ralf masters the art of identifying disfigured relics.

"What's this, honey?" Patricia holds up some crisped object.

"DVD player," he says.

A ceramic rooster emerges from the pile, sooty but intact, a gift from Ralf's mother. Patricia winces.

Of all the things.

Bits of ash spin down, soft as eyelashes. Some of the landscape surrounding the couple's home is charred and dead, corpses of trees, smoke hanging gray between them. Some is green and living, intact meadows, stands of untouched pine. On an FSPro map, the entire neighborhood was red, highly fire prone. But the neighbors' houses survived.

Why us?

"The firefighters kept reassuring us. They said they'd drop retardant all around it."

The firefighters were probably young. Older ones tend not to make promises.

The Jocko Lakes fire burned some 36,000 acres and cost over \$30 million. At the time, it seemed large. Then came California. For three weeks last fall, fires swept the southern part of the state. Firefighters arrived in force. They fought and retreated and retreated again. There was little they could do but make sweat-drenched stands outside homes, and hope for the wind to die. More than half a million people were evacuated and over 2,000 homes were destroyed. Images of disaster saturated newspapers and television. Plumes of smoke, visible from space, arced over the Pacific. If the nation was shocked, most experts weren't. "If anyone was surprised, it was because they were young or inexperienced," says Jack Cohen, a federal fire researcher who lived in southern California for a decade and often returns to study the wildland-urban interface. Cohen names other deadly, destructive California fires. Oakland–Berkeley Hills, 1991. Laguna Hills, 1993. Cedar and Old–Grand Prix, 2003—a year even worse than 2007.

The state's fire environment differs in significant ways from the rest of the West. Southern California fires often begin and grow in chaparrals, dry thickets of shrubs and trees, many of them oozing combustible resins, all of them well adapted to fire and ready to burn. Usually the fires are ignited directly or indirectly by humans. A boy playing with matches caused one of 2007's major blazes; arsonists lit others. The fires become fierce because Santa Ana winds—strong seasonal winds unique to California—act as giant bellows. When the Santa Anas blow, California often burns.

The region is also the extreme expression of the trend to place ourselves in fire's way. California is the most populous state, growing by roughly ten million people every 20 years. Much of the south is particularly crowded. Houses clot the furrowed landscape. Factors that once constrained settlement—sparse water and remoteness, for example—no longer apply. Americans have been increasingly freed, even encouraged, to spread out and pick plots based less on logic and more on the view. The government policy on this migration into fire territory has been no policy at all, and Americans generally want it that way.

Cohen has watched this movement for more than two decades. He has a deep sense of irony and laughs at his own crankiness, accumulated over years spent watching people ignore the power of fire and repeat their mistakes. After the autumn fires he again traveled to California and again found himself shaking his head.

"The scale of the evacuation was bizarre, quite frankly," he says. "When you evacuate 300,000 houses, to me that's a suggestion that you don't really know what you're doing. With all of our technology, we are obviously incompatible with the environment that we live in."

Cohen is an expert on how houses catch fire. If you examine a neighborhood after a large fire, he says, one of the most striking details is the green, unburned vegetation that often remains between the ashen heaps. It's a sign that what probably ignited the houses was not burning trees or chaparral; instead, the houses touched off one another as embers blew like wind-borne viruses. They landed on the roof or blew under the eaves. They sifted through ceiling vents. In dense neighborhoods, houses replace trees as the primary fuel.

Houses need not serve as tinder, Cohen says; they can be built with fire-resistant roof shingles and siding. "In California there were significant cases of communities that did not burn and did not evacuate because they were fire resistant." Some California communities require fire-resistant construction. Many others do not. "We have the ability to be compatible with fires," Cohen says. "But we mostly choose not to be."

No single action will reduce fires or their damage. Saw-wielding crews may thin the fuel load, but there is simply too much overgrown land. Prescribed burning, fires set on purpose, is a common, if risky, method. It remains to be seen if Americans will voluntarily stop moving into fire-prone areas, or if they will take to the idea of letting natural fires burn unchecked. The best approach would consider all these measures and apply each where appropriate. That would also require a rare symphony of government effort and public will.

And yet, regardless of policy, a basic problem remains: Fire is a force beyond control. Americans in particular have been reluctant to acknowledge that no government or technical solution, no matter how well funded, or brilliant, can halt natural processes or remove their power to affect lives. For this reason, and with an eye toward the increasing costs, many experts believe it is time for a new era of American responsibility, perhaps with policies like those in Australia, another country facing massive wildfires. There the government does not attempt to protect all private property. Responsibility is placed largely on individuals. Citizens are encouraged to evacuate well *before* wildfires arrive—when weather forecasts indicate danger—and government programs teach methods for making homes less vulnerable.

Mark Finney, the fire forecaster, lives in a fire-prone area outside Missoula. He decided long ago he would not depend on others to protect his home. So each autumn, before wet, cold weather leaks over the mountains, he waits for the humidity to be just right, for the wind to blow just so, and then he burns portions of his 50-acre spread. His two sons carry torches and stare at the flames. His old dog rolls in the ash and cloaks itself in soot. The small fires he creates clear dead, dry brush, surrounding him in the blue ink of low probability. When the big fire comes, it won't find much fuel. Odds are it will chew right past.

"I'll sit back with a beer and watch," he says, grinning. *You can't know fire unless you play with it.*

Finney's neighbors occasionally ask if they can borrow his fire-setting tools. He says no. His approach is not for everyone; it requires an intimate knowledge of fire and the landscape. But we can all pay closer attention to the choices we make, the environments we live in. In California, many of the homes destroyed last fall are already being rebuilt. With every new house raised in the chaparral or slotted into the evergreen forests of the Rockies, a wager is placed. *It won't happen to us.* In fire's terms, it is the equivalent of rebuilding below sea level in New Orleans. The water, the flames, will return. They always do.