Introduction

Pile some kindling and small logs in a fireplace so that the paper underneath will send its heat up into them after it is lit. Strike a match. Quickly tilt it so that the flame burns up along this tiny bit of fuel between your fingers, so the match flares strongly enough to pass fire to the wood. Or to the charcoal in a backyard barbecue. Or to the pine needles and twigs within a circle of rocks forming a campfire ring. Or, perhaps, simply to a candlewick, which flares, flickers, and then persists. Light emerges from wick and wax, energy suddenly made visible. Heat also appears, which had been trapped within that fuel, hidden until that moment.

Light and heat are basic attributes of the familiar process of fire. Flames can be comforting and useful when tamed to our will. But this is a wild force, too, one that can roam across the landscape, transforming matter, returning often enough to shape adaptations by plants and animals, and sometimes delivering unstoppable destruction to human communities.

Need it even be said that fire is neither bad nor good, in itself? It is one of the natural, inevitable processes of this earth. We, too, are creatures shaped by fire, using it more purposefully than any other species.

Fire, as our tool, melts, reshapes, cuts, heats, cooks, emits light, and propels us over the ground or through the air. Obvious fires burn in furnaces and smelters, welder's arcs and acetylene torches. More subtle uses trap fire out of sight in our internal combustion engines, or where small pilot lights hide beneath gas water heaters and stoves, waiting to awaken heating elements and burners.

So many examples in our lives reveal our special relationship with fire. Homes, factories, and business buildings may be equipped with fire extinguishers, smoke alarms, and overhead sprinklers. Career firefighters staff fire stations with specialized fire engines and fire gear. Where communities are too small for that extravagance, volunteer fire departments are organized to fill the need. By the start of each year's fire season, seasonal wildland firefighters are hired and trained as hotshots and smoke jumpers, hand crews, and hose crews. Dozer operators and highly trained aircraft pilots are put on call.

Though preparation for fires permeates our lives, when they finally arrive, it is usually a shock, as if our secret thought all along was *fire will never happen to me.* A woman who lost her home in the wildfire that raced through the Oakland Hills in 1991 exclaimed, "We had sidewalks! The way people talk about the fire area, you would think I was Little Red Riding Hood living in the forest!" (Sullivan 1993, 23). Her amazement, after learning that modern urban life could be so disrupted by wildfire (fig. 1), illustrates the importance of knowledge about fire in California.

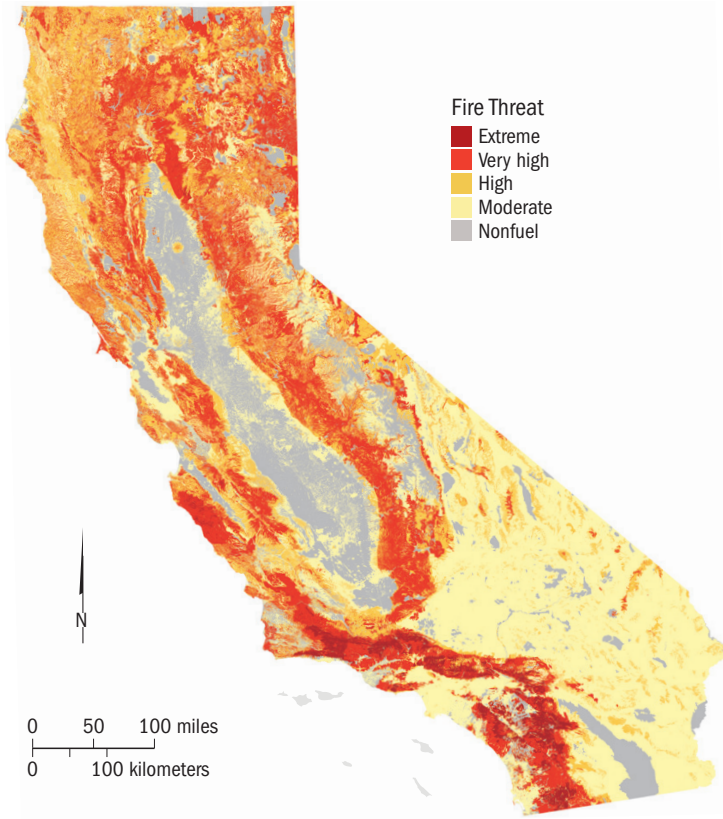
Over eight million Californians live at similar risk, near the edge of wildlands subject to periodic wildfires (map 1). They need to understand this aspect of their environment. Ignorance about fire, as the population has grown and sprawled, has contributed to increased structural damage losses and lost lives from wildfires.

FIGURE 1. One of the Oakland Hills houses burned in the Tunnel fire of 1991.

This book is meant to help humanity understand its place in the California landscape as another one of many fire-adapted species in this state.

Introduction to Fire in California was first published in 2008 as part of the California Natural History Guides series. Most of the first edition remains accurate, but this second edition addresses increasingly extreme temperature and wind events and the relationship of wildfires to global climate warming. Why have "superfires" driven by high winds become so prevalent?

California's eternal wildfire challenges intensified from 2010 through 2020, when the deadliest and most destructive wildfires in the state's history ignited. The *number* of wildfires started in those years and the total *acreage* burned were actually not far outside of historical norms. Before the California gold rush, natural ignitions and fires purposely set by the native population had touched about



MAP 1. Statewide fire threat.

4 million acres each year. But comparing historical statistics with recent fire totals did not capture essential changes: a few massive holocausts, particularly in 2017, 2018, and 2020, began racing across the landscape, driven by extremely high winds, and in those years, wildfire killed far too many people.

The Rim fire that burned wildlands from August 2013 to October 2014 in Stanislaus National Forest and Yosemite National Park