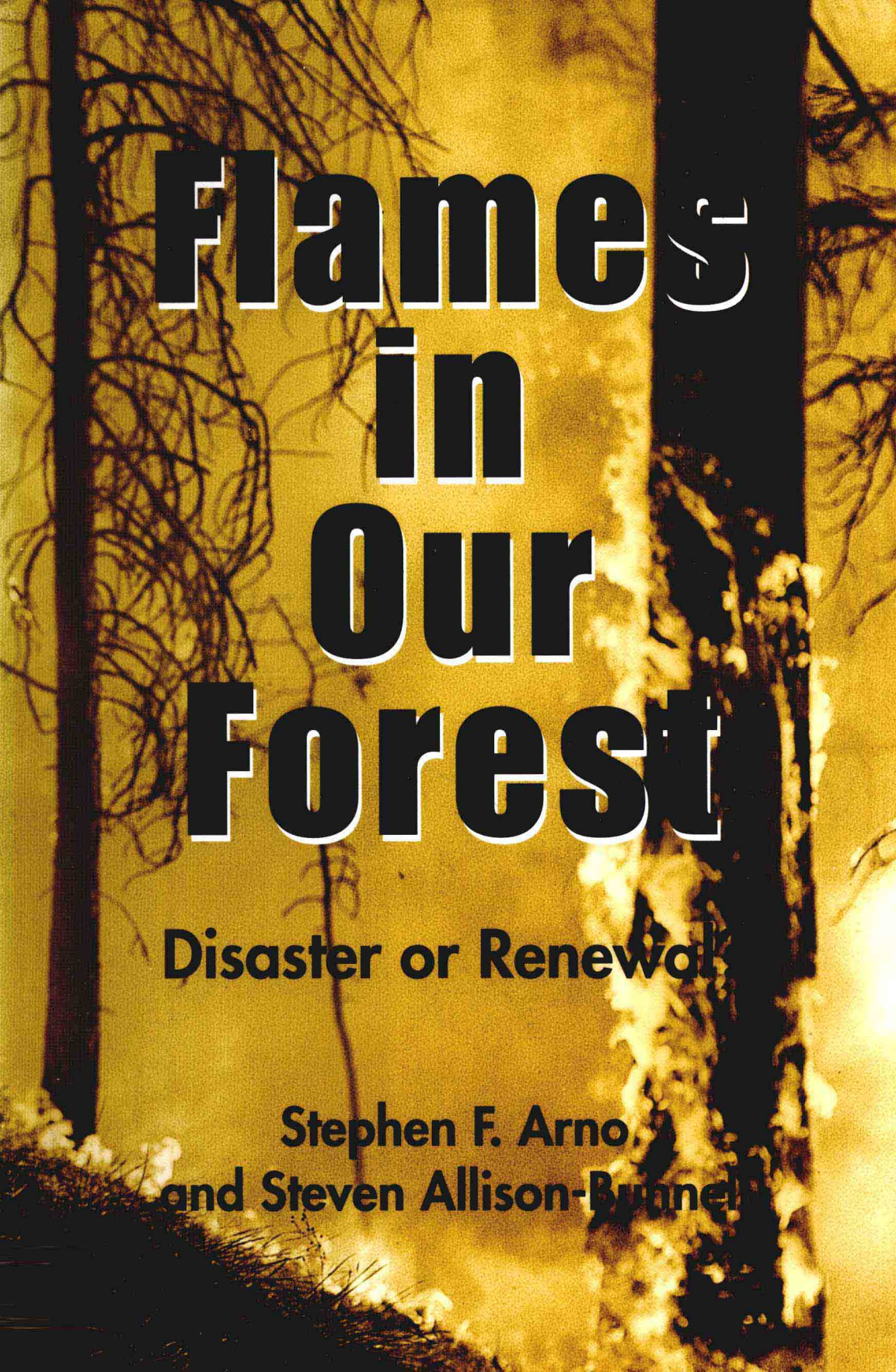
Flames in Our Forest
Disaster or Renewal
Stephen F. Arno
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Preface

Fire has shaped forests in the western United States for thousands of years. As communities of trees, other plants, animals, and microorganisms, these forests are as well adapted to periodic fires as they are to the climate and the native soils. People love these forests, but we have difficulty understanding and accepting the idea that we cannot simply remove fire from them.

If you are interested in western forests, and their future health and prosperity, this book is for you. Our goal is to help you appreciate the importance of fire in these forests and to show how some of the benefits of natural fire can be restored. Restoration involves creative use and suppression of fires that occur, prescribed burning, management of forest fuels, and silviculture—the art and science of tending the forest. We also need to make forest homes and their surroundings more fire-resistant.

This book is a nontechnical account of the fascinating story of fire in our forests that has unfolded from current scientific knowledge and experience. For students and others interested in further information, references to publications that elaborate on specific subjects are cited in the text (in parentheses) by author and date and are listed alphabetically in the References section. Additionally, this book offers candid commentary on wildland fire management practices and policies—arguably one of the most compelling ecological and natural resource management issues facing the West today.

The Forester's Perspective (Stephen Arno)

My early experience with fire was positive, perhaps making it easier to later appreciate fire's role as a vital force of nature. Growing up on the outskirts of the small city of Bremerton on Puget Sound in western Washington, surrounded by humid forests, one of my earliest and most frequent chores was gathering and preparing firewood to help heat our home. I went with friends on frequent camping trips, either by small boat exploring remote areas in Puget Sound or hiking in the nearby Olympic Mountains. The weather was often cold and damp, and we relied on campfires for drying out, keeping warm, and cooking. The wood, like the forest, was usually wet. Thus it was no small feat to build a robust campfire or even an effective blaze in our home fireplace. Forest fires were a possibility, but they were uncommon in those cool, moist woods. To me, fire was a useful tool for keeping warm as well as for disposing of brush and tree limbs. We even used bonfires to crack and break up the giant boulders on our beach that were a hazard for boating.

Leaving home broadened my experience with fire. In 1962 I took a summer job in the woods in a drier part of the state and wound up fighting a few small forest fires, which seemed like an arduous, dirty job, even compared to the outdoor labor I was used to. The next summer, while working in Sequoia and Kings Canyon National Parks in the California Sierra Nevada, I participated in holding the upper fire line on a fast-moving "controlled burn" that raced through several hundred acres of tinder-dry, brushy chaparral on a foothill ranch below the national parks. This was an amazing experience for a youth from the humid Northwest forest. At Sequoia and Kings Canyon I was also introduced to the ecological story that frequent fires had helped perpetuate the magnificent groves of giant sequoias over millennia.

In 1965 my wife, Bonnie, and I moved to western Montana, where I studied forest ecology as a graduate student. At first, I assumed that most fires in Rocky Mountain forests were severe, stand-destroying conflagrations. Big wildfires were a frequent topic of conversation. But my assumptions about fire in the forest were challenged in 1971. My first assignment as a professional forest ecologist involved surveying old growth forests of

all kinds, gathering and analyzing evidence of fire history and fire's effects on stand composition and structure. Surprisingly, I discovered many of these forests contained trees that had survived one or more fires in past centuries. The fire-resistant trees—often shielded from damage by thick bark—were of several species. They bore blackened scars at their bases, clear evidence that many fires in the past had been of low to moderate intensity. These fires had *not* killed all the trees in their path like the high-intensity, stand-replacing infernos portrayed in stories and news accounts.

That same year Bonnie and I bought a 40-acre parcel of second-growth ponderosa pine forest land in the Bitterroot Valley of western Montana. Most of the trees on the property had become established soon after heavy logging in the 1880s. The few remaining old growth pines were being logged on the adjacent property. The fresh stumps revealed an unmistakable pattern of frequent low-intensity fires that had left multiple fire scars on these trees, just like the pattern reported in the giant sequoia groves and in ponderosa pine forests elsewhere in the West. Soon I started thinning and using fire to reduce fuels in our family forest, which we eventually expanded to 60 acres. Thankfully, it was relatively easy to keep a fire from traveling out of bounds using standard fire-control tools, provided we burned under appropriate weather conditions, in moderately moist fuels.

I had heard about the first program to allow natural (lightning) fires to burn, which began in 1968 in the high country of Sequoia and Kings Canyon National Parks. This program was a significant accomplishment, but forests of the High Sierra Nevada were generally discontinuous, with intervening barren alpine ridges and rock-walled canyons commonly slowing the growth of fires. It would be a bigger challenge to allow fires to burn in denser forest landscapes.

In the early 1970s some of my Forest Service colleagues were designing a program to allow some lightning fires to burn at all elevations in the Selway–Bitterroot Wilderness of northern Idaho. In 1973, with the program in place, the adjacent White Cap and Fritz Creek fires were allowed to burn amidst great uncertainty as to the outcome, and considerable controversy. By the time autumn rains extinguished them, these fires had covered 2,800 acres, mostly in the warm, dry lower-elevation forests. To my

surprise, upon visiting this burn the following year, I found a complex mosaic of different burn severities laid out on the rugged terrain as a result of several weeks of unsuppressed burning.

By the early 1970s the public was becoming increasingly critical of extensive clearcutting in Northern Rocky Mountain forests, and foresters were looking for other ways to harvest trees and regenerate forests for the future. I was on a team assigned to develop advice for managing forests in a manner consistent with the natural processes that had shaped them over past centuries. A few foresters in other parts of the West began to advocate use of selective cutting coupled with prescribed fire in ponderosa pine forests as a means of mimicking the effect of frequent fires of the past. These treatments were designed to perpetuate open-canopied forests containing trees of many sizes and ages while yielding timber for harvest. The concept made sense, and I soon started using variations of it on our family forest as well as working with Forest Service colleagues to test similar practices on national forest land.

Unlike most conventional logging, attention was focused on leaving a stand of large vigorous trees and removing the smaller, slow-growing "suppressed," and diseased trees. We tested low-impact harvesting techniques, such as use of horses and farm tractors equipped for logging, to minimize damage to the soil and the remaining trees. We removed or burned the accumulations of branches in piles and then used low-intensity prescribed fire in the stand to reduce surface fuels and to stimulate tree regeneration and native plants used for wildlife habitat. This was a fire that burned the entire stand with flames mostly 1 to 2 feet high.

The more I used and studied prescribed fire, the better this form of management looked compared to the alternative of excluding fire and then having to cope with the consequences. These consequences include decline of important fire-dependent tree and undergrowth species, increasing density and stagnation of forests, epidemics of insects and diseases, and the high potential for severe wildfires. There are many ways to use prescribed fire and other fuels management treatments to restore more historic conditions or vigorous self-sustaining forests. Our widespread practice of ignoring, and in a sense denying, the original role of fire is costly in terms of decline of ecological values of the forest, including

natural biodiversity, as well as economic loss and human suffering—loss of forest homes and property. This book explains these problems and presents viable solutions. Flames in our forest are inevitable. Whether their effects are perceived as disaster or renewal depends on how we manage fire, fuels, and the forest itself.

The Science Writer's Journey (Steven Allison-Bunnell)

In retrospect, I have appreciated stewardship forestry all of my life without knowing what it was called or fully understanding the ecological implications of its practice. Although formal knowledge would only come much later, I absorbed the process and results of stewardship forestry over many visits to my grandparents' woodlot and tree farm in the Willamette Valley during childhood and adolescence. In the late 1960s my father's parents bought 21 acres of what had once been an oak and madrone river bottom forest, but which was by then second-growth Douglas-fir and a field of Christmas trees. By the time I can remember anything about the place, they had been at work for several years pruning dead limbs up every tree trunk, collecting and burning piles of slash and brush, cutting windfallen logs and standing snags into firewood, and planting and pruning the Christmas trees. Even though they had a large garden in town to take care of, they spent many happy days working there, sometimes camping in their motor home. For more than 20 years, my grandparents fought off invasions of Himalayan blackberries and Scotch broom and resurgences of ever-present poison oak. It was a family ritual to visit the tree farm at Thanksgiving to cut a Christmas tree, and when I lived with my grandparents during college, I would help my octogenarian grandfather cut firewood (he still handled the chain saw).

The "tree farm" as I knew it was a lovingly tended forested park with widely spaced trees and wild irises, shooting stars, and Calypso orchids growing in the sunny openings beneath the tree canopy. It was home to deer, wild turkeys, and, much to my childish delight, orange-bellied salamanders creeping through the ferns and moss. Although my grandparents were primarily intent on keeping their woods tidy and bringing in as much firewood as they needed to heat their home during the damp Oregon winters, they also created a wonderfully diverse and attractive

habitat. Was it natural? Certainly they managed it quite intensively. But save for a few rotting stumps and narrow tracks winding through the woods, it looked quite unharmed. Any doubts as to the value of their active management were dispelled when they could no longer maintain the Christmas tree stand and the small Douglas-firs grew to 20, then 40 feet tall. Ten years after the last Christmas tree was cut, a dense thicket of firs covered the area so tightly that the only thing growing on the ground was moss and a few bracken ferns. Now that both of my grandparents are dead, the tree farm has passed into my father's keeping. Although he can't spend the same amount of time on the place as they did, he has arranged for this area to be thinned. Now that I know what I do about forest ecology, we look forward to seeing how this young forest matures alongside its elder counterpart in the woodlot.

Broadcast burning or prescribed fire was not among the tools my grandparents used in their woodlot. My grandmother took much pleasure in burning the brush and slash in huge bonfires, but she always burned in the same place and only when it was safe to do so. I now know that what she did was a classic fuel reduction treatment in a fire regime that would probably have burned in a high-intensity stand-replacement fire if left alone. None of us had ever heard anything besides the idea that forest fires were dangerous and undesirable. The comic book version of the Smokey Bear saga was distributed in my school and I treasured my copy. In my mind's eye, my father's stories about his stints on summer fire crews in the Oregon Cascades during his college years were surrounded in an aura of heroism fighting the good fight even though he actually spent more time digging hiking trails than fireline.

At the same time that I saw what the involved and patient owners of a small woodlot could accomplish on the scale of an individual stand, I grew up with a profound dislike for the results of industrial logging as it was practiced in the Coast and Cascade Ranges of Oregon and Washington. Whereas my grandparents had minimized their impact, in commercial clearcuts I saw hundreds of acres of stumps, bulldozer-scarred hills, and tangles of wasted timber and slash. It was a sobering moment when on a family vacation, we counted the rings on an enormous section of a log left behind and realized that the tree had been growing before

Columbus set sail. I knew that I would never see the likes of that tree again in my lifetime. Ken Kesey's description of the beauty and thrill of felling trees in *Sometimes a Great Notion* is the only depiction of logging that could convince me it was anything other than a soul-numbing brute rape of the land. Robert Leo Heilman's memoir of a tree planter, *Overstory Zero*, only served to reinforce my previous perception.

I remained an unapologetic tree-hugger and unquestioning fire-hater until I moved to the Northern Rockies and met Steve Arno while reporting a series of articles on wildland fire ecology for the Discovery Channel Online in 1997. Like most writers unaware of the details, I was initially attracted to the story because of the exploits of the smokejumpers conveniently based in Missoula, and because my academic training in environmental history and the social studies of science conditioned me to ask how we know what we know about that natural world. When even the smokejumpers—the people most highly trained to fight fires—told me that they would rather be involved in prescribed fire and restoration treatments than suppression, I knew this dreaded enemy deserved closer attention. Interviewing Steve and other advocates of reform in fire management policy like Ron Wakimoto of the University of Montana School of Forestry, I was astonished to have all of my assumptions about both fire and logging turned inside out. I tried to convey that sense of a personal paradigm shift in my original articles and am grateful for the chance to amplify it further in the much finer detail that this book offers.

Today I strongly believe that fire and logging do not inherently contradict environmentalist values. In one of my first conversations with Steve Arno, he said that we must become "high-tech hunter–gatherers" as we manage and adapt to the forests of the West. That phrase has stuck with me as an encapsulation of the idea that we can both use and respect the land. I believe this is possible because I no longer believe in the concept of untrammeled wilderness completely devoid of human presence or impact. Recent scholarship in environmental history has shown that human beings have been interacting with and shaping the landscapes they inhabit for as long as we have evidence to tell the story. Our modern destruction of habitat and natural places differs only in scale and intensity. The American conservation movement was founded on the myth of

wilderness as uninhabited, pristine nature contrasted sharply with the decadence and unnaturally stultified life of cities. We now acknowledge what Progressive Era environmentalists did not: that American Indians shaped the landscapes whites saw as untouched by human hands, and that fire was their primary tool. So there is no such thing as pure nature, no human-free wilderness, only lands where we work in concert with, instead of in ignorance of, natural processes. Many committed environmentalists reject this idea as the first push on a fast ride down the slippery slope of business as usual exploitation of the land without regard for biological diversity, ecosystem health, or the intangible but profound spiritual value of wildness and wild places. We do not presume to convince the most adamant, but we do hope to make it clear that none of what we propose is business as usual in approach, motivation, practice, or outcome. My own journey to this perspective has been too full of surprises for that to be the case. Instead, this book is a manual for would-be high-tech hunter–gatherers. Steve Arno's voice and expertise speak authoritatively throughout this book, and it is a privilege to have been his collaborator. We warmly dedicate it to all stewards of our forests, past, present, and future.

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Contents

Chapter 1

Introduction: Why Learn about Fire?

Since the end of the last ice age fire has molded most forests in the western United States. Repeated patterns of burning heavily influenced which tree and undergrowth plant species prospered. Fires also helped determine the structures and patterns of forests on the landscape as well as their suitability as habitat for a myriad of birds and mammals. Pioneer western naturalists were sometimes alarmed by the destructive power of fire; but they also recognized that fires helped create many of the splendid old growth forests at which they marveled (Pinchot 1899). Now, for almost a century, we have tried to eliminate fire from most forests without considering possible adverse effects on native plants and animals and on the sustainability of the forest itself. Logging and other human activities have of course changed western forests dramatically. But our endeavors to eliminate fire have caused some of the most widespread and harmful changes.

This book explores the underlying historical and ecological reasons for the problems associated with fire exclusion. It also examines the scientific knowledge and available technology that could be used to mimic and restore some of the ecological effects of natural fires to help sustain western forests. The messages about forest fires that we have been exposed to for nearly a hundred years have bred skepticism as to the possibility, or even the desirability, of restoring some approximation of the natural fire