

FINAL REPORT

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Stephen J Pyne
Arizona State University



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Regional Surveys of American Fire History Cooperative Agreement No. L17AC00207

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Origins and purpose

The agreement was, in effect, an extension of a project to which JFSP had previously contributed, a survey of the contemporary American fire scene. The earlier project resulted in a narrative history, *Between Two Fires: A Fire History of Contemporary America* and a series of shorter (200-page) books on regions under the general rubric *To the Last Smoke*. When that grant formally expired, volumes had been published for Florida, California, the Northern Rockies, the Great Plains, and the Southwest, and two additional volumes were in press, one on the Interior West and the other a collection of topical essays titled *Here and There*. Both are now in print.

I had some material left over on the Pacific Northwest, the oak woodlands, and the Northeast. When the BLM approached me about including Alaska, I saw the possibility of completing the suite with another full volume on the Northeast and one titled *Slopovers* that would include shorter surveys of Alaska, the oak woodlands, and the Pacific Northwest. I had hoped to complete my travels and writing by the end of 2017, but I broke my foot while on a research trip to Pennsylvania and had to reschedule the final trek, to Maine, in October, 2018. (My Maine essay had already been through the review process by the press, but I was able to introduce significant rewrites upon my return.)

Primary output

The travels are complete, and the final two texts written and approved through the peer-review process of the University of Arizona Press, and will be published in spring, 2019, probably late February or early March. This will complete the series. The press and I, however, are discussing the possibility of culling out of the nine survey volumes a 'greatest hits' anthology of essays; it is likely this will happen. That volume might be ready for the fall, 2019 catalog, or in spring, 2020.

A long publication process, but that is the reality with academic presses. As always, with everything, there are trade-offs. The press has published quality volumes, both in print and e-book; it has a marketing program and standing orders from research libraries; it brings a level of review far beyond self-publication; and publication has not been charged to the grant (that charge would have been twice the size of the award). The downside of course is that the books cost money. I've worked with the press to lower the cost by refusing any royalties and they have agreed to match my royalty rate. This fall I published another book with them, of comparable size, that sells for \$20. The fire volumes sell for \$15.

As wide as series' reach has been, some places remain beyond its grasp. Because of the way the project evolved, the Southeast dissolved into the Florida book, the Southern Appalachians got an essay on the Gatlinburg fire in *Here and There*, and the Lake States shrank into a longish essay in the Northeast volume. The Pacific Northwest deserved more space (California crowded it - sound

familiar?) The Northern Plains could have welcomed more examples. But all in all, the project went well beyond the two books originally proposed; and the current project has succeeded in adding four regions to the confederation. I have no plans or ambitions to continue the project.

Copies of the books have been sent to JFSP as they have been published. The final two will come this spring.

Secondary output

The project has recalibrated my understanding of the current fire scene, which has entered into other writings and interviews - the presentation on American fire history for NAFRI (Fire in Ecosystem Management), commentaries and op-eds of all kinds, interviews in print, radio, and television.

It is my hope that the books will cause old timers to reflect back on the fire world they have known, to inspire newcomers to understand the challenges before them with more nuance, depth, and precision, and to bequeath to the future a rough but readable cross-section of what American landscape fire looked like in the second decade of the 21st century. I can think of nothing comparable.

Conclusion

Given the nature of the deliverables - books, with copyrights - it isn't possible to reproduce the full texts here. Instead, I am including the tables of contents and prologues for the four regions the grant has touched on - oak woodlands, Pacific Northwest, Northeast, and Alaska. Consider them as invitations to an abstract.

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Prologue: Dark Days

On 19 May 1780 the sky over New England darkened ominously. An immense pall of smoke spread from Portland, Maine to southern New England. It propagated at an estimated 25 miles an hour. "Candles were lighted in many houses; the birds were silent and disappeared; and the fowls retired to roost." For some observers the vision was puzzling; to some, disturbing; to a few, apocalyptic. Was the Day of Judgment at hand? The alarm was such that the Connecticut legislature proposed to adjourn, when Colonel Abraham Davenport rose and declared, "I am against adjournment. The Day of Judgment is either approaching, or it is not. If it is not, there is no cause for an adjournment; if it is, I choose to be found doing my duty. I wish therefore that candles may be brought."¹

Black Friday was the most celebrated of New England's Dark Days, but it was one of a litany that began in 1716. A notably Dark Day blanketed Quebec on 9 October 1785, and yet another smothered Anticosti in 1814. But smoke was common - Northeastern North America had been often discovered by Europeans first by the sight (and smell) of its smokes before shorelines were sighted. Only occasionally did the smoke thicken into vast shrouds that blocked out the sky. They were the pyric foreshadowings of what was to come, first in the Burned-Over District of New England, then further west. Their rise and fall tracks an era of settlement-inspired big burns. Eventually the Dark Days thinned, and migrated west with the frontier, smothering the North Woods around the Lake States and in 1881 sending a pall from Michigan to Massachusetts. By 1910 the Great Fires had moved into the Northern Rockies and merely turned the Sun over Boston into a coppery haze. Then they disappeared.²

Eyewitness accounts testify to their effects, only rarely, directly, to their origins, but there can be little doubt that the palls of the Dark Days pooled smoke from larger and smaller burns west and southwest of the pall's epicenter, and that some may have spilled out of the Old Northwest. Data from tree rings and fire scars draw a net of burning from the Algonquin Highlands in Ontario to the

southern Appalachians to the Missouri Ozarks. A cold front quickened those fires and gathered their smoke, which followed storm tracks between the Great Lakes and the Gulf Stream.

They were, in brief, a premonition, a vast foreshadowing of a wave of fire that rolled westward over the course of two centuries, made fire institutions, and remade fire regimes. The Northeast was a point of ignition for that continental slow burn.

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Today, the Northeast is a minor feature in America's pyrogeography. Its fire scene has shriveled to a vanishing point. Wildfires have, it seems, gone the way of Pennsylvania's bison. Prescribed fires struggle to become more than boutique burns. A fire infrastructure scrambles to maintain itself, finding closer bonds with Canada than with the rest of the U.S. The region could drop out of the national fire scene and likely no one elsewhere would notice.

Yet the story of how American nature and European ideas interact begins here. Even a century ago the Northeast and its mutant progeny, the Lake States, dominated national fire news. America's first great fire of settlement burned across Maine and New Brunswick in 1825; its last, the Maine blowup, came full circle in 1947. Between them the fires that commanded news were those that blasted Wisconsin in 1871, Michigan in 1881 and 1908, Minnesota in 1894 and 1918. These provided the flame-and-ash vision of ruin to sustain arguments for state-sponsored conservation. National fire policy was as much influenced by the 1903 and 1908 fires in the northern Appalachians and Adirondacks as by the fabled Big Blowup of 1910. The 1896 National Academy of Sciences Committee on Forestry that advised on what became the organic act for the national forests was staffed with faculty from Yale and Harvard's Arnold Arboretum, as well as consultants like John Muir and Gifford Pinchot. The nation's first forestry schools were located at Yale, Cornell, and Maine. The idea for reserving lands from fire and axe had its model in the Adirondacks Preserve as much as with Yellowstone National Park; the earliest reforms began in states before migrating to the federal government. The Burned-Over District that spawned religions amid the Second Great Awakening later sparked the movement that became a conservation crusade. The 1911 Weeks Act that allowed for national forests to expand by purchase and for federal-state cooperative programs for fire protection was sponsored by John Weeks, congressman from Massachusetts. The first chapter established by the Nature Conservancy was in eastern New York, and its first purchased plot, the Mianus River Gorge on the New York-Connecticut border. The concept of land conservation trusts and conservation easements sprang out of the Northeast's peculiar history of land tenure and tradition of local governance. The wilderness movement had its prophet in Henry Thoreau, wandering from Walden Pond to the Maine Woods, and its political realization through a Howard Zahnizer inspired by the Adirondacks. Even American fire literature originated here, with the accounts of Native burning practices, the symbolic sermons of Jonathan Edwards, the novels of Fenimore Cooper, and the poems of bonfires and blueberry burning from Robert Frost.

Folk heroes like Ed Pulaski might devise new combination tools, but the educated elite set policy, and they hailed from the Northeast. Like the mountain men who created the Rocky Mountain fur trade, they were not locals, but easterners who learned their trade in the Appalachians and then went west. Jed Smith was from New York, Jim Bridger from Virginia, Hugh Glass from Pennsylvania, and Tom "Broken Hand" Fitzpatrick from County Cavan, Ireland. So, likewise, Teddy Roosevelt came from New York, George Perkins Marsh from Vermont, Charles Sargent from Massachusetts, Gifford Pinchot from Pennsylvania with a career trek to the British imperial forestry school at Nancy, and Bernhard Fernow from Prussia. Conservation did not spring indigenously out of the West, or from westerners going East, but from educated easterners who went West or ventured to Europe. James Fenimore Cooper, of Cooperstown, created the archetypal westerner of American literature, Natty Bumppo - pathfinder, deer-slayer, Old Trapper - and set *The Pioneers* in the wilds of backcountry New York. Owen Wister, a Philadelphian, culminated that tradition, now gone Far

West, with *The Virginian* (the title alone says a lot). The foundational work of American landscape art, Thomas Cole's, *The Oxbow*, featured the Connecticut River painted by an emigre from England. The renown *Twilight in the Wilderness* by Frederic Church (of Hartford, Connecticut) celebrated the Adirondacks and became the reference for later Western sublime. Of the greatest landscape artists of the Wilderness West, Albert Bierstadt was born in Prussia and Thomas Moran in England.

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Those Progressive-minded easterners tried to apply what they knew from learning and experience. In the Northeast the strategy worked. Climate, land use, laws, new technologies, and invented institutions managed to snuff fire out of the scene, as it had in temperate Europe. That model failed when applied to the West, as it did throughout most of Europe's colonies, but the West still bears the scars of the failed experiment. Had those easterners not tried their experiment, the westering Americans would likely have slashed and burned through what the country later regarded as sacred landscapes. But the experiment was flawed, and it left a different legacy of landscapes. If it prevented what Teddy Roosevelt called "scalping" the land, it left many of those lands profoundly unsettled. In solving one problem, it created others.

That storied past is relevant for appreciating why America's fire scene today looks like it does. The institutions that oversee American fire were devised in the Northeast; institutions for the federal public domain, institutions for state lands, institutions among the states themselves, even institutions across national borders. Trying to understand today's pyrogeography from the record of the past half century, almost all on public lands, mostly in the Far West, or on agricultural lands, mostly in the Great Plains and the Southeast, is like explaining the evolution of life on Earth without reference to the Cambrian extinction, dinosaurs, or the antiquity of fire. The role of the Northeast is encoded in the institutional DNA of America's fire establishment. That alone makes the Northeast worth reconsideration.

But the region also serves as a counterexample to the West because it shows how an anthropogenic fire regime behaves, because it causes us to question common assumptions about the interaction of climate and people, and because it challenges anecdotal history based on experiences in places where fire is a problem today. Most of America's landscapes are overtly cultural. How should we manage them? to what ends? by what means? and with kinds of fire? Most landscapes knew fire in their history, most today know mostly its absence. What fire, if any, should be restored? The West can remove people and still have fire. The Northeast, largely, cannot.

But that does not mean fire has no place in the ecology of the northeastern biota or that the Northeast has no significance to the national fire narrative, even if, over the past century, the region has mattered more to fire than fire to it.

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The Dark Days of smoke palls that blotted out the sky are gone. The region seems to have retreated from the national fire scene into a lair safe from prying eyes, drought, and wind. Where there is no smoke, there is no fire. Yet a better allusion would be to protective coloration. The region still burns prodigiously, but its fires have been invisible because they are burned in special combustion chambers, not free-ranging over landscapes.

Here, too, the Northeast led a wave of burning. Industrial combustion entered the U.S. through New England; the nation's transition from burning living landscapes to burning lithic ones was field-tested and then fueled nationwide by the fossil biomass of the Northeast. This burning is mostly beyond the field of vision of the region's population, which live in cities or reside in suburbs and exurbs for which power mostly means fuel oil, electricity, gasoline, and diesel, most of whose emissions merge imperceptibly into the atmosphere. Acid rain, pollutants, and greenhouse gases, most of which are invisible to the naked eye, do not darken the sky; smoke's particles cluster around

the wavelengths of visible light and are impossible not to see. But they do loom over and foreshadow a kind of darkness.

The region's new dark days reside not in the sky but amid its biota, an ecological darkness caused by the absence of fire. The second nature that human artifice, catalyzed by fire, had made from nature's bounty had morphed into a third nature shaped by the burning of fossil fuels. The Dark Days of colonial America whose smoke blocked out the Sun had yielded to the dark days of Anthropocene America whose emissions were trapping sunlight and turning the planet into a crockpot and obscuring the future. What its conflagrations say about frontier America, its missing fires say about postmodern America.

The region's role in understanding the nation's fire past is clear; but is it also pertinent to understanding the troubled future? Most research into landscape fire has focused on the American West, and parts of the east and southeast where the federal government (the primary sponsor of research) manages the public domain and reserves lands in a wild state or at least a simulacrum of the wild. Most of America's landscapes, however, are in private hands and overtly cultural. They deserve fire management, too. Some still use fire for agriculture and plantation forestry, these in places where a traditional of burning never extinguished. Others probably need some fire restored, or need a fire regime reexamined. Such lands constitute the bulk of the national estate. How should we manage them? to what ends? by what means? what role might fire play in the drama of their existence? Here, once again, the Northeast can prove instructive.

Twice the Northeast has pioneered American fire history, first with axe and torch, and then with dynamo and combustion engines. The first era led to ideas and institutions of national significance for how America would address its landscape fires. Perhaps the second will do something similar for the Big Burn kindled by a fossil-fuel civilization. Whether by its presence or its absence, free-burning fire remains relevant to the ecology of the Northeast. The same can be said for the region in America's national fire narrative.

To the Last Smoke, Volume 8, Slopovers: the Mid-American Oak Woodlands, the Pacific Northwest, and Alaska

The Mid-American Oak Woodlands

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Prologue: East of the 100th meridian

In 1893 Frederick Jackson Turner read one of the most famous sentences ever penned by an American historian. "Stand at Cumberland Gap and watch the procession of civilization, marching single file - the buffalo following the trail to the salt springs, the Indian, the fur-trader and hunter, the cattle raiser, the pioneer farmer - and the frontier has passed by." A colonial society, hemmed in between the Atlantic and the Appalachian Mountains, suddenly spilled through the Gap and then seized a continent. Within a single long generation, a folk migration blew across the Appalachians to the Great Plains, from mixed woodlands to prairie. The rush of settlement poured through the Gap, and simultaneously down the Ohio River, like a stream debouching into a long delta before slowing and spreading to its flanks. This saga is, more than any other, America's favorite creation story.³

Less well appreciated, that historical process overlays an ecological biome that was virtually co-extensive with it. The American backwoods frontier was primarily a backwoods of oak, hickory, and grass. The sprawl of pioneering filled the oak woodlands and the prairie barrens like water in a basin before splashing over north and south. The early settlers didn't linger in the mountains: they hurried through them and across the deeply dissected Cumberland Plateau where it joins the Appalachians until the plateau lowered into hills and they reached the oak-hickory savannas and great barrens, dense with game and grass, and there they settled. It was a biome peculiarly suited to their simple economies of hunting, trapping, herding, and resettling. Like their archetypal guide, Daniel Boone, they moved in and then moved on, and then moved on again, until the hills flattened into the plains and woodland mosaics thinned into tallgrass prairie.

Until recently neither narrative - the saga of pioneering or the tale of a sprawling biome that spanned the central Mid-East - spoke to fire. There is a long tradition of discourse over the origin of the grassy Barrens which splashed about the region and became the rallying points for American settlement. On one side stood those who argued for the unquestioned supremacy of climate: the prairies were barren of trees because climate and soil (itself a byproduct of climate) dictated that only forbs and grasses and scattered shrubs could grow there. On the other were those who promoted fire, which was also a declaration on behalf of the power of humans to challenge climate since natural fire was almost unknown. A related, secondary skirmish broke out over the role of fire along

the fringe where oak and prairie met. But fire in the hardwoods themselves was dismissed. It was unthinkable that fire might have any integral role; it appeared only as an unwanted disturbance or act of ecological vandalism. On this nearly all authorities agreed.

Yet the evidence builds that the great oak-hickory forests were fire frequented and probably fire informed. And because natural fire has almost no presence, this means those obligatory fires were set by humans, and had to have been set by people for millennia, perhaps as far back as the origin of the Hypsithermal, and this realization changes the narrative of pioneering. If correct it means that America's indigenous peoples, through fire, had been instrumental in sculpting the great swath of woodlands and grasslands that swept through the middle American lands east of the Mississippi. America's backwoods frontiersmen picked up that torch. Instead of something incidental to the scene, like a campfire, outside the major action, the realization grows that anthropogenic fire is a critical catalyst, a core technology that helped make the rest possible. Remove it, and the landscape unravels. That, too, has happened. And it threatens to redefine, if not unhinge, the intellectual geography of fire in America.

In the West it was possible to pretend that Precolumbian humans had little say in the grand processes that shaped landscapes. In the oak woodlands that is not possible, even in the imagination. Here natural history and human history flow in and out of each other, like streams in the karstified Barrens, that rise and fall, flow and disappear, with seasons and sinkholes. Human history, fire history - neither makes sense without the other.

The Pacific Northwest: A Fire Survey

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Prologue: Green on black

Like most places the Pacific Northwest has many terrains and many definitions. And like most, its fire history can be surprising. Among the wettest places in the United States it routinely burns, and has since the ice receded. "Almost every forest type has experienced a fire in the current millennium," James Agee has summarized, "and some may have burned more than a hundred times." Visiting the region in 1912 John Muir concluded that "fire, then, is the great governing agent in forest-distribution and to a great extent also in the conditions of forest growth." Around Puget Sound he concluded that "plainly enough" the forests have been "devastated by fire," though now "veiled with mosses and lichens." So, too, the region's celebrated rains and sodden coasts, and later its environmental controversies, have hidden the ancient record of fire. In nature, in history, in social discourse - green continues to cover black, although in recent years the black has become undeniable.⁴

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How to characterize the Pacific Northwest? In geology, it's a series of north-south trending mountain ranges and basins. In climate it shows a similar striping of parallel bands that run from wet west to dry east, the rain-shadow ranges filtering the moisture out. In ecology, the banding translates into temperate rainforest along the Coast Range, montane forests in the central Cascades, and a sage-steppe toward the interior. Old-growth forests harbor marbled murrelet and northern spotted owl; the steppe, the greater sage grouse. There are fires everywhere, sometime.

Like most places the Pacific Northwest is a landscape of transitions, as terrain, weather, and woods mutually massage the land into fire regimes, and these regimes align with those of the larger prevailing bioregion. In broad terms, the region divides into wet westside and dry eastside. The westside grasslands, in the Willamette Valley, resemble tallgrass prairie. The eastside grasslands, on the Columbia Plain, behave like shortgrass. The summit of the Cascades divides wet conifers from dry. Southeast Oregon joins the sage steppes of the Great Basin. Northeast Oregon hosts the Blue Mountains, a geologic outlier of the Basin Range and Sierra Nevada and a biotic outlier of the Northern Rockies.

The big surprise is the explosive burning, from time to time, perhaps on the order of centuries, of the coastal woods. For that, the region can thank its foehn winds. What the Santa Ana is to Southern California, what the chinook is to Colorado, the east wind is to Oregon. That wet westside, however, has defined the region to the public imagination. Its timbers have concentrated the attention of foresters, public and private. And here green has tended to overlay the memory of

black, to hide the scars of big burns, and more recently to overlay a timber industry with a cloth of environmentalist green.

The region is no less transitional in the national history of fire. What makes the Pacific Northwest distinctive is the way that fire history plays out against the history of its forests, the timber industry, and public forestry. The fire regime shifted with white settlement from a dialectic of wet and dry to one of fire and axe. Unlike the Lake States, the national timber industry migrated to the Northwest at a time when fire protection was maturing. Unlike the Northern Rockies, ownership was split equally among private, state, and federal agencies, which forced them to form alliances. Unlike California, no master plan linked all the parts together into a common commitment to suppression. In the Pacific Northwest a somewhat domesticated timber industry met a somewhat mature national fire program and found ways to mutually support one another as they co-evolved.

The region acquired a dense infrastructure of fire institutions, from forestry schools to experimental forests to federal, state, and private fire agencies, all of which demanded cooperation if they were to work smoothly. From the Pacific Northwest was forged the template for cooperative forestry based on fire protection. Logging slash provided a shared obsession. During the New Deal innovations in fire control spilled out. Later, the region contributed one of the prophets of prescribed fire. The great fire saga of the 20th century was the Tillamook Burn cycle, which began in logging slash, then reburned amid massive salvage logging, and ended with a replanted forest destined for commercial harvest.

Call it what you will - character, theme, persuasion - the informing feature of the Pacific Northwest fire story over the past two centuries has followed a dialectic between fire and axe. Two wars over the axe and two eras of great fires - collectively, they frame and define most of the 20th century. Then the 21st century kindled a new cycle.

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Prologue: Last Frontier, Lost Frontier

Big, remote, boreal, and unsettled, maybe conflicted, in its institutional infrastructure - stir these ingredients over a flame, and you get a fire scene unlike any other.

None of these traits is unique to Alaska. What makes Alaska special is how they come together in a mostly fire-prone environment and an often incendiary politics. Other states have large firescapes, Hawaii is as distant from the contiguous 48, the Lake States have large boreal biotas and Maine, wholly one. Many states, maybe all of them, have uneasy relationships with the national government, and a handful have cultivated suspicion into a political artform. But only Alaska holds all these traits in a common valence and in exaggerated forms.

Ask anyone in the Alaskan fire community about the state and they will begin with the observation, "Alaska is different."⁵

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Alaska isn't just big: it's a veritable subcontinent. It's larger than Texas and California combined. If Alaska were a country, its 663,300 square miles would place it 26th by size, between Columbia and Ethiopia. In John McPhee's memorable phrasing, it's "a place so vast and unpeopled that if anyone could figure out how to steal Italy, Alaska would be the place to hide it."⁶

From Ketchikan to Point Barrow is 1,328 miles by air, as far as from Los Angeles to Chicago. From Ketchikan to Attu is 1,890 miles, or between Los Angeles and Pittsburgh. The North Pacific laps against its southern mountains; the Arctic Ocean against its north slope. Alaskans revel in the number of superlatives the Great Land bestows - the biggest state by more than a factor of two, seventeen of the 20 highest peaks in North America, a coastline longer than the rest of the U.S. combined. Alaska has more glaciers, more volcanoes, more earthquakes; more open space, more bald eagles, more brown bears; and in some years, more burned area.

Its actual firescape is much smaller than the state. Dismiss its two relatively incombustible outliers, the Aleutian Island chain and the temperate rainforest of the southeast. The remaining landmass divides into east-west trending mountains and plains. The North American cordillera that wends along the Pacific Coast ends as three mountain chains jut westward, one after another, crossing Alaska. The southernmost is the Alaska Range, a vast battlement that arcs into the Aleutians. Above it a stubby range wedges west before dissolving into smaller chains and hills and a

vast intermountain interior, a region higher, narrower, and forested in the east, and lower, broader, and marshy to the west. Small ranges, tumbling hills, and river systems, also trending east and west, texture the plain. Further north, spanning the state west to east, runs the Brooks Range, whose northern flanks spill into the North Slope and the Arctic Ocean.

Alaska's informing firescape is that central region between the two great bounding mountain ranges. Some fires start on the Kenai, and some dapple the tundra above the Brooks Range, but the gravitational power of Alaskan fire comes from the great burns of Alaska's intermountain core, which make the interior into a red giant among the nation's constellation of firescapes. Here summer thunderstorms move inland, following Alaska's great rivers from delta to headwaters. A gradient of dryness and elevation runs west to east. In the lowland west McGrath has an annual rainfall of 18 inches, and 97 of snow. Near the center Tanana has 12 inches of rain, and 44 of snow. In the higher east Fort Yukon village, along the Yukon River, averages 6.57 inches of rainfall a year, less than Phoenix, Arizona, along with 42 of snow. Still, the dimensions are vast, around two-thirds of Alaska, a swath perhaps 600 x 700 miles, a combustible landmass larger than Texas or the Interior West. That's a lot of country with a lot of fires, and they are hard to get to.

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Alaska is not just big, it's remote. Fairbanks is as far from San Diego as San Diego is from New York City. It isn't possible to drive to Alaska and stay within the United States; most of the Alcan Highway traverses Canada. Alaska's Little Diomedes Island is within sight of Russia's Big Diomedes Island. Its historic entrepôts, Seattle and San Francisco, are 1,447 and 2,018 air miles away. But its distance from the nominal metropole is only half the issue.

Its size also makes most parts of Alaska remote from other parts. From Juneau to Barrow is as far as from Orlando to New York. There are few roads (and one railroad) relative to its landmass. Alaska has slightly more mileage of public roads than Vermont, slightly less than New Hampshire. Outside that tiny road network, transport is by barge on the large rivers and by air everywhere. Its capital, Juneau, can be reached only by boat and air. That makes everything expensive, which further adumbrates the remoteness that is Alaska's bane and blessing.

Distance makes Alaska exotic, memorable, and, oddly, forgettable. Within Alaska the scene saturates the horizon. Outside it, out of sight can segue into out of mind. Its remoteness can push it beyond the frame of national awareness. Much as it gets mislaid on the national atlas, so it's easy to misplace Alaska in the national narrative. Even within the wildland fire community, Alaska, in most years, is a sideshow that bursts forth, if it burns big, through June and early July. By July 11, typically, Alaska resources are available to move south.

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So vast a land inevitably has lots of biomes. There are rainforests, fog-shrouded islands, forests, tussock grasslands, sprawling wetlands, floodplains, permafrost plateaus, and mountains. Yet all of the biomes that are burnable are broadly boreal. The wetlands are muskeg and marsh. The interior forests are taiga. The tussocks are tundra. Many soils are peat, underlain or intercalated by permafrost.

Collectively they comprise what the Canadian historian Harold Innis termed a northern economy, a commodities commerce based on fish, fur, timber, and (later) minerals. A third of the state's economy is founded on oil and gas. There is little value-added manufacturing; the in-state economy is mostly services, including tourism. Like Australia, floating on minerals and sheep, Alaska depends on minerals and fish. Over a third of the economy derives from the public sector, especially the federal presence. But its northern economy leaves Alaskans vulnerable to two outside forces over which they have little control - the global commodity market and national politics. Increasingly, that duopoly must expand into a triad to include an unstable climate. In time the biota might evolve

beyond the boreal but not in ways that will likely leave Alaskans with more hands-on control over their fate.

So it is, too, with nature's economy of fire. The boreal is a place that defies averages. It's a place defined by variance, for which a norm is valueless for planning. The summers are short and sun-drenched, which crowds growing and decaying into a riotous few months, and makes fire ecologically essential to liberate scarce nutrients otherwise warehoused into woody stems and peaty soils. But the fluctuation among seasons means that some years burn hugely, and some hardly at all. In 1944 69 fires started; in 1974, 869. In 1964 3,430 acres burned; in 2004, 6,590,140. Fire either smolders or soars.

What mediates between outside forces and personal lives are institutions. They absorb the stress, buffer the blows, smooth out the lumpiness between what happens outside society and what is felt inside. Inevitably, they get strained; typically, they can be abused and become unstable themselves when the tensions between what people want and what the boreal environment can provide get too great. In Nordic Europe the land is small enough that society can return the strain to the landscape, which gets cultivated to serve a social model. In Canada agencies like the Canadian Forest Service and provincial departments of natural resources become subject to endless reorganizations. In Alaska it's reflected in chronic complaints about federal oversight.

The paradox is that a first-world economy in a boreal environment requires large-scale institutions, either global businesses or national governments. That applies to the economy of fire as to other matters. Smaller entities cannot, alone, master the episodic fire threats or needs. So while it's hard to speak of "zones" of 40 million acres, or agencies that oversee 60 million acres as small, they can be within the context of a boreal environment. The need to get big pushes institutions toward corporatism, consolidations, and confederations.

Big as they are, however, land and fire agencies in Alaska cannot succeed alone; nor can Alaska. In fact, its size worsens the issue because transportation costs become prohibitively high. The state needs to unite with a larger entity. It has to bond to the nation overall.

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The foundational Alaskan narrative is the struggle to exercise control over the major conditions of economic and political livelihoods. Alaska - Alaskans - can't do this to the extent they wish but that reality doesn't stop frustration with institutions established to intervene or buffer against those outside forces. Alaska can't control climate directly, or the oil market, or the fish market, so it expresses its unhappiness by blaming those institutions nominally established to modulate the effects. Because ownership of its land has been unsettled so long, the federal government makes a convenient whipping boy.

What metamorphoses garden-variety grievances into political mythology and popular anger is that even when Alaska does own substantial lands, it still can't exercise the level of control or economic vigor its citizens demand. Statehood, in 1959, raised expectations that even Alaska's progressive Act of Statehood couldn't resolve. So, as Stephen Haycox has put it, when "statehood did not generate the prosperity advocates had expected and promised... Alaskans fell easily into their habit of blaming the federal government." A rabid "antistatism" came to "characterize Alaska's self-identity to an exaggerated degree."⁷

Its relationship to the country at large is itself a source of both security and instability because it is culture that finally defines how fire is managed and what it means. That Alaska is part of the United States lends its landscapes and firescapes a different character than the boreal forests of Nordic Europe, Canada, or Russia. Nordic Europe is not so remote or so vast that European-style agriculture could not move into it, and where agriculture faltered, silviculture could take its place. The Canadian confederation allowed a political arrangement quite different from the American federation. Canadian provinces control their natural resources; American states control only those

lands granted to them upon entering the union. The tension between economy and ecology can arc sharply in the U.S., where national lands exist within the boundaries of states, in ways that get diffused in Canada. When big fire years overwhelmed even the most muscular of provinces, and forced them to seek alliances, they did so through a corporation (Canadian Interagency Forest Fire Centre), not a government bureau. The Russian boreal all lies under a central government, though one that has aptly been characterized as a tribute-taking state. Fire suppression, mostly aerial, is powerful but spotty and often arbitrary.

So while many of Alaska's tensions arise from its being within the circumpolar north, being big, remote, and boreal also makes for unique tensions within the U.S. as well. Alaska was for long a colony, then it stutter-stepped into territorial status, and finally it achieved statehood; and by the time it was admitted it came into an American federation that had learned some hard insights from nearly 200 years of state-making and the environmental consequences of unrestricted settlement. Those lessons, codified into the act of statehood, spared Alaska some of the worst excesses endured by other states, but also denied it some of the opportunities that other states had enjoyed (and had not infrequently abused). Its political creation, that is, made semi-permanent a political dialectic that has suffused nearly all aspects of Alaskan life, the way color can leak from a pair of socks to tint everything in the wash.

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Alaskans have been taught to understand their history as a struggle - a struggle against a majestic but harsh natural landscape, and a struggle against outsiders seeking to control them. The first leads to a heroic story of continued pioneering, broadly conceived. This is interpreted as a matter of mostly individual strength and character. The second story speaks to a sordid political contest against institutions, some of them the expressions of big capitalism, most of them representatives of the federal government, which made Alaskan statehood needlessly problematic. That understanding leverages anecdotal frustration into a mythology.

What both narratives share is a sense of Alaska as the Last Frontier. What that phrase means, however, is itself a source of further contention as groups compete to be the rightful inheritor of the mantle. One vision emphasizes the Wild. Alaska is where America's last best nature endures. Here all Americans can experience and relive the encounter between civilization and wilderness that, in their minds, is the fundamental narrative of America. The other vision emphasizes a Wild West. Alaska is the last chance for frontier development, a place where oversized characters can engage an oversized land and extract wealth and freedom. Nearly all the great controversies have pivoted on the conflict between these two visions. Basically, the Alaskan story is the American story gone far north, where the past can be replayed again but with perhaps better outcomes.

What really makes Alaska special, however, is its Native population. Their presence and voice have destabilized the traditional dialectic into a three-body problem in politics. Wild and Wild West could re-enact the drama of American settlement and environmental protection but, unlike the Lower 48, the indigenes could not be silenced, eliminated, or removed into reservations. The narrative arc was not simply the story of a Manichaeian struggle between frontier development and preservation, or between state and federal government, but a complex negotiation among state, feds, and Natives. Alaska's Native peoples got land, economic institutions, and a say in how both federal and state lands were managed. This has made the old drama harder to re-enact and the old narrative trickier to update. The narrative arc is bent by passing through a prism of Native political power.

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All these features manifest themselves in landscape fire. How could they not?

Alaska's fire economy is boom or bust, sometimes a sink, sometimes a source. In some years Alaska dominates national statistics, while in others, it has a fire load comparable to that of Massachusetts. Its remoteness means fire control, later fire management, must be conducted by air,

which greatly increases costs but also allows for options not often available in the contiguous U.S. Aerial fire management of big fires in a big backcountry has sparked a fire culture with its own axioms, initiations, and elan.

A thumbnail history of Alaskan fire has it lagging national developments until 1980, then leading. With statehood it developed within 20 years a sophisticated suppression organization that had taken the nation 70; then it distilled into a handful of years a fire revolution that has struggled, incompletely across the rest of the country, over the past 50. Only Alaska, and maybe Florida, succeeded in restoring fire at a landscape scale. After passage of the Alaska National Interest Lands Conservation Act, Alaska showed what was possible in wildlands.

Its awkward, seemingly never-complete history of land tenure kept Alaska open to changes in fire philosophy and policy. Its relatively segregated realms of anthropogenic and natural fire left it with room to maneuver. It could trade the cost of an aerial fire program for the social and political costs of managing fire in lands, like those in most of the Lower 48, which mingled competing land uses into an ecological omelet. With its immense land base, and relatively few owners, Alaska could dilute the complexity that overwhelmed so many efforts to restore fire elsewhere. It could trade land for decision space.

But Alaska is also a state of mind. The freedoms its geography and history have made possible have also defined a memory, continually rekindled, that has frequently fettered its ability to exercise those freedoms. Alaska might be formally a state, but economically, and hence geopolitically, it remains a colony. Political autonomy quarrels with economic dependence. The upshot, what might be termed the Alaskan Persuasion, is as much a part of its fire scene as black spruce, high tundra, and dry lightning.

¹ Quoted in Barbara Miller Solomon, ed., Timothy Dwight, *Travels in New England and New York* (Cambridge: Harvard University Press, 1969), Vol. 3, Letter 7: 350-351.

² See Stephen Pyne, *Fire in America: A Cultural History of Wildland and Rural Fire* (University of Washington Press, 1995): 56 and Pyne, *Awful Splendour: A Fire History of Canada* (University of British Columbia Press, 2007): 124-127. The standard popular reference has been David M. Ludlum, "New England's Dark Day: 19 May 1780," *Weatherwise* (June 1972): 113

The 1780 Dark Day has been reexamined in the light of fire scar data by Erin R. McMurry, Michael C. Stambaugh, Richard P. Guyette, and Daniel C. Dey in "Fire scars reveal source of New England's 1780 Dark Day," *International Journal of Wildland Fire* 16 (2007): 266-270, which includes a thorough update of sources.

³ For a fuller rendition, see Frederick Jackson Turner, *The Significance of the Frontier in American History* (Henry Holt and Co., 1921), p. 12

⁴ James Agee, *Fire Ecology of Pacific Northwest Forests* (1993), p. 8. Muir quoted in Pyne, *Fire in America*, p. 327, fn 9

⁵ My Alaska trek was made possible by Ron Dunton, with assistance from the Joint Fire Science Program. I wish to thank Beth Ipsen and, in particular, Mike Roos for making my visit to the Alaska Fire Service productive. But there were many other people, not included in the specific acknowledgements elsewhere because their special expertise did not end up as a stand-alone topic. Let me thank them here: Thomas Kurth, Alison York, Peter Butteri, Jennifer Barnes, Doug Alexander, Brian Sorbel, Douglas Downs, Jay Wattenbarger, Randi Jandt, Bill Cramer, Larry Weddle, and Michael Butteri.

⁶ John McPhee, *Coming into the Country* (Farrar, Straus, Giroux, 1977), p. 57.

⁷ Stephen Haycox, *Battleground Alaska: Fighting Federal Power in America's Last Wilderness* (University Press of Kansas, 2016), pp. 24, 16.