The Forest Management Conundrum in the United States

by Don Healy, *B.S. Forest Management, Oregon State University, 1968*

> *"It ain't what you don't know that gets you into trouble.*
> *It's what you know for sure that just ain't so"*
> *— Mark Twain*

Preface

The portion of this paper pertaining to the role of the Native Americans prior to the arrival of European explorers and settlers in the management of their ancestral lands was inspired by the work of Dr. Robert T. Boyd, a fellow graduate of Oregon State University, and editor of the book "Indians, Fire, and the Land in the Pacific Northwest" originally published in 1999 and revised in 2021 by Oregon State Press. In an email exchange with Dr. Boyd he related that the book was not particularly well received initially. The lore passed down in the oral traditions of the native tribes was not believed credible or was simply ignored. In some cases the tribes have been hesitant to disseminate this information after decades of confinement and degradation by the later arrivals. However, over the past 27 years, many new lines of evidence have surfaced proving the veracity of Dr. Boyd's and the other contributing authors' work. One of whom was Dr. Frank K. Lake, Research Ecologist with the Pacific Southwest Research Station, USDA who provided very helpful references on this topic. The recently completed North American Tree Ring Fire Scar Network, a more thorough review of the written works by the early explorers such as Geroge Vancouver and Joseph Whidbey, the botanical studies of David Douglas, the journals of Lewis and Clark, the records of the Hudson Bay Company, the records of the early railroad surveyors and the written documentation of some of the earliest non-native settlers in the region now demonstrate how remarkably benign and beneficial was the resource management employed by the Native Americans for at least the past 10,000 years using fire judiciously.

Fire is both the problem and a part of the solution. The Native Americans used it as a solution. Our fire prevention policy for the past 150 years on the west coast have created a massive fire deficit. At this stage, we cannot use fire as the Native Americans did. The fuel loads are much too high; the results would be catastrophic. The fuel loads need to be reduced to the levels that we can employ fire using the Native American's principles.

In light of this information, it is now obvious our current forest management, or in many cases non-management, is wrong-headed and needs to be addressed. Continuing on our current path will lead to increased forest fires and further unnecessary degradation of our nation's forest resource. The solutions are obvious but will not be easy.

1. The public needs to be educated in the long-term history, covering the past 10,000 years. This will require the news media to take a very active role in first, themselves becoming educated, then second, passing that knowledge along to their readers and viewers. This currently is a major problem: A tiny percentage of journalists and reporters have even minimal training in any of the sciences, which is painfully obvious when reviewing their current efforts.

2. The second major hurdle is our legal system. When applied to forest management situations as has been done for the past 45 years, total anarchy reigns and nothing fruitful is accomplished. As a society, we need to accept final forest management prescriptions developed in a science-based process involving all concerned parties in a democratic, bipartisan fashion. Once those management plans are completed they need to remain inviolate.

Should we not do so now, we will undoubtably have to do so in the future when the wildfire situation becomes unacceptable and we tire of heavy doses of smoke-filled air during our summers.

Section 1 Introduction: The Conundrum of American Forest Management

The United States is in the midst of a deepening wildfire and forest health crisis, yet the federal policies most capable of addressing it remain largely paralyzed — trapped between litigation, ideological conflict, and a failure of political will. Each fire season brings new records: acres burned trending upwards, more communities threatened, more old-growth lost to flame. And yet the management actions that ecologists, silviculturalists, and fire scientists broadly agree are necessary — thinning, prescribed burning, managed wildfire, and active fuel reduction — continue to be delayed, blocked, or abandoned in the face of legal challenge and public controversy. This is the central paradox of American forest management: we understand what our forests need, and we remain unable to provide it.

At the heart of this impasse lies a powerful and persistent myth — the idea of the "pristine wilderness." According to this narrative, the forests of North America before European contact were ancient, untouched, dense, and self-regulating; vast cathedrals of old growth that sustained themselves without human intervention for millennia. This image has shaped conservation law, federal land management policy, and public sentiment for more than a century. It has inspired genuine love of the land and motivated real conservation victories. But as a description of ecological history, it is deeply and consequentially wrong. The forests that early European explorers encountered were not wilderness in any meaningful modern sense. They were cultural landscapes — actively shaped, managed, and maintained by Indigenous Peoples over thousands of years.

The central argument of this manuscript is threefold. First, the forests Europeans encountered across North America between 1500 and 1850 were the product of at least 10,000 years of intentional human management, primarily through the use of fire. Indigenous Peoples were not passive inhabitants of these landscapes — they were sophisticated ecological engineers who used burning, harvesting, transplanting, and other tools to maintain open, resilient, and productive forests. Second, the collapse of those stewardship practices — caused by epidemic disease, displacement, and forced removal — produced the dense, fuel-loaded, insect-vulnerable forests we struggle to manage today. Climate change and industrial logging have amplified the crisis, but they did not create it. The root cause is the abrupt removal of human stewardship from landscapes that depended on it. Third, and most importantly, the only path to restoring resilient forests in the United States is a science-based, historically informed management strategy that learns from the past while applying the best tools of modern silviculture, ecology, and policy.

The evidence supporting this argument is wide-ranging and convergent. Paleoecological charcoal records spanning thousands of years reveal the persistent signature of anthropogenic fire long before European contact. Tree-ring fire-scar networks, including the North American Tree Ring Fire Scar Network, document the frequency and character of historical fire regimes across hundreds of forest types. Early explorer accounts — from Lewis and Clark to George Vancouver to Spanish missionaries and French voyageurs — consistently describe landscapes that bear no resemblance to the dense, closed-canopy forests that dominate the West today. Ethnobotanical studies catalog the sophisticated plant management practices of dozens of Indigenous nations. And modern silvicultural science confirms what these historical records suggest: that frequent, low-severity fire is essential to the long-term health and resilience of most western forest ecosystems.

The sections that follow move through this evidence systematically. We begin with Indigenous populations and their long history of land management, then examine the specific fire regimes and ecological engineering practices they employed. We trace the collapse of Indigenous stewardship and its immediate ecological consequences, document the historical forest conditions those stewardship practices created, and assess the modern crisis that has emerged in their absence. The manuscript concludes with a practical, ecologically grounded national forest allocation and management framework — one designed not for a mythologized past, but for the complex and urgent realities of the present. The forests of the United States can be restored to health. But only if we are willing to engage honestly with what they once were, what they have become, and what science tells us they need.

Section 2 Indigenous Populations and Land Use Over the Last 10,000 Years

Understanding the condition of North American forests prior to European settlement requires looking far deeper into history than the 1500–1850 period typically referenced in environmental debates. (Later we will discuss the changes that have taken place during the last century that further exacerbate the situation.) Archaeological, paleoecological, and anthropological evidence now makes it clear that Indigenous peoples have been shaping the continent's landscapes for at least 10,000 years, and in many regions even longer. Their influence was not marginal. It was continuous, intentional, and ecologically transformative.

Population estimates for the pre-contact era vary widely, but even conservative reconstructions show that Indigenous populations were large enough — and geographically widespread enough — to exert landscape-level influence. While the estimates for 1500 CE range from roughly 2.1 million to 18 million, earlier periods also supported substantial populations. By 8,000–10,000 years ago, nearly all major ecological regions of North America were inhabited, from the Pacific Northwest to the Great Plains to the Eastern Woodlands.

What matters most for understanding forest conditions is not the absolute population number, but the duration and continuity of human management. Even a smaller population, applying fire and other tools consistently over thousands of years, can maintain open forests, prairies, and mixed mosaics. Paleoecological charcoal records from the Pacific Northwest, California, the Great Basin, and the Plains show persistent, frequent burning long before the rise of large sedentary societies. These records demonstrate that anthropogenic fire was not an occasional or opportunistic activity — it was a defining ecological force.

This long-term human presence means that the "natural" forests often idealized by modern environmental activists — dense, closed-canopy stands with heavy fuel accumulation — are not natural at all. They are the product of a brief, anomalous period following the collapse of Indigenous populations due to disease and displacement. For thousands of years prior, the forests were shaped by people who understood that fire was essential to maintaining ecological balance, wildlife abundance, and food security.

Section 3 Indigenous Fire Regimes and Landscape Engineering

Initially it was thought that Indigenous People were hunter/gathers much like our more prehistoric ancestors. While not purely agriculturalists like modern society, research has now shown that the Indigenous People were diligent managers of numerous food and material sources, but unlike farmers today who intensively manage a consolidated acreage for the production of one, or at most very few species, the Indigenous People managed the desired crops in situ and traveled to those locations where the crops grew naturally, in many cases following a regular migration each year to fulfill their needs. Farming now involves only a tiny portion of our population, and most people today have only a distant relationship with the natural world. At the other extreme, virtually every member of the Indigenous population had an intimate relationship with their environment and their only significant tool to cultivate and manage the plants and animals upon which they depended was fire. The following quote from Lara. A. Jacobs (Citizen of Muscogee/Creek/ Nation with Choctaw heritage) best describes this relationship:

"Across many Tribal Nations, fire is medicine. It has the power to heal lands after they have been scarred, to protect beings who dwell within them, and to restore balance in ways both visible and unseen. Fire teaches, reminding us of the ties that sustain our kinship with trees, water, winds, animals, and all our more-than-human relatives who share its warmth and power. To live well with fire is to honor the relationships and responsibilities it carries, with people, with land, and with the living world that breathes through flame." (Landkeeping, Restoring Indigenous Fire Stewardship and Ecological Partnerships, Edited by Jared D. Aldern & Theresa Lynn Gregor, Oregon State University Press, 2026)

Indigenous Nations across North America used fire as their most important ecological tool. This was not random burning, nor was it destructive. It was a sophisticated, intentional system of land management designed to produce predictable ecological outcomes. As one observer aptly noted of the Pacific Northwest's First Peoples:

> *"Indigenous Northwesterners did indeed have a tool — fire — and they knew how to use it in ways that not only answered immediate purposes but also modified their environment."*

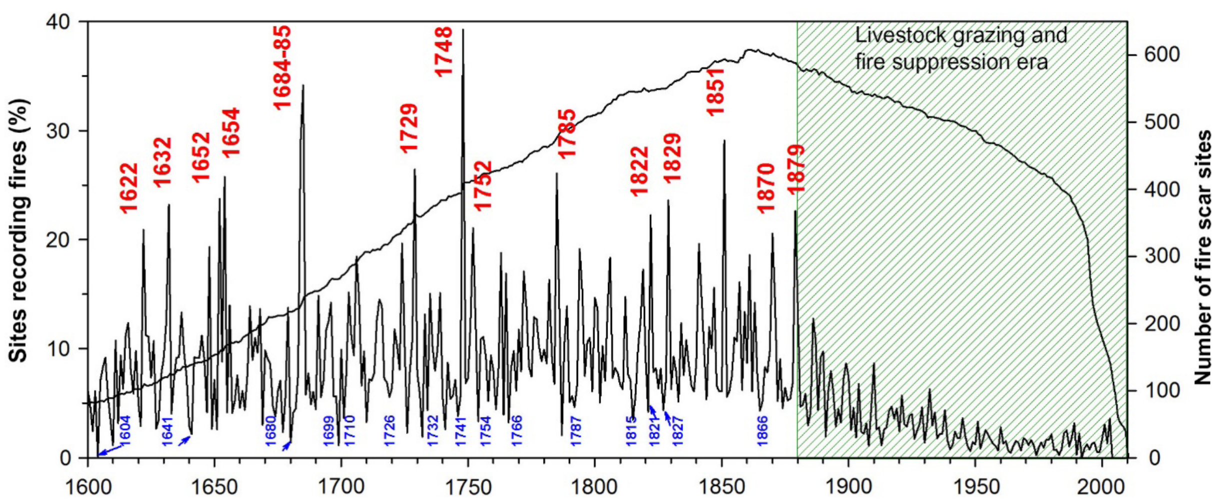
The depth and intentionality of this fire management cannot be overstated. Across virtually every ecological region of North America, the physical and biological record tells the same story: human fire was frequent, purposeful, and landscape-shaping.

Fire Frequency and Scale

In the last several years several excellent, peer-reviewed papers derived from the North American Tree-Ring Fire Scar Network (NAFSN) that details forest fire history back to 1600 have been published. ([The North American tree-ring fire-scar network | US Forest Service Research and Development]())

The first paper is "**Evidence for widespread changes in the structure, composition, and fire regimes of western North American forests.**" (https://esajournals.onlinelibrary.wiley.com/doi/10.1002/eap.2431)

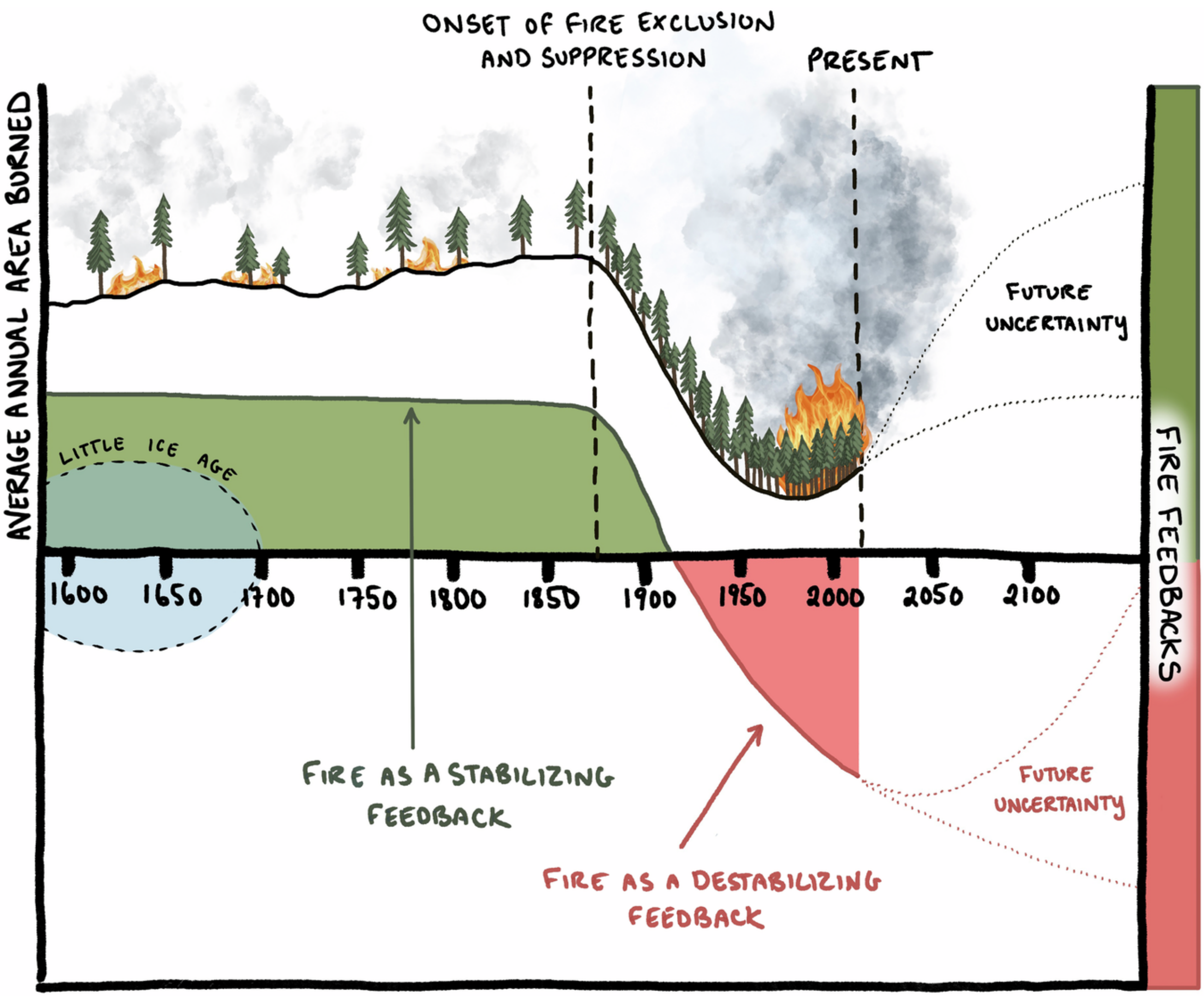
The signature graph from this paper is shown below.



Across western North America, fire frequency decreased substantially following expansion of colonization by Europeans, intensive livestockg razing, decimation of Indigenous populations and suppression of Indigenous burning in the late 19th century. The combined record of fire occurrence from more than 800 forest and woodland sites, the largest network of tree-ring based fire-scar chronologies in the world, illustrates this reglonwide decrease in fire frequency.

Reprinted from Swetnam et al. (2016) with the author's permission.

From a more recent paper, A fire deficit persists across diverse North American forests despite recent increases in area burned" (https://www.nature.com/articles/s41467-025-56333-8) we have the following graph:



Tree-ring fire-scar networks, including the North American Fire Scar Network (NAFSN), show that many forest types — especially ponderosa pine, mixed conifer, oak woodlands, and interior valleys — burned at intervals of 5 to 25 years. These fires were typically low severity, consuming understory fuels, recycling nutrients, and maintaining open structure.

In many regions, Indigenous ignitions were more frequent and more widespread than lightning ignitions. The result was a landscape characterized by:

- Open canopies
- Sparse understories
- Patchy mosaics of age classes
- High biodiversity
- Low fuel continuity

These conditions are the opposite of what we see today.

B. Ecological Purposes of Burning

Indigenous fire served dozens of functions, including:

- Maintaining berry fields (huckleberry, serviceberry, salmonberry)
- Enhancing root crops (camas, wapato, biscuitroot)
- Improving forage for deer, elk, and bison
- Reducing pests and pathogens
- Maintaining travel corridors and visibility
- Protecting villages by reducing nearby fuels
- Encouraging fresh growth for basketry and medicinal plants

These were not incidental benefits — they were the intended outcomes of a deliberate management system.

"In 1845, Samuel Hancock commented on the unusual shape of the oak trees in the Willamette Valley: "very low with bushy tops…(that) reminded me of the apple trees at home" Regular low-intensity burning of the oak understory apparently produced standardized, well-groomed oak groves that resembled fruit and nut orchards cared for by more complex techniques of arboriculture familiar to the American settlers.

The ethnographic information on burns in oak groves by the Indians of northern California is relatively detailed and provides a model for the practice among the Kalapuya. The Karok reason for burning under the oaks was as follows:

Maimie Offield says "the trees are better if they are scorched by fire each year. This kills disease and pests. Fire also leaves the ground underneath the trees bare and clean, and it is easier to pick up the acorns" (Indians, Fire and the Land in the Pacific Northwest, Edited by Robert T. Boyd, Revised Edition, 2021, Oregon State Press, pg. 116.)

C. Landscape-Scale Effects

The cumulative effect of thousands of years of burning was the creation of park-like forests, extensive prairies, and open savannas in regions that would otherwise support dense conifer stands. Early explorers repeatedly described these landscapes as resembling "well-kept parks" — accurate observations of a landscape engineered by human hands, not romantic exaggerations. Accounts from George Vancouver, Joseph Whidbey, and Methow Valley elders all paint the same picture: a continent of open, managed, abundant landscapes.

In May and June of 1792, Captain George Vancouver's expedition enter Puget Sound expecting a wilderness populated with unsophisticated natives. Viewing the Penn Cove area on Whidby Island the following report was written:

"The surrounding country, for several miles in most points of view, presented a delightful prospect consisting chiefly of spacious meadows elegantly adorned with clumps of trees which the oak bore a very serious proportion, in size from four to six feet in circumference. In these beautiful pastures…the deer were seen playing about in great numbers. Nature had here provided the well-stocked park, and wanted only the assistance of art to constitute that desirable assemblage of surface, which is so much sought in other countries, and only to be acquired by an immoderate experience in manual labor. (George Vancouver, A Voyage of Discovery in the Pacific Northwest and Round the World, 1791-1795, Vol. 2. Kaye Lamb ed. (London, 1984).568.)

Shortly thereafter, Joseph Whidbey recorded "clear spots or lawn…clothed with a rich carpet of "Verdure." The "verdure" of these "lawns" included grass of excellent quality, tall ferns "in the sandy soils" and several other plants: "Gooseberrys, Currands, Rasberrrys & Strawberrys were to be found in many places. Onions were to be gotten almost everywhere." ((Whidbey's observation are recorded by Archibald Menzies. "Menzies' Journal of Vancouver's Voyage, April to October 1792.(Archives of British Columbia Memoir V, 1923, 48.)) The onions mentioned most likely being camas lilies; a major food source.

It was not initially apparent to these early explorers that the landscapes describe in the two quotations above were not natural but rather were created by the native population's use of fire for millennia prior to Vancouver's arrival.

Section 4 Indigenous Management of Wildlife and Plant Communities

Indigenous Peoples did not simply adapt to their environments — they actively shaped them to support abundant wildlife and diverse plant communities. Their management practices were sophisticated, regionally adapted, and grounded in deep ecological knowledge accumulated over millennia.

A. Wildlife Management

Fire was used to:

- Create fresh browse for ungulates
- Maintain edge habitat, which supports high wildlife diversity
- Direct animal movement during hunts
- Reduce cover for predators
- Maintain open grasslands for bison

The result was that wildlife populations at the time of European contact were often higher than they would have been under purely "natural" conditions without human intervention.

B. Plant Community Management

Ethnobotanical studies document active management of hundreds of plant species, including:

- Root crops: camas, wapato, bitterroot, biscuitroot
- Berries: huckleberry, blackberry, elderberry, serviceberry
- Nuts: acorns, hazelnuts
- Basketry plants: beargrass, willow
- Medicinals: yarrow, Oregon grape, wild ginger
- Wetland plants: tule, cattail

Management techniques included burning, weeding, transplanting, soil aeration, selective harvesting, coppicing and pruning, and irrigation in some regions.

> *"Native Americans probably knew as much if not more about specific plant sequences in local communities as contemporary forest and rangeland specialists."*

In many cases, this is literally true. The accumulated ecological intelligence embedded in Indigenous land management practices represents knowledge that modern science is only beginning to fully appreciate and document.

C. The Resulting Landscape

The combined effect of wildlife and plant management was a continent characterized by high productivity, high biodiversity, low fuel accumulation, frequent disturbance, and open structure. This is the ecological baseline against which modern forest conditions must be compared — and against which the magnitude of today's crisis can be properly understood.

Section 5 What Early Explorers Actually Saw

The historical record left by early European explorers provides powerful, firsthand testimony that directly contradicts the modern myth of a "pristine wilderness." These accounts are not romantic exaggerations — they are accurate descriptions of a landscape engineered by human hands.

A. The Consistency of Early Accounts

Explorers across the continent — Lewis and Clark, John Muir, Hudson's Bay Company traders, Spanish missionaries, and French voyageurs — all described remarkably similar landscapes: open forests, extensive prairies, abundant game, frequent burning, and terrain resembling managed estates. George Vancouver, exploring Puget Sound in the 1790s, described the shores as resembling "a well-kept park." Joseph Whidbey's accounts of interior valleys and Methow Valley oral histories describe the same open, fire-maintained mosaics. These were not untouched ecosystems. They actively maintained cultural landscapes.

In 1979, anthropologist Jay Miller "went into the Methow Valley in north-central Washington with a van load of Methow Indian elders, some of whom had not been there for fifty years. When we had gone through about half of the valley, a woman started to cry. I thought it was because she was homesick, but after a time, she sobbed, "when my people lived here, we took good care of all this land. We burned it over every fall to make it like a part. Now it is a jungle." Every Methow I talked to after that confirmed the regular program of burning. (Indians, Fire and the Land of the Pacific Northwest, Edited by Robert T. Boyd, New edition, 2021.Pg.1)

B. The Collapse of Indigenous Stewardship

After 1800, epidemic disease reduced Indigenous populations by as much as 90–95%. This sudden collapse ended millennia-old fire regimes almost overnight. Within a single generation, prairies began converting to forest, understory fuels accumulated, forest density increased, insects and diseases proliferated, and fire severity climbed dramatically.

This transition — not logging, not climate change, not industrialization — is the root cause of the dense, overstocked forests we see today. The "pristine wilderness" romanticized by 19th-century naturalists was not ancient. It was new — the product of a sudden absence of human stewardship.

Section 6 Historical Forest Density, Composition, and Fire Frequency & Role of Plant Succession:

To understand the wildfire crisis facing the United States today, it is essential to recognize that the forests encountered by early European explorers were not "natural" in the sense often implied by modern preservationist narratives. They were the product of millennia of frequent, low-severity fire — both lightning-caused and intentionally set by Indigenous peoples. These fires shaped forest structure, species composition, and fuel dynamics in ways fundamentally different from the conditions we see today.

A. Forest Density and Structure

Paleoecological records, early explorer accounts, and modern fire-scar data all converge on the same conclusion: historical forests were far more open and less dense than contemporary stands. In many regions of the West, particularly in ponderosa pine and mixed-conifer forests, tree densities were often 10–20% of current levels. Large, fire-resistant trees dominated the canopy, while the understory was sparse, with limited ladder fuels.

This structure was not accidental. It was maintained by frequent fire, which removed small trees and shrubs, reduced surface fuels, limited competition for water and nutrients, and promoted fire-adapted species such as ponderosa pine and oak. The result was a forest that was both resilient and productive — capable of withstanding drought, insects, and fire without catastrophic loss.

B. Fire Frequency

The North American Fire Scar Network (NAFSN), which provides the most comprehensive physical evidence of historical fire regimes, documents data from more than 2562 sites containing more than 37,000 fire-scarred trees. Fire-scarred trees show that many western forests burned every 5–25 years, some grass-forest ecotones burned every 1–10 years, and even moist forests such as parts of the western Cascades burned more frequently than previously believed.

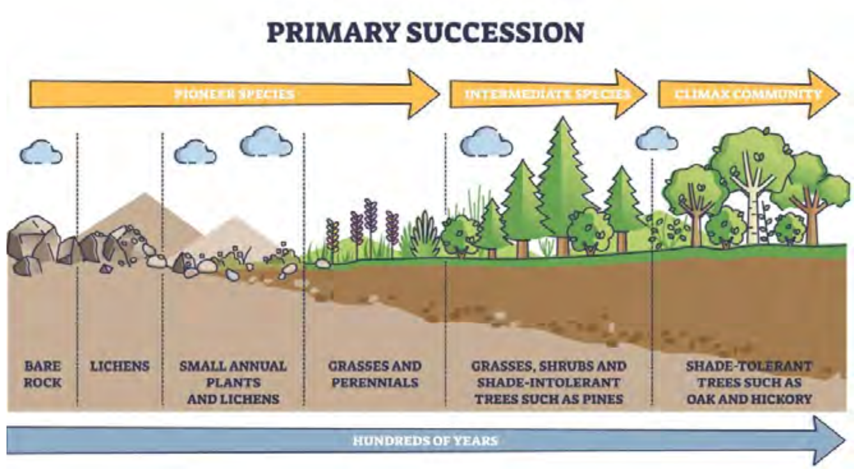
Compared to the contemporary fire record, historical fires burned much larger acreages much more frequently. This finding is supported by a 2025 Nature Communications study demonstrating that even the "record" fire years of the 21st century burn far less area than typical fire years in the 1700s.

C. Species Composition

Frequent fire favored ponderosa pine, western larch, oak species, and fire-tolerant shrubs and grasses. It suppressed shade-tolerant firs, dense understory vegetation, and insect-susceptible species. Today's forests, by contrast, are dominated by species that historically would have been kept in check by fire. This shift in species composition is a major driver of modern insect outbreaks and high-severity fires.

D. Review of Principles of Plant Succession:

Ecological succession is the process by which the mix of species and the habitat in an area change over time. Gradually, these communities replace one another until a "climax community"—like a mature forest—is reached, or until a disturbance, like a fire, occurs.



(https://news.uchicago.edu/explainer/what-is-ecological-succession)

Go to: *Explainers tab, then Ecological Succession, Explained tab*.

Succession in a Pacific Northwest (PNW) westside forest (west of the Cascade Crest) typically follows a predictable trajectory from a cleared area to a complex old-growth ecosystem. Driven by the region's mild, wet climate, this process of stand development spans hundreds of years and unfolds in distinct structural stages.

1. Stand Initiation (0–20 Years)

Following a severe disturbance (wildfire, windstorm, or logging), the area is colonized by sun-loving pioneer species.

- **Vegetation:** Rapid growth of grasses, shrubs, and hardwood saplings like Red Alder.
- **Dominant Trees:** Fast-growing, shade-intolerant conifers such as Douglas-fir begin to establish and outpace the hardwoods.

2. Stem Exclusion (20–80 Years)

The young conifer trees grow rapidly, creating a dense, uniform canopy that blocks out most of the sunlight.

- **Vegetation:** Lower branches die off, and the understory becomes relatively sparse due to the lack of light.
- **Dynamics:** Fierce competition ensues. Weaker trees are "excluded" and die, leaving behind a closed-canopy stand of even-aged Douglas-fir.

3. Understory Reinitiation (80–200 Years)

As the even-aged Douglas-fir canopy ages, natural mortality and disturbances create gaps in the ceiling.

- **Vegetation:** Sunlight penetrates to the forest floor, allowing a lush understory of shrubs and shade-tolerant tree species (like Western Hemlock and Western Redcedar) to establish.
- **Dynamics:** The forest develops multiple canopy layers, transforming into a mature, multi-generational ecosystem.

4. Old-Growth (200+ Years)

The forest reaches a late-successional, steady-state structure.

- **Vegetation:** The original, towering Douglas-firs begin to die, creating massive "nurse logs" that provide nutrients and a substrate for new seedlings.
- **Dynamics:** Shade-tolerant trees like Western Hemlock and Western Redcedar dominate the canopy. The structure is highly irregular, featuring standing dead trees (snags), downed wood, and varied canopy heights.

In the west-side forest of the Pacific Northwest this path is generally followed if uninterrupted by fire, landslide, harvesting or insect and disease epidemics. Should such incidents occur, the affected plant communities simply return to an earlier stage and start the process again. Early successional stages frequently contain more nitrogen-fixing plants and trees which include alder and many of the legume family. Ironically, our atmosphere is about 80% nitrogen, but most plant and tree species are unable to utilize this source. Plant succession is simply a pathway, and no stage is more or less critical than any other, but some are more prolific than others and some are much more beneficial in providing suitable habitat for certain animal species. The Native Americans were fully cognizant of these relationships and used fire to manipulate the successional process to their benefit.

Let us examine how the Native Americans managed the single largest land area in the U.S., the Great Plains. Without their fire management this entire area would have transformed into forests thousands of years ago.

How Indigenous Fire Shaped the Great Plains

Multiple lines of evidence show that the Great Plains were historically fire-dependent ecosystems, and Indigenous nations played a major role in sustaining those fire regimes.

- **Frequent fire intervals (1–35 years)** characterized the plains, with fires ignited by both lightning and humans. Indigenous-set fires were especially common in late spring and summer.
- **Native American communities intentionally burned grasslands for many purposes:**
    - improving forage for bison and other game
    - directing animal movement
    - clearing brush and woody encroachment
    - maintaining travel corridors
    - protecting settlements by reducing fuel
    - agricultural preparation and maintenance These uses are explicitly documented across Minnesota, North Dakota, South Dakota, and the broader Plains.
    - Fire prevented the spread of trees and shrubs,

kept prairies open, and stimulated vigorous regrowth of native grasses and wildflowers, which depend on periodic burning.

- The U.S. Forest Service notes that historical fire regimes were a blend of lightning and human ignitions, and that Indigenous burning was a major contributor to the frequent, landscape-shaping fires that maintained the prairie mosaic.

Why fire was essential

The Great Plains evolved with fire. Without regular burning:

- leaf litter accumulates
- woody plants invade
- biodiversity declines
- grassland birds lose habitat
- wildfires become more severe due to fuel buildup

Indigenous fire practices kept these systems in balance for thousands of years.

Indigenous Burning in the Willamette Valley

In the previous discussions of Indigenous burning practices, we mentioned the purposes of the burning, but not the scope of it. The scale of the fires was quite impressive as documented in Dr. Boyd's book in the chapter "Strategies of Indian Burning in the Willamette Valley" starting on page 94. In 1825 (this was prior to the massive influx of immigrants over the Oregon Trail which took place in the mid-1840s) the Hudson Bay Company initiated their annual southern trapping expedition to California. Alexander McLeod led the party and David Douglas, the noted botanist, accompanied them. The party departed Fort Vancouver in early September during the Indian's burning season. In Yamhill Valley McLeod noted "several Indian habitations" and a landscape "much overrun by fire." Near the present site of Salem, Oregon, ""the party was obliged to ford the river in order to find food for their horses because the land was "burned and destitute of grass.""

Over the next few days, Douglas recorded:

> "9/27 Country undulating; soil rich, light with beautiful solitary oaks and pines interspersed through it and must have a fine effect, but being all burned and not a single blade of grass except of the margins of the rivulets to be seen."
>
> "9/30 (heading south)…Most parts of the country burned; only on little patches in the valleys and on the flats near the low hills that verdure is to be seen. Some of the natives tell me it so done for the purpose of urging deer to frequent parts to feed, which they leave unburned and of course they are easily killed."
>
> "10/2 (McLeod) Pasture is rarely found in the course of this day none has been seen, altho' we traveled good twenty miles and had to put up along a small river that our horses might have the pickings along the margin of the woods, elsewhere the fire destroyed all the grass."

The Willamette Valley is about 140 miles long and up to 60 miles wide and from the accounts of McLeod and Douglas it appears that a sizeable portion was managed with fire by Native Americans. So the scope of the burning activity was extensive. The Hudson Bay Company estimated that the native population was about 8000 at the time of the expedition, However, by 1825, the population had already been greatly reduced, with an estimated pre-contact population of perhaps 15,000.

Douglas separated from the party in Umpqua County and headed back to Fort Vancouver in early November. Where all had been burned heading south, he found "Country open, rich , level and beautiful." "Fall rains had caused a greening of the prairies." Where he saw deer on the way down he found newly formed marshes and lakes filled with migrating waterfowl (pages 100 and 101). It is obvious that the Native Americans had finely-tuned land management skills.

Section 7 The Collapse of Indigenous Stewardship and the Rise of Fire Suppression

The transformation of North American forests did not begin with industrial logging or modern climate change. It began with the collapse of Indigenous populations due to disease, displacement, and forced removal from ancestral lands — a collapse that abruptly ended the millennia-old fire regimes that had shaped the continent.

A. The Demographic Collapse

The Indigenous population of what is now the United States was estimated to have been as much as 20 times greater prior to the introduction of measles, smallpox, and other epidemic diseases. By 1800, that population had fallen to roughly 600,000. By the 1890s, it had declined to approximately 250,000. This represents one of the most rapid and devastating demographic collapses in human history.

B. The Immediate Ecological Consequences

When Indigenous burning ceased, the ecological effects were swift and profound. Prairies began converting to forest. Oak woodlands filled in with fir and maple. Understory fuels accumulated at unprecedented rates. Forest density increased dramatically. Fire severity rose. This transition happened within decades. The "pristine wilderness" described by 19th-century naturalists was not ancient — it was new, the product of a sudden absence of human stewardship.

C. Institutionalized Fire Suppression

By the early 20th century, federal agencies adopted a policy of total fire suppression. The 1935 "10 a.m. policy" required all wildfires to be extinguished by the morning after detection. This policy, though well-intentioned, was ecologically disastrous. It created unprecedented fuel accumulation, dense multi-layered forests, increased insect and disease vulnerability, and conditions ripe for high-severity, stand-replacing fires.

The beneficial effects of understory and spot burning — effects that Indigenous peoples had relied upon for thousands of years — became timely reminders of an ill-advised, unnatural practice: the complete removal of fire from fire-dependent ecosystems. This is the central paradox of modern forest management: the attempt to "protect" forests by eliminating fire has instead made them far more vulnerable to destruction.

Section 8 Modern Fuel Loads, Insects, Disease, and Fire Severity

The forests of the United States today bear little resemblance to the forests of 1600–1850 and before. They are denser, more homogeneous, more stressed, and far more flammable. The combination of fuel accumulation, species shifts, and climate stress has created a perfect storm of ecological vulnerability.

A. Fuel Loads

In many western forests, fuel loads are now 4–10 times higher than historical levels. This includes dense thickets of small trees, heavy surface fuels, continuous ladder fuels, and dead and dying trees from drought and insect outbreaks. These conditions make low-severity fire — the kind that historically maintained forest health — almost impossible without prior mechanical thinning.

B. Insects and Disease

Dense, stressed forests are highly susceptible to bark beetles, root diseases, defoliators, and fungal pathogens. Historically, frequent fire reduced these threats by removing weak or diseased trees, reducing stand density, and promoting species diversity. Today, insect outbreaks kill millions of acres of trees each year, adding even more fuel to already overloaded forests.

C. Drought

With the Indigenous People maintaining the forests at much lower densities, the water resources available to each tree would have been considerably increased, resulting in healthier, more vigorous individuals, more capable of withstanding drought conditions. Today, drought conditions pose much greater risk to forest health with decreased vigor leading to less resistance to fire as well as to insect and disease issues. A significant problem currently are various bark beetles, with the mountain pine beetle and the Douglas-fir bark beetle currently causing devastation across much of North American. The primary defense for trees is having sufficient sap pressure to repel beetle attack and this requires that the tree not be water stressed.

D. Fire Severity

The most important distinction between historical and modern fire regimes is not how often fires occur, but how they burn.

Historical fires were frequent, burned at low severity, removed fuels, and maintained forest structure. Modern fires are infrequent, burn at high severity, kill entire stands, destroy soils, and threaten communities and watersheds.

Although contemporary fire extent is not unprecedented when compared against the deepest paleoecological record, unprecedented contemporary fire severity is now driving irreversible forest loss. This is the core of the wildfire crisis: not too much fire, but the wrong kind of fire.

Section 9 Old Growth: Myths, Realities, and Actual Threats

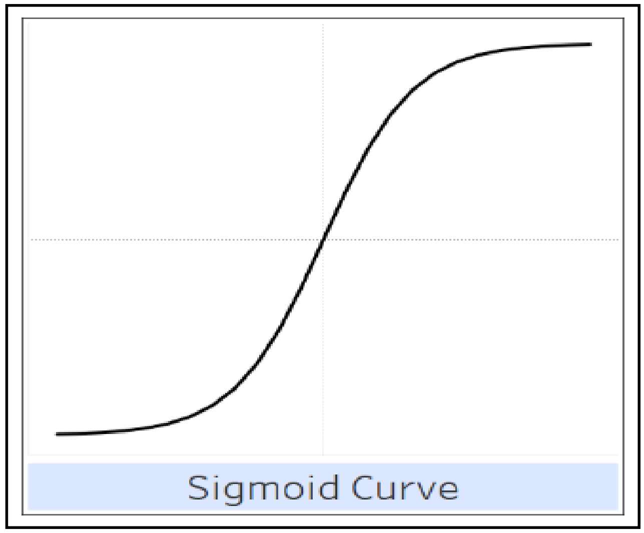
Old-growth forests occupy a central place in public imagination, often portrayed as ancient, untouched ecosystems that must be preserved at all costs. While old growth is ecologically valuable, the modern narrative surrounding it is frequently disconnected from historical reality and current ecological risk.

A. Historical Old-Growth Extent

Old growth was never the dominant condition across most western landscapes. It existed as part of a dynamic mosaic shaped by frequent fire. Large, old trees were common, but continuous expanses of dense old growth were not. The open, park-like forests documented by early explorers — dominated by large ponderosa pines, western larches, and oaks — were a product of this fire-maintained dynamism, not of protected stillness.

B. Modern Old-Growth Vulnerability

The obvious need to reduce the fuel load in our nation's forests to reverse the upward trend in wildfires is met with resistance from the environmental community. The focal point of this concern generally involves old growth forests. In the past 60 years, the definition of old growth has changed considerably. In forestry school in the mid-1960s we were taught that an old growth forest was a mature forest in which the amount of growth was slowing to the point that it was equaled by the amount of mortality. Currently, the old growth label is applied to stands as young as 150 years old. While old growth forests are important for numerous reasons, carbon sequestration is frequently mentioned as a top consideration as one of their benefits. However, when discussing a fully mature old growth forest, this is questionable. In individual trees, and even-aged forests such as the Douglas-fir common to much of the western United States, the growth pattern follows that of a sigmoid curve. Very slow growth in the early years, followed a sustained period of consistent growth, followed by a decline to a static condition before death. In a typical old growth forest, we see downed timber and a much greater incidence of decay. Obviously, an old growth forest while storing a large amount of carbon has less utility as a carbon sink than does a vibrant, middle-aged stand.



"With all the recent attention being paid to climate change and decarbonizing our atmosphere, which takes more carbon dioxide out of the atmosphere —100 hectares of mature old growth forest, or 100 hectares of young forest?"

Gregory Paradis, a forester, engineer, and assistant professor of forest management in the Faculty of Forestry at the University of British Columbia has an answer.

"Trees capture carbon from the atmosphere by converting sunlight to cellulose through photosynthesis. When trees die and fall to the ground, they gradually emit most of this captured carbon back into the atmosphere. Young vigorous stands grow and sequester carbon at maximum speed. As stands get older, the tree canopy closes and individual trees begin to die off from self-thinning and other causes.

Very old forest stands can reach a sort of carbon neutral equilibrium state where trees are dying and decaying at approximately the same rate as they are growing back.

So, taking into account both growth and mortality, 100 hectares of young forest will generally speaking have a higher net carbon capture rate than older but otherwise identical stands." (https://www.evergreenalliance.ca/fact-checker/do-new-forests-or-old-ones-capture-more-carbon-dioxide-from-the-atmosphere-r6/)

Again, the perception and the reality vary considerably. “While timber harvesting is recognized as the historical cause for loss of much of the nation’s mature and old-growth forests, current data show that in recent decades the leading cause for losses on forestlands managed by the Forest Service and BLM is from wildfires.” Between 2000 and 2020 losses due to forest fires were 3.2%, insects and diseases were second at 2.3% , while tree cutting was only amounted to 0.3% “

(Source: Mature and Old-Growth Forests: Analysis of Threats on Lands Managed by the Forest Service and Bureau of Land Management in Fulfillment of Section 2(c) of Executive Order No. 14072)

Old-growth forests are also deemed important for the diversity of animal and plant species that they support. Again the reality differs from the perception. Plant species diversity changes predictably during ecological succession. It typically follows an inverted U-shaped curve, peaking in the mid-successional stages before stabilizing or slightly declining as a mature, stable “climax community” is established.

1. Pioneer / Early Stage

- Conditions: Harsh, exposed environments (bare rock or disturbed soil) lacking topsoil and nutrients.
- Species Type: Opportunistic, fast-growing species (e.g., lichens, mosses, annual grasses).
- Diversity: Low. Only a few highly specialized or hardy species can survive the initial conditions.

2. Mid-Successional Stage

- Conditions: Improved soil structure, increased nutrient availability, and more shade.
- Species Type: A dense mix of fast-growing herbs, shrubs, and pioneer trees.
- Diversity: Peak. The highest total species diversity occurs here. Early pioneer species still linger, while K-selected (longer-living, competitive) species successfully establish themselves in the increasingly complex habitat.

3. Late / Climax Stage

- Conditions: Deep soils, stable microclimates, and strong competition for light and resources.
- Species Type: Long-lived, shade-tolerant canopy trees and understory plants.
- Diversity: Moderate to High. Total species diversity slightly drops or levels off compared to the mid-stage. Highly competitive dominant trees outcompete less hardy species, limiting the presence of smaller, early-stage vegetation.

Understanding these changes is foundational for ecological restoration and forestry management. As we see here for most habitats, the mid-successional stage supports the greatest diversity of life forms. But the reality is that all the inhabitants of all stages of succession are important and to emphasize one, old-growth over all others is inappropriate. Additionally, if one focuses on those successional stages that provided the bulk of the material and dietary needs of the Indigenous People, and does the same for modern civilization, the mid-successional stages are the heavy lifters. Ecologists generally find that the landscape has the greatest biodiversity when multiple successional stages coexist rather than when everything is old growth or everything is young forest.

C. The Management Paradox

Current efforts to protect old growth by prohibiting thinning or prescribed fire often increase the very risk of losing it entirely. Without reducing fuel loads, old-growth stands become tinderboxes. The solution is not to abandon old-growth protection, but to actively manage the surrounding landscape so that old growth can survive long enough to fulfill its ecological and cultural value.

With this in mind, perhaps the ideal course for mature and old growth stands would be a very light thinning to remove trees with declining growth rates while preserving the more vigorous members of the stand. Were the harvested trees to be converted into lumber and engineered products the already sequestered carbon would remain sequestered while the remainder of the stand would continue absorbing carbon at maximum efficiency.

Section 10 A National Forest Allocation and Management Strategy

The United States cannot continue managing its forests under a one-size-fits-all model. The ecological diversity of our forest types, the historical role of Indigenous stewardship, the modern wildfire crisis, and the competing demands placed on public lands all require a more nuanced, science-based approach. Also the current system

— in which every proposed management action is litigated, delayed, or blocked — is not sustainable. It results in paralysis, fuel accumulation, and ultimately the loss of the very forest values we seek to protect.

A national forest allocation and management strategy must begin with a clear understanding of how our forest resource has changed in the past century and what we want our forests to look like 50, 100, and 200 years from now. Returning to Mark Twain's quote at the top of the paper let us review common perceptions versus the reality, starting with forested acres during recent history.

The Pertinent Data Necessary To Create A Management Plan:

Now to examine how our forest lands have changed over the past century to compare the reality to the public's perception.

Forested Area: "The U.S. Census Bureau reports the total land area of the continental United States and Hawaii (excluding the Caribbean Islands and U.S. territories) as 2.3 billion acres. Forests and woodlands combined occupy 822.5 million acres of the U.S. land base. Of those, 93 percent (765.5 million acres) meet the international definition of forest, with the remaining 7 percent recognized as woodlands. Thus, forests comprise 34 percent of the American landscape, and forests combined with woodlands comprise 36 percent."

Forested Acres in the United States

Year:	1920	1938	1953	1963	1977	1987	1997	2007	2012	2017
Thousand Acres:	721,415	737,572	741,652	752,786	742,345	732,553	741,937	752,272	766,234	765,493

From Table 3, USDA, Forest Resources of the United States, 2017. A Technical Document Supporting the Forest Service 2020 RPA Assessment.

The perception by most is that our forested acreage has diminished. The reality is that we have gained 44,078,000 acres since 1920, a gain of 6.1%.

Owners of Forest Land: There are numerous owners and administrators of the forested lands within the United States. Here is just a fraction of the major players:

a

Inventory of Forested Area in the U.S. (Acres)			
			% of Total Forested.
Total Acreage of the United States:	2,260,000,000		
Total Forested Acreage in the United States:	818,814,000		
U.S. Government:	238,400,000		29.1%
USFS *		145,200,000	17.7%
BLM *		38,100,000	4.7%
Nat'l Park Service & Dept. of Defense *		55,100,000	6.7%
Bureau of Indian Affairs: **		19,200,000	2.3%
State County and Municipal: *		82,700,000	10.1%
Private:			
Corporate: *		147,400,000	18.0%
Non-Corporate: *		297,600,000	36.3%
Other:		33,514,000	4.1%
Total:		818,814,000	100%

Sources: * https://www.stateforesters.org/timber-assurance/legality/forest-ownership-statistics/
** https://edit.doi.gov/ocl/tribal-forest-management

Timber volume trend in the United States: Again, the perception of many is that our timber supply has diminished as well. The chart below shows just the reverse.

Net Volume of Growing Stock on Timberland in the United States						
	1953	1977	1987	1997	2007	2017
Softwood Vol.	431,794	466,960	467,575	483,842	531,600	560,526
Hardwood Vol.	184,090	266,096	314,080	351,828	402,894	424,712
Total Vol.	615,884	733,056	781,655	835,669	934,494	985,238

Source: U.S.D.A., Forest Resources of the United States, 2017: A Technical Document Supporting the Forest Service 2020 RPA Assessment. Tabs 18 and 19

With the dramatic reduction in harvesting on federal lands commencing in the late 1970s we have watched the volumes of merchantable timber increase by 60%. On federal lands, we quit harvesting, but the trees kept growing. U.S. wood products needs have been met in large part with Canadian imports which in recent years have reached $40 billion per year and provide about 70% of our nation's wood product's needs. During the past 45 years with very little forest management occurring on federal lands, we have seen an increase in insect and disease issues, stagnation in some stands and the resultant increase in wildfires.

Inventory of old growth, mature and younger stands: Currently, on federal lands administered by the U.S.F.S. and the BLM we have the acreages in the following forest classifications:

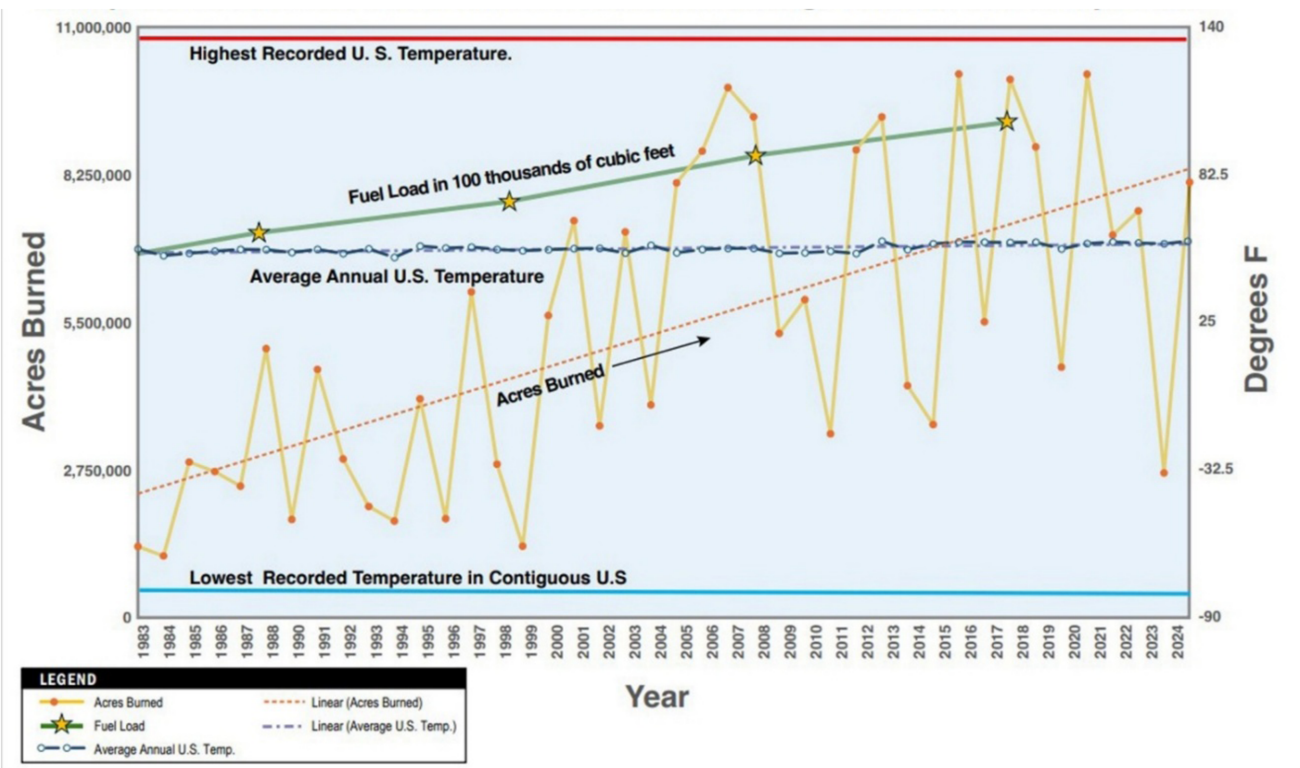
Younger Stands:	64,671,733 acres	36.2%
Mature:	80,756,003 acres	45.3%
Old Growth:	33,070,350 acres	18.5%
Total:	**178,498,091** acres	
Source: Mature-and-Old-Growth-Forests.pdf		

So currently, 63.7% of the forested acreage managed by U.S.F.S. and the BLM is currently old growth or mature stands.

Climate Change: For the past several decades the climate change has been a primary focus, and one that needs to be considered in establishing a national forest management plan, with serious consideration given to the wildfire issue. The following graph spells out in graphic detail the relative relationships between the two most frequently cited causes of the recent increase in wildfires; fuel load and climate change. The increase in timber volumes mentioned above is used as a proxy for fuel load in this chart although it probably understates the issue considerably due to two factors.

- With very little management of federal lands for the past 45 years, the volume of grasses, shrubs, and smaller timber classes, of which we have no measure, have probably grown even more rapidly.
- The CO2 fertilization effect has impacted all vegetation. As an example, the birch tree in my yard is growing 20% more rapidly today than it was in 1960. To see how this effect might be affecting your favorite trees or plants please see: (www.co2science.org/data/plant_growth/plantgrowth.php)

Comparison Of The Relative Importance Of Fuel Load To Temperature Change:



Sources: https://www.nifc.gov/fire-information/statistics/wildfires
https://www.nifc.gov/fire-information/nfn
www.weather.gov/media/slc/ClimateBook/Annual%20Average%20Temperature%20By%20Year.pdf

The center, dashed line plots the average annual U.S. Temperature on a rational scale against the highest and lowest temperatures recorded for the United States. This indicator appears as a virtual flat line, while the fuel load and acres burned lines show significant upward trends that correlate well. Yes, the scientific maxim that "correlation does not prove causation" is true, but science has already proven that fuel load is one the three requirements for fire.

Additionally, from: Evidence for strong bottom-up controls on fire severity during extreme events | Fire Ecology | Springer Nature Link. In this paper, top down refers to outside factors such as climate and temperature, while bottom-up includes topography and fuel load. "Our results provide strong evidence to counter two emerging narratives regarding wildfire in western North America. First, although top-down effects were important, climatic gradients and fire weather were not always the primary influence on wildfire behavior. Models that incorporated the local importance of predictor variables identified conditions under which bottom-up factors were influential in regulating fire severity. Results showed that fuels were a central factor driving fire severity patterns—a result that can be obscured by looking solely at global statistics of variable importance. While severe wind speeds and fire weather conditions increased severity, actual fire severity was dependent on bottom-up factors that influenced available fuels for burning. Second, our study provides empirical support for the efficacy of ecological forest management for restoring resilience and building climate-adapted forested landscapes in the interior Pacific Northwest. Treatments were most effective where they reduced the amount, distribution, and connectivity of surface and canopy fuels. In particular, those that included mechanical thinning followed by prescribed burning appeared to be most effective, even under extreme fire progression days. As with other studies (see Kalies and Kent 2016, Prichard et al. 2021, and McKinney et al. 2022 for reviews), we showed that fuel reduction treatments were effective at mitigating fire spread and severity, and our results support their broader use to meet fire and forest management goals."

Goals:

With the charts and graph above we have a foundational base upon which to commence creating a management plan. Without explicit goals, management becomes reactive, inconsistent, and vulnerable to political swings. The following framework outlines a practical, ecologically grounded approach to allocating federal forest lands into functional categories, each with its own management objectives and tools. Since current forest densities have increased considerably during the past century and are substantially greater than they were when managed by the Indigenous people, virtually all forest types will require thinning and harvesting to return fuel loads to fire safe levels. Currently, the annual increase in fuel loads and density far exceeds our meager efforts during the past 45 years. We have a great deal of catching up to do, but there are solutions and steps that should at least be considered.

1. We currently do not have the mill capacity necessary to meet our own forest product's needs, nor do we have enough mills (buyers of logs) to create a competitive marketplace to make harvest operations economically viable at the scale needed. We must reconstruct a modest forest products industry in the United States. Ideally this would include a focus on engineered wood products. Buildings in excess of fourteen stories are now being constructed using engineered wood products with two monster benefits:
   - Long-term sequestration of carbon
   - A carbon footprint that is one fourth that of the concrete and steel approach we commonly use. The production of both steel and concrete are very energy-intensive. ("Timber! How wood can help save the world from climate breakdown." Paul Brannen, Agenda Publishing Limited, 2024, Page 20.)
2. To bring our fuel loads down to acceptable levels it will be necessary to remove a great deal of non-merchantable material. This material is biomass and can be burned to generate electricity. While not economically feasible in remote areas, there may be many locations in which a financial return is possible. It would be far better to get a return here and reduce the need to obtain electricity from other sources.
3. The public needs to become fully educated in the entire process. This has been the biggest roadblock for the past 45 years.

A. For Old Growth Reserves

Old-growth forests are ecologically valuable and culturally significant. They provide habitat for specialized species, store carbon, and represent a living connection to the continent's ecological past. However, we must realize that it is simply one stage in the successional path of plant communities and does not generally have the greatest diversity, nor is this stage the most efficient a removing CO2 from the atmosphere, although it does store a very large amount of carbon. Judicious removal of the less vigorous trees in the stand and achieving better spacing would improve the overall health and reduce fire risk and would sequester the carbon if the harvest were used for lumber production. As discussed in the preceding section, old growth is now more threatened by high-severity wildfire than by any other factor. This approach was mentioned in a paper published 2007. "A purely preservationist strategy of excluding human influences altogether appears to be an untenable strategy for old-growth protection in frequent fire forests (Agee 2002) The conservation and restoration of frequent-fire old-growth forests may depend on fostering a relationship between humans and forests that avoids the pitfalls of both utilitarianism and preservation." (https://www.ecologyandsociety.org/vol12/iss2/art17/)

I find it interesting that we venerate old-growth forests far more than it appears the Indigenous People did. They tended to focus on maintaining the mid-successional stages upon which they were dependent upon for sustenance and material needs very few of which were obtained from old-growth forests. Is there not a strange dichotomy in considering the aversion that most of us have to residing in nursing homes, assisted living or long-term care facilities which would be the human equivalent of an old-growth forest in nature for a tree.

Management Objectives:

- Protect existing old growth from catastrophic fire
- Maintain or restore historical stand structure
- Reduce ladder fuels and surface fuels
- Promote fire-resistant species

Management Tools:

- Mechanical thinning of small-diameter trees and less vigorous larger individuals
- Establish spacing of trees suitable to the site class
- Removal of diseased or insect-infested trees
- Prescribed fire (after thinning)
- Strategic fuel breaks around old-growth stands

KEY PRINCIPLE:

Protecting old growth requires active management, not passive preservation. Without intervention, many old-growth stands will be lost within the next few decades.

B. For Mature Forests with Old-Growth Potential

These are forests that, if properly managed, could become the old growth of the future. They are often the focus of litigation because they contain large trees or late-successional characteristics. However, without thinning and fuel reduction, these stands are at high risk of being destroyed before they ever reach old-growth status.

Management Objectives:

- Reduce stand density to historical levels
- Promote large-diameter, fire-resistant trees
- Restore frequent, low-severity fire regimes
- Create structural diversity

Management Tools:

- Commercial thinning
- Non-commercial thinning
- Prescribed fire
- Managed wildfire where safe

KEY PRINCIPLE:

We cannot grow old growth in a high-severity fire regime. Fuel reduction is essential if these forests are to survive long enough to mature.

C. For Fire-Adapted Forests and Frequent-Fire Landscapes

Large portions of the western United States — including ponderosa pine, mixed conifer, and oak woodlands — evolved with frequent fire. These landscapes historically burned every 5–25 years, often due to Indigenous ignitions. Restoring this fire frequency is essential to reducing fuel loads and preventing catastrophic fires.

Management Objectives:

- Restore historical fire return intervals

- Reduce fuel continuity across the landscape
- Increase resilience to drought and insects with basal areas proportionate to the site class
- Maintain open, park-like structure

Management Tools

- Mechanical thinning
- Prescribed fire
- Managed wildfire
- Biomass utilization

KEY PRINCIPLE:

Fire must return to these landscapes — but only after fuel loads are reduced to safe levels.

D. For Timber Production Zones

The United States will continue to need wood products, and relying heavily on imports is neither economically nor environmentally sustainable. The Canadian forest products industry is currently in decline. The Canadians have been high-grading their lands while we ceased virtually all harvesting on our federal lands. In the very near future we will need to ramp-up our harvesting and wood products production to fulfill our own needs. The Canadians mills have been nearby and provided relatively inexpensive wood products, providing 70% of our requirements for the past 45 years. There are no other suppliers convenient to our shores, and importing from abroad will be much more expensive. We must be become more self-sufficient.

Well-managed timber production zones can provide a steady supply of wood while maintaining ecological health and improving our economic well-being..

Management Objectives:

- Produce sustainable timber yields
- Maintain soil and watershed health
- Reduce fire risk through active management
- Support rural economies and forest products infrastructure

Management Tools:

- Even-aged and uneven-aged silviculture, preferably selective harvesting.
- Regeneration harvests where appropriate
- Thinning
- Reforestation with climate-adapted species

KEY PRINCIPLE:

Active timber management reduces fuel loads, supports local economies, and provides the raw materials needed for housing and industry.

E. For Wildlife Emphasis Areas

Some forest lands should be managed primarily for wildlife habitat, especially for species that depend on early successional or mixed-age conditions. Ironically, many wildlife species decline when forests are left unmanaged and become overly dense.

Management Objectives:

- Maintain habitat diversity
- Create a mosaic of age classes
- Support species dependent on open or early successional habitat
- Reduce risk of habitat loss due to high-severity fire

Management Tools:

- Thinning
- Prescribed fire
- Regeneration harvests where ecologically appropriate
- Meadow and riparian restoration

KEY PRINCIPLE:

Wildlife habitat is dynamic, not static. Active management is often required to maintain it.

F. For Community Protection Zones

Forests adjacent to communities require special attention. High fuel loads near homes and infrastructure create unacceptable risks, as recent fires in California, Oregon, and Washington have demonstrated.

Management Objectives:

- Reduce wildfire risk to communities
- Enact and enforce fire-wise building and landscaping codes

- Create defensible space at landscape scale
- Protect evacuation routes and critical infrastructure

Management Tools:

- Aggressive thinning
- Fuel breaks
- Prescribed fire
- Removal of hazard trees

KEY PRINCIPLE:

Protecting communities is non-negotiable. Fuel reduction in these zones must be prioritized.

G. A National Strategy Requires Clear Targets

One of the most significant problems in current forest governance is the absence of explicit targets for old growth, mature forests, and other forest conditions. Without targets, every management proposal becomes a political battle.

A national strategy should include:

- Target percentages for old growth, mature forests, and early successional habitat
- Fire return interval goals for fire-adapted landscapes
- Annual acreage targets for thinning and prescribed fire
- Reestablish a modest forest products industry

This approach mirrors successful forest management systems in countries such as Finland and Sweden where clear goals and active management have produced resilient forests and stable wood supplies.

H. The Cost of Inaction

If the United States continues on its current path of litigation, paralysis, and fuel accumulation, the consequences will be severe:

- Loss of old growth
- Loss of wildlife habitat
- Increased carbon emissions from catastrophic fire
- Declining water quality
- Destruction of rural communities
- Further collapse of the forest products industry
- Irreversible ecological change

The choice is not between "management" and "preservation." The choice is between active management and catastrophic loss.

Section 11 Conclusion: Restoring Balance Through Active Stewardship

The forests of the United States are at a crossroads. For more than a century, our management policies have been shaped by misconceptions about what these landscapes once were and how they functioned. The prevailing image of a "pristine," untouched wilderness — dense, ancient, and self-regulating — has never aligned with ecological reality. As the evidence presented throughout this paper demonstrates, the forests encountered by early European explorers were not the product of natural processes alone. They were the result of thousands of years of intentional, skillful, and continuous management by Indigenous peoples.

These original stewards used fire as their primary tool to shape the environment, maintain open and resilient forests, promote wildlife abundance, and support hundreds of plant species essential to their survival. Their burning practices were frequent, widespread, and ecologically sophisticated. They prevented fuel accumulation, limited insect and disease outbreaks, and created the park-like landscapes repeatedly described in early journals. The forests of 1600–1850 were not wild in the modern sense — they were cultural landscapes, maintained through knowledge passed down across countless generations.

The collapse of Indigenous populations due to disease and displacement abruptly ended this stewardship. Within decades, prairies filled with trees, understories thickened, and forests grew denser than at any time in the previous 10,000 years. The subsequent federal policy of total fire suppression accelerated this shift, creating the unprecedented fuel loads, species imbalances, and ecological vulnerabilities we see today. The catastrophic fires of recent decades are not a return to historical norms — they are a direct consequence of removing fire from fire-dependent ecosystems.

At the same time, the United States has seen a steady increase in forested acreage and timber volume over the past century. Contrary to popular belief, we are not running out of forests. We are, however, running out of healthy forests. The combination of overstocked stands, accumulated fuels, drought stress, and insect outbreaks has created conditions in which high-severity fire is now the dominant disturbance agent across much of the West. These fires are destroying old growth, degrading watersheds, threatening communities, and releasing massive amounts of carbon — outcomes that would have been unthinkable under historical fire regimes.

The path forward is clear. We must adopt a management strategy that reflects the ecological realities of our forests, the historical role of Indigenous stewardship, and the modern risks posed by climate and fuel accumulation. This strategy must include:

- Active fuel reduction through thinning and prescribed fire
- Protection of old growth through strategic management, not passive preservation
- Restoration of frequent, low-severity fire in fire-adapted landscapes
- Support for a sustainable, competitive forest products industry with a focus on new engineered wood products technology.
- Clear national targets for forest structure, age classes, and fire return intervals
- A diversified allocation of forest lands that balances ecological, economic, and cultural values

The choice before us is not between management and preservation. It is between active stewardship and catastrophic loss. If we fail to act, we will continue to see the destruction of old growth, the decline of wildlife habitat, the collapse of rural economies, and the loss of forests that once defined the American landscape. From: "***Adapting Western North American forests to climate change and wildfires: 10 common questions***". "Although the management situation for western North American forests is daunting, our review of the scientific literature offers clear guidance. In seasonally dry western North American forests that were historically dominated by fire-resistant species, restoring open, fire-tolerant canopy structure and composition, favoring larger tree sizes, and reducing surface fuels can effectively mitigate subsequent wildfire and stabilize carbon stocks In many instances, these adaptation actions, with ongoing maintenance, will also enable future wildfire events to continually reinforce resilient structure, composition and fuels." (Ecological Applications, 31(8), 2021, e02433, 63624.pdf)

But if we embrace a science-based, historically informed approach — one that honors the knowledge of the continent's first land managers and applies modern tools with precision and care — we can restore resilience to our forests. We can reduce wildfire severity, protect communities, support biodiversity, and ensure that future generations inherit forests that are healthy, diverse, and capable of withstanding the challenges ahead.

The forests of the United States have always been shaped by human hands. The question now is whether we will shape them wisely.

About the Author

Don Healy graduated from **Oregon State University** with a B. S. Degree in Forest Management in 1968. His efforts towards a master's degree were curtailed by the Vietnam War and he spent three years in the U. S. Army serving in military intelligence. In 1971 he returned to the field of forestry working as an Acquisition's Forester for the Boise Cascade Corporation in La Grande, Oregon. With legal actions impeding the company's purchase of timber from federal lands, the company wanted to create a program to assist private timberland owners in their management of forested property. The project became Don's responsibility. The result was the Private Landowners Forest Management Assistance Program. A detailed management plan with maps, inventory, values, survey and prescriptions was provided to the landowner in exchange for a First Right of Refusal. The program was very well received, and Boise Cascade soon added two additional foresters to handle the workload. However, the total cessation of harvesting timber from federal land that resulted by the end of the 1970s was not anticipated, and since between 80% and 90% of the raw materials for Boise Cascade's mills in the region came from federal lands, most of our mills shut down or were severely curtailed and a large percentage of our nation's forest products industry was eliminated, including our own jobs.

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While our program was short lived, our teams members felt very pleased about the results of the harvest operations we did complete. Following our commercial thinning operations we left properly spaced stands of trees free of mistletoe, pine beetle or other insect and disease problems, more resistant to fire and poised to grow well and be ready for another thinning on a regular basis thereafter, while providing the landowner with a reasonable financial return.

It should be pointed out that in Northeast Oregon, which is comprised of mixed species and mixed age forests, selective harvesting techniques were utilized exclusively. The author feels that this method could and should be utilized to reduce fuel loads on much of our nation's forested area.

You can take the forester out of the forest, but you cannot take the forest out of the forester. While the author was forced to go into another profession, he is still greatly concerned about the inability of both the federal government, and the government of Washington State to properly apply sound forest management principles.

You can take the forester out of the forest, but you cannot take the forest out of the forester.

Don Healy can be contacted at: dr.liz@frontier.com

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