

WILDLAND BURNING BY AMERICAN INDIANS IN VIRGINIA



Hutch Brown

Two days after first sighting the coast of Virginia in 1607, the Jamestown colonists noticed “great smokes of fire” rising from deep in the woods. “We marched to those smokes,” recalled George Percy (1607), “and found that the savages had been there burning down the grass as, we thought, either to make their plantation there or else to give signs to bring their forces together, and so to give us battle.” One of the first things the English discovered about American Indians in Virginia was that they burned their wildlands.

The purposes for burning—agricultural clearing or military signaling—are speculative in Percy’s account. Notable, however, is the fuel type mentioned: grass. Grassland in Virginia rapidly succeeds to forest unless maintained by grazing, mowing, or fire. In his account, Percy suggests a possible reason for its persistence—American Indian fire use.

A Burning Question

Was burning by American Indians extensive enough to influence Virginia’s ecosystems? The answer, according to one early USDA Forest Service researcher, is emphatically yes. Hu Maxwell (1910) claimed that had the colonists not “snatched the fagot from the Indian’s hand,” Virginia would have become one vast “pasture land or desert.”

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At the other extreme, Emily Russell (1983) has challenged the notion that American Indians burned much at all. Most colonial accounts that describe Indian life, she notes, do not mention wildland burning. But such accounts in Virginia are generally limited to what visitors saw Indians doing in their villages, which would not have included setting vegetation on fire.

Today, many researchers agree that disturbances, both natural and manmade, helped to shape the patchwork of presettlement ecosystems sometimes known as the primeval forest. Wildland fire is capable of making fundamental, long-term changes to ecosystems in the mid-Atlantic region. For example, slash fires in the early 20th century severely burned the Dolly Sods area on the Monongahela National Forest, WV. The original red spruce forest never recovered; a dense tangle of heaths now covers much of the burn site.

The overwhelming majority of wildland fires in Virginia are ignited by humans (Main and Haines 1976; Stapleton 1999) and probably have been for thousands of years. For the past 4,000 years, lightning fires have been uncommon on most of the Atlantic

seaboard (Delcourt and Delcourt 1996, cited by Barber 1999; Patterson and Sassaman 1988). Local concentrations of natural fires might have favored fire-adapted species in some areas (Stapleton 1999; Williams 1998); but in most of Virginia’s presettlement landscapes, frequent fire would have depended on activities by American Indians. If we are to preserve and restore our eastern wildland ecosystems, then we must first understand the role American Indians might have played in using fire to make presettlement ecosystems livable and productive.

A thorough study of the role that Indian fire use played in Virginia’s presettlement ecosystems would require examining evidence, both qualitative and quantitative, from multiple sources (see sidebar on page 31). However, a single source—accounts by colonial explorers and travelers—can provide a useful preliminary overview of the impact that Indian fire use might have had on wildland ecosystems in Virginia.

Why Did Indians Burn?

Based on historical evidence, four purposes for burning—agriculture, hunting, range management, and travel—might have opened

THE FOREST PRIMEVAL

Many people believe that the first English to settle North America found an ancient, impenetrable wilderness stretching uninterrupted from the shores of the Atlantic to the banks of the Mississippi. The popular view of a pristine wilderness inhabited by American Indians who left no trace on the land is rooted in the Romantic notion of “the forest primeval” promoted by such poets as Henry Wadsworth Longfellow.

The Romantic view entered the early conservation movement through the writings of Henry David Thoreau and others (Williams 1999). It plays a strong role in today’s environmental movement (Brown 1999) and has even influenced the science of ecology (Whitney 1994). For example, ecologists often conceive of forest succession as a progression toward a stable, self-perpetuating “climatic climax” (or “potential natural”) forest. Implicit in the notion of the climax forest is the goal of returning to an undisturbed state of forest stability—the condition that prevailed in the Romantic imagination before the arrival of Europeans.

Old-growth remnants today suggest that there is some truth to the Romantic notion of a forest primeval, but only on some sites (Whitney 1994). Research has shown that the pre-Columbian eastern temperate forest was actually a complex, relatively unstable (Davis 1981) patchwork of ecosystems that included extensive grasslands. Disturbances at various scales, from the decline of a single species to the destruction of vegetation for miles around, helped to shape—and could change—presettlement ecosystems in various ways, depending on such factors as soil, climate, geography, and human activities (Patterson and Sassaman 1988; Pyne 1982; Whitney 1994; Williams 1999). Accordingly, there is also some truth to one researcher’s claim that “most of the forests seen by the first settlers in America were in their first generation after one or another kind of major disturbance” (Raup 1967).

Virginia’s landscape and affected its ecosystems the most.

Slash-and-Burn Agriculture. All of Virginia’s native populations practiced agriculture, from the Coastal Plain (Rountree 1989) to the western valleys (Brinker 1998). Small farming communities were concentrated near freshwater springs or creeks along major waterways (fig. 1) (Smith 1612; Barber 1999).

Although the American Indian presence was permanent throughout Virginia, Indians periodically moved their villages from site to site. An excavated archeological site at Seneca Rocks, on the headwaters of the Potomac River in what is now West Virginia, shows that a farming village flourished there for about 20 years, then was abandoned (Brinker

1998). Two centuries later, an almost identical village was built on the same site, only to be abandoned again after a single generation. Why?

Each village required, depending on its size and location, from a few acres to hundreds of acres of fields for corn, beans, and squash (Archer 1607a; Rountree 1989; Smith 1624). Villagers cleared the fields by felling, girdling, or firing trees at the base and then using fire to reduce the slash and stumps. The farmers did not use fertilizer, so soil productivity gradually declined, requiring new fields to be cleared. Fishing and hunting depleted local fish and game, and trash and waste disposal diminished local water quality over time. Meanwhile, tree felling for fuelwood, new cropfields, and building materials eventually pushed the

forest out of easy reach. A few decades after a village was established, these circumstances combined to make the village untenable (Brinker 1998). The inhabitants then moved on. The original site, if left undisturbed, passed through successional stages until reaching climax forest two or three centuries later. Depending on local conditions, it might take decades or even centuries for the site to be suitable for renewed inhabitation.

With every change in location, a village used fire to clear new land and left an even larger amount of cleared land behind. Traces of clearings abandoned during previous decades might be scattered over many miles. From its farming activities alone, a single village occupying 50 acres (20 ha) might leave a disturbance pattern,

SOURCES OF EVIDENCE FOR INDIAN FIRE USE

Did wildland burning by American Indians affect presettlement ecosystems in Virginia? Relevant sources of evidence (adapted from Whitney 1994) might include:

- Historical materials, including written accounts, maps, and drawings;
- Statistical records, especially land surveys;
- Studies of old-growth forests or ancient individual trees;
- Archeological evidence, especially from excavated Indian village sites; and
- Paleoecological studies, including pollen and charcoal analyses from sediments.

Evidence from different sources does not always agree. Despite eyewitness accounts of bison in Virginia, archeologists have found no supporting evidence such as bison bone fragments in excavated Indian fire- and trashpits (Stapleton 1999). But bison did not spread into Virginia until the 14th or 15th century (Haines 1970), whereas most archeological excavations are on earlier, “prebison” sites (Brinker 1999).

at any given time, on hundreds of acres of widely scattered tracts at various successional stages. Where populations were relatively concentrated, this broad pattern of impact probably helped provoke warfare among peoples competing for limited resources such as hunting grounds. As stocks of deer declined on the coastal plain, for example, the Powhatans organized large upriver hunts in areas claimed by the Monacans, leading to occasional bloody battles (Rountree 1989; Strachey 1612).

Hunting. Fire was widely used in Virginia during organized hunts. Villagers, “commonly two or three hundred together” (Strachey 1612), would form a large circle and ignite the forest leaf litter,

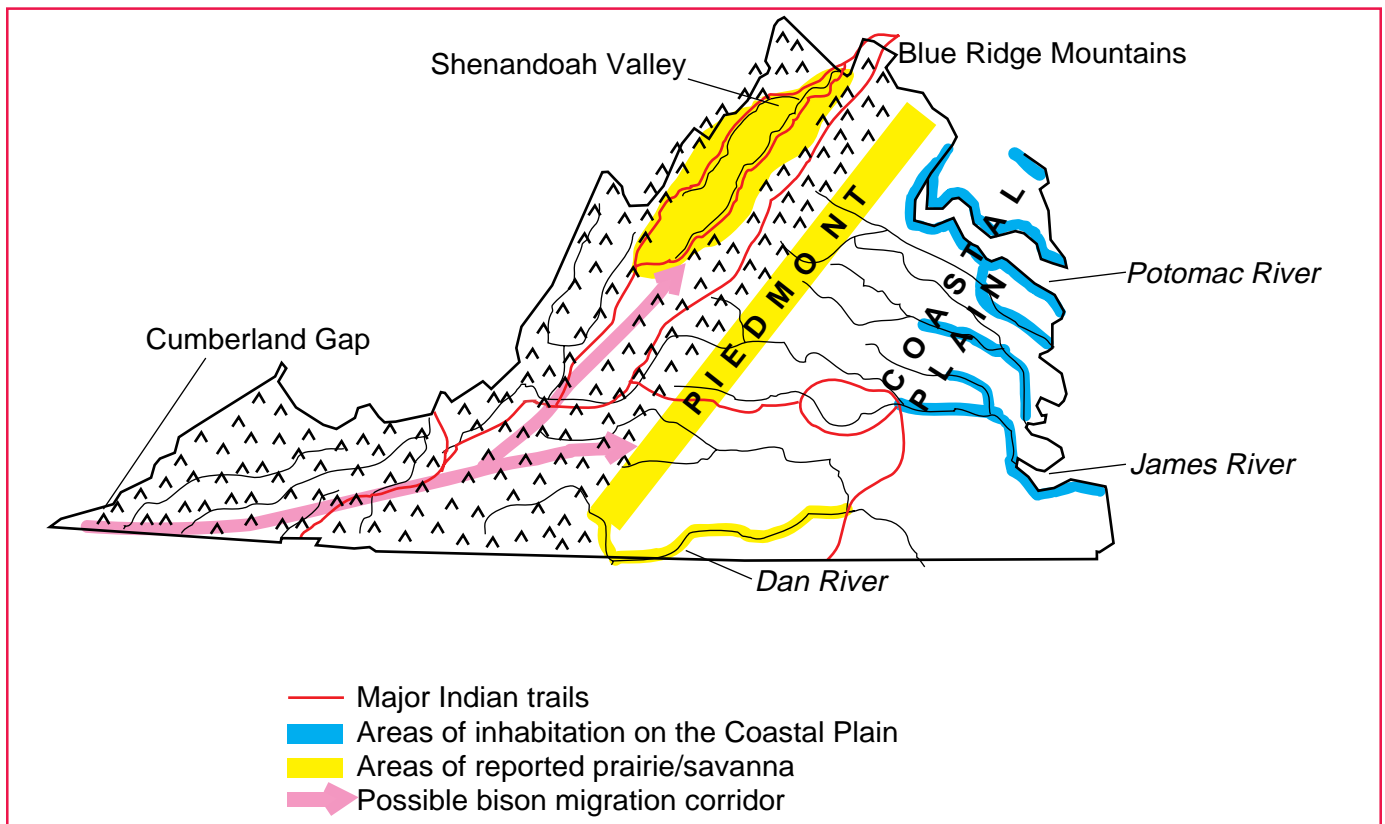


Figure 1—Virginia in about 1600, showing some of the areas where fire use by American Indians might have affected presettlement vegetation. Areas of Indian settlement on the Coastal Plain are based on Smith (1612); areas of settlement in the interior are not shown, but were similarly concentrated along waterways. American Indians burned lands adjacent to their villages for agriculture, hunting, and other purposes, opening the forest and promoting pines and oaks over less fire-resistant species such as maples and beech. The western Piedmont and Shenandoah Valley had fire-maintained grassland or open woodland that probably reached southwestward along valleys to the Cumberland Gap, providing a migration corridor for bison (Haines 1970). The major Indian trails shown were used for regional trade and travel (Lambert 1989; Randolph 1973); not shown are the many local trails along rivers and ridges. Frequent fire use to maintain such trails probably formed corridors of open pine and oak forest. Illustration: Gene Hansen Creative Services, Inc., 2000.

driving deer into the center where they could easily be killed. Or they would burn a line of forest across a point of land, driving game into the river to be shot by hunters in canoes (Smith 1624). Fire surrounds were organized in autumn, when leaf litter was plentiful and there were fewer ladder fuels to turn a surface burn into a raging canopy fire.

Communal fire surrounds were more efficient than individual hunts, which might go for weeks without success. However, communal hunts represented a larger—and therefore riskier—

investment of time and energy. To reduce the risk, hunters ignited areas known to abound in game, which had the self-reinforcing effect of increasing future game stocks in those areas. Even in closed forest, underburning multiplies the quantity and quality of deer browse, attracting and supporting increased deer herds (Mellars 1976). The fire surround thus functioned not only to drive game, but also to regenerate game for future hunts. By improving browse through fire, the hunters could concentrate animals in limited areas where they were easiest to find and kill.

Range Management. European settlers found extensive areas of open game habitat throughout the East, commonly called “barrens” (Pyne 1982). The American Indians used fire to maintain such areas as rangeland. Europeans reported evidence of widespread grassland or savanna in two parts of Virginia: the Piedmont (including the Dan River watershed in southern Virginia) and the Shenandoah Valley (fig. 1).

In the Piedmont, after “marching into the country” from Little Falls on the Potomac River (near present-day Washington, DC),



“Chieftain of Virginia,” from a drawing in about 1585 by John White near the ill-fated Roanoke colony in what is now coastal North Carolina. Note that the hunting ground behind the “chieftain” is sparsely wooded; sharp forest margins suggest careful disturbance control. White’s drawing matches Henry Spelman’s (1613) mention of open areas in coastal Virginia supporting luxurious grass for game. Illustration: U.S. Library of Congress, Washington, DC.

Four purposes for burning—agriculture, hunting, range management, and travel—would probably have opened Virginia’s landscape and affected its ecosystems the most.

AMERICAN INDIANS AND COLONISTS IN VIRGINIA

Colonial accounts suggest that at least 13,000 people, or about 2 people per square mile, were living in what is now Virginia in 1607, when Jamestown was founded (Rountree 1989). Estimates are highly conjectural, partly because European epidemics and 17th-century wars for control of the inland beaver trade devastated American Indian populations in eastern North America before settlers actually encountered them. The pre-Columbian population might have been much higher.

After accounting for the effects of epidemics and warfare, one researcher calculated that pre-Columbian population densities reached 50 people per square mile in parts of coastal New England (Cook 1976, cited in Whitney 1994). The coastal Virginians under the Powhatan confederacy, also sustained by agriculture and rich fishing grounds, probably had similarly high population densities, at least locally. Moreover, the Powhatans’ inability to conquer the inland Chickahominies, Monacans, and Manahoacs suggests that populations of the Piedmont interior were comparable in size. Archeological excavations indicate that the Tutelos and others who occupied the mountain valleys to the west maintained extensive villages in the floodplains and frequent camps in the uplands for hunting and other purposes (Barber 1999).

The Jamestown colony, established in 1607 by a few dozen settlers from England during a rare prolonged regional drought, faced starvation and was almost abandoned in 1610. But ships from England brought fresh supplies and new settlers, and the colony soon expanded. By 1616, after destroying nearby native villages, the colonists had established a series of settlements from the mouth to the falls of the James River.

The Powhatans, eager to trade for English tools and other manufactures, generally tolerated the Jamestown settlement until too late. In 1622, they finally launched a coordinated series of assaults that nearly wiped out the English. In 1644, after another failed military campaign, the Powhatans suffered bloody reprisals that broke their power for good. By the 1750’s, decimated by European diseases and warfare, most native peoples—including populations in the interior—had abandoned their fields and villages in what is now Virginia. A tiny Indian reservation remains on the Pamunkey River near the original seat of Powhatan power.

Samuel Argall (1613) spotted “a great store of cattle as big as kine [cows]” that were “heavy” and “slow.” From his description, what Argall must have seen were bison, a grassland indicator species. The explorer John Lederer (1672) prepared a map of his travels showing “savanae” throughout Virginia’s western Piedmont. In the same area, the traveler Robert Beverley (1705) described “large Spots of Meadows and Savanna’s, wherein are Hundreds of Acres without any Tree at all; but yield Reeds and Grass of incredible Height.”

In the Dan River watershed, the surveyor William Byrd (1733) saw extensive areas “pretty bare of timber,” including vast cane-breaks—a type of vegetation that needs frequent fire to flourish (Komarek 1974). Byrd’s survey party found scattered bison and took the opportunity to kill one for food.

In the Shenandoah Valley, the traveler Robert Fallam (1671) found “brave meadows with grass about a man’s height.” John Fontaine (1716), who accompanied the expedition led by Virginia Governor Alexander Spotswood into the Shenandoah Valley, reported finding “the feeting of elks and buffaloes, and their beds,” sure signs of grassland. George Washington surveyed parts of the Shenandoah Valley in 1752, after American Indians had disappeared from the area and their burning had ceased, but before extensive European settlement. He found many “barrens” with old burnt stumps and patches of hardwood saplings (Spurr 1951), signs that the prairie had once been burned to remove the trees and was now succeeding to forest.

To the south, localities in the upper James River watershed, such as Cowpasture and Calfpasture, reportedly took their names from the bison herds that once roamed the tallgrass prairie northward from the Cumberland Gap into the Shenandoah Valley (Fithian 1775). Bison reportedly once used a salt lick near present-day Roanoke, in southwestern Virginia, on their migrations through the Alleghenies to the Piedmont (Haines 1970). Daniel Boone blazed the Wilderness Trail in 1769 on a well-trodden bison path through the Cumberland Gap, suggesting that grassland corridors once reached from southwestern Virginia into the Piedmont and Shenandoah Valley (fig. 1).

Even coastal Virginia had patches of fire-maintained rangeland. “The country is full of wood in some parts,” Henry Spelman (1613)

By using fire to improve browse and remove thickets, American Indians kept game animals concentrated on relatively open hunting grounds where they were easiest to find and kill.

reported, implying that there were other parts without forest. “[The Powhatans] have marish ground [marshland], and small fields for corn, and other grounds whereon their deer, goats [sic], and stags feedeth.” Open areas such as old cropfields, periodically reburned to prevent forest succession, supported patches of shrubby habitat with “rank [plentiful] grass” for deer and elk (Spelman 1613). John Smith described one such area, where “all the woods for many an hundred mile for the most part grow sleight” (Arber 1910). Frequent burning would have been necessary to maintain such fire-stunted woodland.

Spelman’s use of the term “their” to describe the game on the range maintained by the Powhatans suggests proprietorship. Wildland burning, including fire surrounds, took an investment of time and energy toward future hunting success. Groups therefore claimed and defended the areas they burned. For example, when John Smith once blundered into a Powhatan fire surround, he was promptly captured and the others in his party were killed (Smith 1608), even though the Powhatans generally tolerated the Jamestown colonists and often traded with Smith.



Fire-adapted species on the George Washington and Jefferson National Forests, VA. The endangered Peters Mountain mallow (left) requires fire for germination. Prescribed fire in Table Mountain pine-pitch pine forest (right) promotes pine regeneration by opening serotinous cones and suppressing competing vegetation. For thousands of years, such fire-adapted species flourished in Virginia despite a low incidence of lightning fires, suggesting that fire use by American Indians played a role in sustaining fire-adapted ecosystems. Photos: Steven Q. Croy, USDA Forest Service, George Washington and Jefferson National Forests, Roanoke, VA, 1995.



Travel. Colonial explorers discovered Virginia by ship or by following trails known to their American Indian guides. Most used trails leading up the major rivers from the coastal plain into the interior. Another set of trails, leading along the spine of the Blue Ridge and the branches of the Shenandoah River, connected to a network of regional trails (fig. 1) used by American Indians for trade and travel (Randolph 1973; Lambert 1989). The trails were maintained through fires kindled annually “by the Indians that happen to pass that way,” according to William Byrd (1728). “They cannot travel but where the woods are burnt,” John Smith (1624) noted.

In addition to using fire-maintained trails to reach specific destinations near and far, American Indians traversed Virginia’s wildlands in search of game and edible plants. They routinely burned areas near their villages to help them find and gather food. Fire not only promoted game browse, but also reduced deadfall, leaf litter, and underbrush, facilitating passage and making it easier for hunters to spot and stalk their prey (Mellars 1976).

How Did Burning Affect Ecosystems?

About 16,000 years ago, at the peak of the last ice age, Virginia was largely covered by tundra and jack pine forest (Davis 1981). As the ice sheet retreated, successive waves of temperate forest species invaded Virginia from the south and west. American Indians entered Virginia at least 11,500 years ago (Barber 1999), roughly coinciding with the rapid spread of oak into Virginia about 11,000 years ago (Davis 1981). By about 8,000 years ago,

European explorers reported evidence of widespread grassland or savanna in two parts of Virginia—the Piedmont and the Shenandoah Valley.

oak and pine dominated much of Virginia (Kneller and Peteet 1993; Maxwell and Davis 1972). The role of fire in oak and pine regeneration (Abrams 1992; Apfelbaum and Haney 1991; Barnes and Van Lear 1998; Brose and Van Lear 1998; Komarek 1974; Van Lear and Watt 1993; Whitney 1994; Williams 1998), coupled with the comparatively slow spread of such fire-intolerant species as beech and maple (Davis 1981), raises a question: Did Indian fire use during the Holocene (the last 10,500 years) help to shape the forest that colonists found in Virginia?

In a detailed study for the late Holocene (the past 3,900 years), Delcourt and Delcourt (1996, summarized by Barber 1999) found that Indian fire use in western North Carolina resulted in a changing mosaic of vegetation types that included fire-adapted species on some sites and fire-intolerant communities on others. Colonial accounts in Virginia suggest that Indian fire use had a similarly patchy pattern of impact on the land.

Forest Communities

Most of Virginia was wooded when the Jamestown colonists arrived. Many trees were enormous—Robert Beverley (1705) reported forest trees so large that they were free from branches up to 70 feet (21 m) above ground.

But the colonists did not report certain telltale signs of fire-free old growth. In undisturbed forests, as

individual trees die from pests, disease, and windthrow, canopy openings result in patches of thick successional vegetation, and large quantities of leaf litter and deadfall accumulate. Such features are strikingly absent from most colonial accounts. “Thick[et]s there is few,” Smith (1624) wrote, and Strachey (1612) observed that the forest floor was “clean” and “at least passable both for horse and foot.” In 1634, Andrew White even claimed that forest trees near the Potomac River were “commonly so farre distant from each other as a coach and fower [four] horses may travel without molestation” (Frius 1971).

Indeed, colonial accounts describe remarkably open forests (Rostlund 1957). After discovering the area where “the savages” had been burning grass, George Percy (1607) and his party of Jamestown colonists “pass’d through excellent ground full of flowers...and as goodly trees as I have seen” into “a little plat of ground full of fine and beautiful strawberries,” a mixed landscape of open forest and meadow. Members of the Spotswood expedition were able to travel upriver on horseback all the way to the Blue Ridge, then enjoy sweeping vistas from its crest (Fontaine 1716). By contrast, the density of Virginia’s forests today prevents most horseback travel and blocks the view from almost every ridgetop.

In the absence of frequent lightning fires, presettlement Virginia’s clean forest floors and open, varied

landscapes were probably due to frequent fire use by American Indians. Underburning would have reduced the underbrush and debris, facilitating passage and promoting the abundant herbaceous cover that the colonists admired each spring. Herbaceous growth and edge habitat along fire-cleared openings would have multiplied such game species as deer and turkey (Komarek 1965; Mellars 1976; Whitney 1994). Increased light and heat in open areas would have favored dry-forest species such as oaks. Burning would also have affected interior forest recruitment, promoting the fire-resistant keystone species that dominate oak-hickory communities and are frequently mentioned in colonial accounts.

In addition to oak and hickory, the Jamestown colonists found abundant pine, enough to support a pitch and tar industry (Archer 1607b; Strachey 1612). Pines are successional species on Virginia's Coastal Plain; undisturbed stands

succeed to hardwood forest within about 100 years (Komarek 1974; Monette and Ware 1983). The pine forests found by the Jamestown colonists were probably successional woodland on old cropfields or village sites cleared by fire.

On upland slopes and ridges throughout western Virginia, fire-dependent forests of pitch pine and Table Mountain pine were more common before European settlement than now (Williams 1998). Without fire, these forests succeed to oak on all but the most exposed sites. Regular burning on ridgetops by pre-Columbian travelers and hunting parties would have kept many western ridges and slopes under grass or open pine forest, with views of the valleys below.

Overall, American Indian fire use probably had a mixed impact on Virginia's forests, greatly affecting areas near villages, trails, and hunting grounds while scarcely touching areas that were uninhabited and little used (Clark and

Royall 1996; Russell 1983). Of course, Indian fires would have burned deep into adjacent unused areas and might have occasionally climbed into the canopy to become high-severity crown fires that could have spread for miles. But in areas distant from human habitation and travel, such events might have been too sporadic to have had much long-term effect (Patterson and Sassaman 1988).

Even in well-populated areas, the impact of Indian fire use was probably uneven. Jamestown colonists reported many fire-intolerant hardwood species, including elm, ash, and beech. Presettlement landscapes near Indian villages probably supported a patchwork of communities ranging from moist forest assemblages on the wetter sites (perhaps similar in appearance to older bottomland or cove forests today) to relatively open, fire-maintained oak and pine forests on the drier sites, interspersed with patches of grassland.

DID FIRE KEEP BEECH OUT OF THE CANOPY?

American beech is mentioned less often in early colonial accounts from Virginia than many other tree species, particularly oak. William Strachey (1612), for example, cataloged coastal Virginia's trees in detail, describing their utility for both the colonists and the American Indians. He listed oak, elm, ash, walnut (including hickory*), cypress, cedar, sassafras, pines, and even wild rose, but did not mention beech. John Smith (1624) wrote that the "woods that are most common are oak and walnut [hickory]," then listed a number of other species that did not include beech.

One study has suggested that undisturbed stands of pine on Virginia's Coastal Plain succeed first to oak forest and finally to forest dominated or codominated by beech (Monette and Ware 1983). In the absence of

fire and other disturbances, oak is known to give way to shade-tolerant species such as beech and maple on many sites in the eastern temperate forest (Barnes and Van Lear 1998; Brose and Van Lear 1998; Olson 1996; Van Lear and Watt 1993; Whitney 1994). If beech was at least as important as oak in Virginia's presettlement forest canopy, then why did colonial accounts seem to ignore it?

One reason might be American Indian underburning. Beech is slow growing and thin barked, vulnerable to fire. Frequent fire would have suppressed beech in favor of more fire-resistant species such as oak (Barnes and Van Lear 1998; Van Lear and Watt 1993). If presettlement underburning prevented beech from becoming widely established in the forest canopy, then pine and oak-hickory forests would have predominated and the colonists would not have reported extensive beech.

* Europe has no native hickories (*Carya* spp.). The early colonists classified hickory as a type of walnut (it does belong to the walnut family).

Prairie and Savanna

Early explorers were awed by the expanses of grassland they found in some parts of Virginia, especially in the Shenandoah Valley. In the Piedmont, dry oak–hickory forest in the rain shadow of the Blue Ridge likely opened into patches of savanna or grassland covering hundreds of acres. West of the Blue Ridge, a fire-maintained tallgrass prairie probably blanketed some valley floors, bordered by forest and interspersed with groves of trees in the wetter areas. After the American Indians stopped burning, the large grassland herbivores disappeared from all of these areas, which promptly sprouted trees. In 1733, for example, William Byrd's survey party in the Dan River watershed found abandoned, overgrown Indian village sites; a few scattered bison; and miles of "young saplings, consisting of oak, hickory and sassafras" (Byrd 1733), signs of grassland succeeding to forest.

In a letter to John Adams, Thomas Jefferson (1813) observed that American Indian fire use "is the most probable cause of the origin and extension of the vast prairies in the western country, where the grass having been of extraordinary luxuriance, has made a conflagration sufficient to kill even the old as well as the young timber." Jefferson was only partly right: The midwestern prairie peninsula extending from Illinois into Ohio is often attributed to the period known as the Hypsithermal Interval (about 7,300 to 3,900 years ago) (Wilkins et al. 1991) or to the dry air masses from the base of the Rocky Mountains that still bring drought to the Midwest (Whitney 1994). However, trees rapidly grew all over the midwestern prairie soon after European

settlement, suggesting that Indian fire use played a role in maintaining the midwestern grasslands (Pyne 1982).

It seems doubtful that grasslands in Virginia could have had a similar climatic origin. Wilkins et al. (1991) have shown that the Big Barrens of Kentucky, a grassland outlier of the midwestern prairie peninsula, formed only after the Hypsithermal Interval, possibly as a direct result of Indian fire use. Moreover, the effects of dry air from the Great Plains are minimal in Virginia (Whitney 1994). In recent millennia, Virginia's climate has been too moist and natural fire too rare to sustain prairie or savanna. The prairie in Virginia's mountain valleys and the open woodland in the western Piedmont were probably formed and almost certainly maintained through seasonal burning by American Indians to promote browse for bison and elk.

A Legacy of Fire

The Jamestown colony was founded on the myth that Virginia was, as John Smith (1624) put it, "a plain wilderness as God first made it." The wilderness myth persists to this day in the notion that the East was once covered by a primeval forest that a squirrel could have crossed "from bough to bough for a thousand miles and never have seen a flicker of sunshine on the ground" (Adams 1931).

That squirrel must have taken a tortuous route across Virginia's checkered landscape. Studies suggest a similarly varied landscape, including broad swathes of grassland and savanna, in other Eastern States (Day 1953; Rostlund 1957; Pyne 1982; Patterson and

Sassaman 1988; Whitney 1994). In addition to grasslands, the ecosystem mosaic probably included large areas of successional woodland maintained through burning techniques that were likely as effective as any we know today.

Of course, any conclusion based on the limited evidence of historical accounts alone must remain hypothetical. Still, accounts by early European settlers and travelers, coupled with what we know about Virginia's climate in recent millennia, consistently point to one conclusion: that at least some of Virginia's ecosystems evolved with, and depended on, frequent burning by American Indians. Shaped and maintained to make the land livable, such ecosystems should not be confused with wilderness. Instead, they should be treated as what they were—a cultural imprint left on the land by Virginia's first inhabitants.

Acknowledgments

This article would not have been possible without generous assistance from USDA Forest Service staff on the George Washington and Jefferson National Forests in Roanoke, VA. The author would particularly like to thank Fire Staff Officer Glen Stapleton, Forest Archeologist M.B. Barber, and Forest Ecologist Steven Q. Croy for their photographs, extensive references, and invaluable information and commentary. Thanks also go to Ruth Brinker, the heritage resource specialist for the Monongahela National Forest in Elkins, WV, for reviewing the article and sharing her insights into American Indian cultural history in West Virginia. The author alone is responsible for any errors.

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FIRST PEOPLES FIRST IN FIRE SHELTER USE*

American Indians, though skilled in the use of fire, were occasionally entrapped by wildland fires. Meriwether Lewis and William Clark witnessed one such incident on their historic expedition from St. Louis, MO, to the mouth of the Columbia River. On October 28, 1804, a prairie fire near a Mandan village north of present-day Bismarck, ND, overran several people. As Clark testified in his journal, a boy survived under a fresh bison hide—perhaps the first recorded use of a fire shelter.

The Prarie was Set on fire (or cought by accident) by a young man of the Mandins, the fire went with such velocity that it burnt to death a man & woman, who Could not get to any place of Safty, one man a woman & Child much burnt and Several narrowly escaped the flame. a boy half white was saved unhurt in the midst of the flaim, Those ignerent people say this boy was Saved by the Great Medison Speret because he was white. The couse of his being Saved was a Green buffalow Skin was thrown over him by his mother who perhaps had more fore Sight for the pertection of her Son, and [l]ess for herself than those who escaped the flame, the Fire did not burn under the Skin leaveing the grass round the boy. This fire passed our Camp last [night] about 8 oClock P.M. it went with great rapitidity and looked Tremendious

* From Bernard DeVoto, ed., *The Journals of Lewis and Clark* (Boston and New York: Houghton Mifflin Company, 1997 [1953]), p. 60.