

Appalachian Fire History – Overview, Potential Sources, and Possible Directions

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Fire in the Pre-Industrial Era (ca 1820 to 1880)

No detailed records of fire occurrence in Southwestern North Carolina appear to exist prior to the last two decades of the 19th century. There are second hand accounts of large destructive fires that are said to have occurred in the Chattooga River watershed (GA-N.C.) in the mid-19th century (Bratton and Meier 1998: 374), but little specific information about these fires is given. However, with the exception of fires related to extensive commercial logging and to railroads it is a reasonable assumption that the fire regime described in the following section also prevailed during the pre-industrial era.

Fire in the Early Industrial Era (ca 1880-1920)

The four decades between 1880 and 1920 were a time of significant change in Southwestern North Carolina. In particular, the arrival of the railroad around 1880 ushered in a period of commercial logging that profoundly affected the mountain landscape. This was also a period in which “commons” lands began to be acquired and regulated both by private interests and the federal government. However, in spite of these changes, there appears to have been some continuity in the lifestyles of mountain people, especially in more remote areas. With some variation, therefore, the following descriptions of fire causation drawn from a series of government reports published in the late 19th and early 20th centuries could probably serve as a reasonable proxy of what occurred between 1820 and 1880.

Causes of Fires

The first study to provide a statistical breakdown of fire cause by region was produced as an adjunct to the 10th (1880) United States Census. Based on information that the author conceded was incomplete, this study asserted that in the year 1880 546,102 acres had burned in North Carolina as a whole. By far the greatest number of fires, 115, were attributed to clearing land, with 34 fires attributed to hunters and 25 fires attributed to “malice.” Other causes of fires included lightening (22), locomotives (11), campfires (10), and smokers (4) (Sargent 1991: 491).

Interestingly, although it is included as a category, no fires were attributed to “improving pasturage.” As no fires were attributed to this cause in many other states, it is probable that this is a survey or reporting error and does not reflect a dearth of these kinds of fires. Another possible reason that no fires were attributed to improving pasturage in the census report is that these sorts of fires were apparently so common during this period that many people did not classify them as “forest fires,” a category that was reserved for more severe conflagrations (Holmes 1910: 18).

Burning to Improve Woods Pasture

The first published study to focus specifically on forest fires in North Carolina, authored by W. W. Ashe in 1895, emphasizes the extent to which burning the woods to improve pasturage was practiced at this time. In this study, Ashe asserted that fully two thirds of the forest fires in the state were of intentional origin, and that “in the majority of such cases the object that is expected to be gained in starting the fires is the improvement of the pasturage” (Ashe 1895: 7).

As described by Silver (1990: 181-182), Davis (2000: 100-101) and others, the practice of burning the woods to improve pasture was very widespread in remote backcountry areas where livestock raising comprised an important part of the economy. The practice was not limited to the areas in the vicinity to settlements, but was extended to ridge tops where herds of animals were pastured during the summer months (see for instance Ashe 1895: 24). Ashe asserted that in the mountains fires were set to “get rid of the leaves, so that the young grass can be easily reached in the spring; to burn off stiff weeds, etc...,” and, most importantly, to keep down the young tree growth that would otherwise shade out grasses and herbage. The fires also tended to kill off pines and conifers, which lessened competition for deciduous trees. Deciduous trees sent up numerous sprouts from roots and stumps that were in turn feasted on by cattle (Ashe 1895: 55). In addition to stimulating the growth of grass and encouraging the growth of deciduous trees the practice of burning the woods had the additional advantage of making the woods easier to navigate through and was believed to be beneficial by killing insects and other vermin (e.g. see Ashe 1895: 10, 46).

Burning to Improve Woods Pasture - Antiquity of the Practice

The custom of burning the woods to improve woods pasture was practiced throughout the historic period and before. Ashe asserted that burning the woods to improve pasturage had been practiced in Graham and Cherokee county “ever since they were settled, and before that time the Indians practiced it” (Ashe 1895: 49).

Burning to Improve Woods Pasture - Effect of the Practice

Ashe depicted these woods fires as extremely harmful, asserting that while “in many localities they are regarded as beneficial rather than otherwise,” “Their continued repetition means the gradual killing of the forest or the reduction of it to a few species, which are physically capable of withstanding scorching heat, which seed or reproduce themselves abundantly or at an early age, and whose young seedlings are exceedingly hardy” (Ashe 1895: 10). Ashe also emphasized that these fires selected for those tree species that sprout from the stump or the root, rather than from seedlings, and attributed the chestnut groves that dominated the higher elevations of the mountains to repeated fires (Ashe 1895: 26). Ashe claimed that “The trees in many places [in Graham County], especially the chestnuts, have been scorched on one side and then hollowed out from the effects of the fires” (Ashe 1895: 49). Similarly, in mountainous Mitchell County, “On many south mountain slopes many of the larger trees [had been destroyed] and only a brushy growth occupied their places” (Ashe 1895: 49). Analogous situations were reported for other mountain counties.

The forester J. S. Holmes was more sanguine about the practice, asserting that the fires set to improve the range did not do extensive damage to mature forests unless they were set late in the spring, after the sap in the trees had begun to rise (Holmes 1910: 10, 19). However, Holmes emphasized that mature trees that had been scarred by fires were more vulnerable to insects or fungal diseases. Holmes also stated that the humic layer of the soil was damaged by these fires (Holmes 1910: 36), and that erosion was increased (Holmes 1911b: 20). Holmes stated that forests that were burned on a regular basis tended to consist of fire tolerant species such as black oak, red maple, and black gum (Holmes 1910: 26).

Burning to Improve Woods Pasture - Extent of the Practice

At the time of Ashe's 1895 report the practice of burning the woods for pasturage seems to have been relegated to the most remote areas in the more settled counties, but to have remained widespread in less populous areas. Ashe asserted that "It is safe to say that one-fourth of the mountain lands of [Graham, Swain, and Cherokee] counties were burnt over in the past year." Ashe attributed the extensive burning in these areas in part to the large Cherokee population (Ashe 1895: 49). In contrast, in longer settled Buncombe county, without the extensive Native American population, burning the woods had "nearly ceased," although it was "still to some extent practiced in the mountain districts, where cattle [were] grazed in the woods" (Ashe 1895: 46). Similarly, in Jackson County, "The outside mountain lands, or wild lands, [were] yearly burned over to supply grazing." Ashe estimated that at least a third of the acreage of these lands had been burned in 1894 (Ashe 1895: 49). And in Macon County, "a large part of the "wild lands" [were] burned over [in 1894]." Ashe estimated that during 1894 between 10,000 and 20,000 acres had been burned and some \$2000 worth of fences had been destroyed in Macon County (Ashe 1895: 50).

Further evidence that the practice of burning the woods was becoming somewhat marginalized by the late 19th century is Ashe's assertion that "Most of the fires in the eastern and many in the western part of the State are started by indigent persons who are amenable to no law, who regard all property as open to destruction and forests as communal property; persons whose parents were hunters and who themselves are scarcely yet seriously affected by the civilization which defines property and allows to the individual its possession." (Ashe 1895: 56). Woods burning seems to have become increasingly marginalized both socially and geographically in the early decades of the 20th century (Holmes 1910: 40; Shea 1940).

The practice of burning the woods was intertwined with the practice of free ranging livestock. During the early 19th century stock laws, or laws prohibiting free ranging livestock, were local option (Holmes 1910: 40). Once livestock were required to be fenced, there was little incentive to burn vast areas outside of one's own property. Various estimates are offered in the contemporary literature as to the ratio of livestock to burned acreage. J.S. Holmes cited an estimate that in one of the mountain counties for every head of free range cattle 67 acres of woods were burned (Holmes 1911a: 98). Another, perhaps more fanciful estimate, was that one person with twenty hogs, twenty sheep, and ten cows would affect 10,000 acres (MacRae 1912: 36).

In a survey of fire causation conducted by J.S. Holmes in 1909, 4 fires out of a total of 51, or just under 8% of reported fires in the mountain counties were attributed to burning “to improve the range” (Holmes 1910: 29). (In this survey Holmes only included those fires reported by correspondents who responded to a questionnaire. Therefore, these figures do not reflect the total number of fires that actually occurred in the mountains in 1909).

Brush Fires

Many forest fires also occurred when fires set to clear new ground for agricultural purposes spread into the surrounding woodlands (Ashe 1895: 56). In the agricultural system that was widely practiced in the 19th century clearing new ground was an ongoing practice. Fertilizer was not used, so as old fields became exhausted they were abandoned and new ground was cleared in its stead. According to J. S. Holmes, “It used to be that farmers cleared a “new ground” each year, and abandoned to “old fields” an equivalent of worn out land.” Holmes asserted that at the time of his writing (1911) this practice was giving way to improved agricultural methods that allowed cultivation of the same field for an extended period of time (Holmes 1911a: 14).

Two methods were generally employed in clearing new fields. The least labor intensive method involved clearing away and burning the undergrowth and smaller trees and girdling the larger trees, which were either partially burned while standing or simply allowed to topple over in time. A more labor intensive alternative was to grub up the small trees and fell the larger trees, which were allowed to dry for a time and then either dragged into piles for burning or burned where they had fallen (Davis 2000: 105-106; Williams 1989: 60-67).

Brush burning fires were not limited to those that were set in order to clear new ground. Fire was also routinely used to burn debris in existing fields, clear fence corners, briar patches, and so forth (Holmes 1910: 30).

Brush Burning Fires – Effect of the Practice

J. S. Holmes suggested that escaped brush burning fires were among the most destructive of fires because they often occurred later in the spring than the fires that were deliberately set to burn the range. Fires set later in the spring, after the sap had started to rise in the trees, were said to be much more destructive to the forests. In addition, windy conditions in the spring encouraged the spread of the fires, and escaped brush fires often burned in forested areas near farmsteads that were not usually burned when the range was burned, and thus had a large buildup of debris. Holmes blamed many such brush fires on renters or others who did not have a vested stake in preserving property (Holmes 1910: 30).

Brush Fires – Extent of the Practice

In Holmes 1909 study of fire causation 4 fires out of a total of 51, or just under 8% of all reported fires were attributed to “farmers burning brush, etc” (Holmes 1910: 29).

Hunters

Many fires during the period 1880 – 1920 were attributed to hunters. Fires blamed on hunters had a wide range of proximal causes. These included fires set by a hunter to warm himself and then abandoned while still burning; fires set in hollow trees in order to smoke out squirrels or opossums or to otherwise drive game from cover; fires set by the ignition of a gun wad, or fires set by discarding a lighted match (Holmes 1910: 31; Ashe 1895: 46, 56). Hunting using torches at night also caused a number of fires (e.g. Ashe 1895: 48; Cowdrey 1996: 94; Davis 2000: 113).

Hunters – Extent of the Practice

In Holmes 1909 survey of fire causation, out of a total of 51 reported fires in Western North Carolina, 6, or slightly less than 12% were attributed to hunters (Holmes 1910: 29).

Gathering Roots and Nuts

Fires were also set to facilitate the gathering of chestnuts by removing the leaves that covered the nuts. A related practice involved setting fires to expose nuts so that hogs would be able to collect them more easily. Some fires were set in the winter and spring so that the leaves of ginseng or other valuable herbs could be readily spotted when they sprouted. According to J. S. Holmes, fires of this sort were usually set by trespassers on other people's property (Holmes 1910: 37; Ashe 1895: 46-47).

Gathering Roots and Nuts - Extent of the Practice

In Holmes 1909 survey of fire causation, out of a total of 51 reported fires in Western North Carolina, 2, or slightly less than 4% were attributed to individuals gathering roots and nuts (Holmes 1910: 29).

Campers

Campers also caused some fires. During the late 19th and early 20th century campers appear to have been as often travelers as recreationists. J. S. Holmes noted that most camping was done in the summer, when it was difficult to light the woods on fire. According to Holmes, the greatest danger of fires caused by campers occurred during the dry periods late in the summer, or during the autumn months (Holmes 1910: 32).

Campers – Extent of the Practice

In Holmes 1909 survey of fire causation no fires were attributed to campers in the mountain areas. However, given the limitations of Holmes data set, this should not be construed to mean that campers never caused fires in the mountains (Holmes 1910: 29).

Malice

Fires were also set out of malice – to destroy an enemy's fences, woodlot, etc. (Holmes 1910: 38-39). During the second decade of the 20th century, many malice or grudge fires were directed against large land owners who were attempting to protect their land from burning (Holmes 1911b: 22).

Malice – Extent of the Practice

In Holmes 1909 survey of fire causation, out of a total of 51 reported fires in Western North Carolina, 4, or slightly less than 8% were attributed to malice (Holmes 1910: 29).

Pyromania

Setting fires simply for the pleasure and excitement of watching them burn seems to have been fairly common (e.g. Holmes 1910: 38; Shea 1940: 162).

Pyromania – Extent of the Practice

In Holmes 1909 survey of fire causation, out of a total of 51 reported fires in Western North Carolina, 15, or slightly less than 30% were attributed to the category “without much object, to see it burn, etc.” (Holmes 1910: 29).

Miscellaneous Causes

In addition to the preceding causes, fires were also set for a variety of other reasons. Some fires were said to have been set to aid in the identification of mineral deposits by exposing the rocks beneath the leaf cover (Holmes 1910: 37). Other fires were set to make travel through the forests easier, to lower the population of snakes and insects, or in the belief that the fires would diminish “fever germs” (Holmes 1910: 38; Shea 1940: 159). Some fires were apparently set by farmers or other homeowners as “protection fires” – fires that were set in favorable weather to burn the woods in the vicinity of buildings or fences so that these areas would not be prone to ignition by accidental fires. (see for example Bratton and Meier: 9). However, according to the forester Holmes, this practice was principally undertaken in the eastern portion of North Carolina (Holmes 1910: 36). Children playing with matches and smokers also accounted for some fires (Holmes 1910: 32). Other fires may have been set as a consequence of or in an attempt to disguise illegal activities such as liquor manufacture.

Lightening Fires

The forester J. S. Holmes described lightning fires as “extremely rare,” and suggested that their occurrence “is of more concern to the statistician than the economist” (Holmes 1910: 35).

Overall Amount of Land Burned

In his 1910 report on forest fires in North Carolina, J. S. Holmes estimated that 166,000 acres had burned in the mountain counties (this includes the Southwest Mountains and the mountains to the north) during the previous year. Holmes estimated that this constituted about 5% of the total forested area of the region. However, he believed these figures to be somewhat lower than the actual occurrence of fire in the region (Holmes 1910: 19).

In the more remote portions of Clay County it was estimated that during the first decade of the 19th century fully 50% of the land was burned over each year, with fires attributed to burning for range improvement, nut gatherers, and malicious persons (Holmes 1911a: 35).

In Swain County, it was estimated that “from 30 to 50 percent of the land [had] been burned over every year for a long period” (Holmes 1911a: 39).

In Jackson County, only 20% of the land had been burned in 1910 and there was said to be growing sentiment against woods fires, particularly among the larger land owners (Holmes 1911a: 42).

Logging and Railroad Fires (ca 1880 – 1930)

Logging

Harvesting trees for local use began simultaneously with the settlement of the Appalachians (e.g. Bratton and Meier 1998: 374). However, commercial logging for export did not begin in the North Carolina mountains until around 1880. Logging in the region proceeded in two phases. During the first 20 years, cutting was limited to the harvesting of highly desirable, high value trees such as black walnut, cherry, and ash, or to areas that were easily accessible. For instance, due to poor transportation facilities only the better quality of lumber had been cut in Clay County by 1910 (Holmes 1911a: 34). In the absence of rail lines, trees were transported to market by conveying them to rivers and streams and floating them to mills. This type of logging apparently did not result in a marked increase in fires in the mountains (Lambert 1961: 351-353).

The completion of a railroad line from Asheville to Murphy in the 1880s created a means to efficiently transport lumber to outside markets, while the subsequent establishment of pulp mills in Canton (Haywood County) created a market for lower quality lumber. These developments ushered in the second phase of logging in the mountains of Southwest North Carolina, during which selective harvesting of high value trees was replaced by extensive clear cutting. The slash and debris left by the logging practices of the day proved to be a volatile fuel source and resulted in very hot destructive fires that contrasted markedly with the range or “leaf” fires that had swept across the region previously (Lambert 1961: 354-359). Interestingly, however, reports on fire cause during this period attribute relatively few fires directly to the logging industry. In 1909, for instance, only one fire was attributed to logging locomotives in the mountains and just two fires to sawmills. No fires were attributed to lumbermen (Holmes 1910: 29). It is likely that these low figures are at least partially the result of poor reporting practices. However, according the forester Holmes, many of the large logging companies in Western North Carolina were eager to keep fire away from their operations and took precautions to avoid setting fires, and to extinguish fires once they were set. Holmes believed that logging operations took greater precautions against fires when operating on their own lands than they did when operating on lands that were not their own (Holmes 1910: 34). The suggestion that the logging operations did not have a cavalier attitude toward forest fires was affirmed by informants in the Chattooga watershed interviewed by Bratton and Meier. These informants generally did not recall loggers purposefully setting fires or burning slash piles in a careless fashion. However, some fires may have been caused by the illegal whiskey making operations that often operated in the vicinity of logging operations (Bratton and Meier: 9-10).

Railroads

Railroads did not arrive in Southwestern North Carolina until the 1880s (Poole 1995). After the completion of the initial lines, branch lines or logging railroads were sometimes constructed to link to the main lines, or to link with railroads in Tennessee or other places (Lambert 1961). Railroad development was said to “rapid” after 1909 (Holmes 1911a: 12).

Sparks emitted from steam locomotives were the principal cause of railroad fires. Areas where locomotives had to labor up steep slopes under a heavy load of steam were particularly vulnerable to these fires. Railroad fires were also sometimes caused by railroad workers burning brush along the railroad right of way; burning old ties, etc. (Holmes 1910: 33).

In J.S. Holmes 1909 survey of fire causation railroads were blamed for the majority of fires in North Carolina as a whole, but the number of fires attributed to railroads in the mountains was relatively small (Holmes 1910: 33-34, 29). The following year, however, steam locomotives were said to be the principal cause of fires in the mountain counties (Holmes 1911b: 21).

Fires from railroad engines or other steam powered engines could be curtailed by the installation of a device known as a spark arrestor, but apparently this technology was still in the development phase during the early years of the 20th century (Holmes 1911a: 97). In addition, there was said to be little disposition on the part of the railroads to prevent fires caused by locomotives and little interest on the part of land owners in insisting that measures be taken to prevent the fires (Holmes 1911a: 97; Holmes 1912: 63). For the railroads, lawsuits over fires were a predictable cost that they preferred to shoulder instead of absorbing the expense of taking preventive measures such as clearing additional right of ways or installing spark arrestors. For some landowners, settlements from railroad fires were a welcome source of income, and indeed according to one account there was something of a cottage industry in some places in defrauding the railroads by deliberately setting fires and then blaming conflagrations on passing locomotives (Anonymous to John Foley, n.d.).

Appalachian Fire History - The Early Years of Fire Suppression – (ca 1911 – 1945)

The practical beginning of managed forestry in Western North Carolina occurred in the late 19th century when the tycoon G. W. Vanderbilt purchased vast amounts of land in the vicinity of Asheville for use as a private estate. Vanderbilt employed professional foresters to manage his holdings, and fire was suppressed on the property (Holmes 1911a: 45). Much of Vanderbilt’s land was eventually folded into the Pisgah National Forest (See <http://www.cradleofforestry.com/history.htm>).

The passage of the Weeks Law of 1911 marked the beginning of public forestry in the Appalachians and the entrance of the federal government into the business of fire suppression. The law was designed to protect the watersheds of navigable streams by

allowing the government to purchase lands in these watersheds and hold them as national forests (Holmes 1911a: 108).

During the early years of fire suppression the budding National Forest Service is said to have been fairly successful in reducing the overall number of blazes (Bratton and Meier: 10-11). Fire suppression was given a further boost during the Great Depression by “make work” programs such as the CCC that provided the manpower both to create a fire fighting infrastructure (e.g. fire towers) and to physically fight fires when they occurred (Pyne 1982: 156; Pyne 1984: 252). The number of serious forest fires is said to have been particularly diminished during WW II, both because many would be arsonists were drafted, and because the war effort cast a patriotic cloak around timber management (Bratton and Meier: 10-11).

Bratton and Meier suggest that the practice of burning the woods to improve the range was discontinued by most people in the Chattooga River watershed around 1930 (Bratton and Meier: 9). However, in at least some parts of the Appalachians the practice was ongoing at least a decade later (Shea 1940). Toward the end of the period of widespread woods burning the practice may have morphed into what might be described as protest or malice fires as more and more land was placed off limits to stock ranging, hunting, and so on. As the fire historian Stephen Pyne emphasized, by setting fire to national forest or park land, or to land held by large timber companies, backwoods settlers could simultaneously perpetuate an old land use regime while protesting the new, more restrictive regime (Pyne 1982: 152).

In the George Washington National Forest in Virginia, early, but incomplete fire records dating to the years prior to 1950 suggest that 40% of all fires during this period were caused by arson or smoking, while 14% were of unknown origin. Fires occurred mostly in the spring and the fall (Anonymous: 8).

Appalachian Fire History – 1946 to Present

During the post-WW II years fires continued to be set for many of the same reasons that they were set during the early decades of the 20th century. Grudge fires were set on land controlled by large land owners or government agencies, and malice fires were set to settle personal grievances. Fires were also set to cover up illegal activities such as whiskey distilling, to facilitate logging or moving about in the woods, to kill snakes and insects, or to aid in the collection of medicinal herbs. Additional fires were blamed on thrill seekers and drunks and irresponsible people, or on people who were mentally ill. Children were also blamed for numerous fires (Myren 1956: 23-26).

Hunters continued to be a problem. According to a 1956 report fires were frequently set in the woods in order to create a clear grassy area where it would be easy to shoot and which was attractive to deer (Myren 1956: 32). Fires also appear to have continued to have been employed to smoke squirrels (and other animals?) out of trees at least as late as the 1950s (e.g. see Pyne 1982: 157).

Fires apparently also continued to be set to improve the range in some places, although in the records of the period these fires may be subsumed under the category of debris burning (Myren 1956: 25).

New or novel causes of fires during this period may include job fires and insurance fires. Job fires were fires that were set in the hope that the arsonist would be employed to help put out the blaze (Myren 1956: 24). Insurance fires resulted from some attempt to collect an insurance settlement. For instance, a number of fires during the 1950s were attributed to vehicles that were torched at the end of rural roads in order to obtain an auto insurance settlement (Myren 1956: 19).

Bratton and Meier suggested that there was an overall increase in human caused fires in the Chattooga River watershed after WW II, mostly due to arson. In particular, there was a spike in arson fires in the 1970s. Many of these fires were protest fires set in reaction federal land management decisions that resulted in restricted access to some land. Other fires were so called job fires. However, arson fires are said to have declined in the watershed since the early 1980s. Reasons given by local informants for the decline were a decrease in illegal whiskey manufacture; arrests for arson, brightened job prospects, and an increased availability of alternate forms of amusement. Residents of the region may also have been frightened by a particularly catastrophic fire that occurred in 1978 (Bratton and Meier: 12-13).

Bratton and Meier also suggest that there was an increase in accidental fires following WW II. They attribute this to the occasional use of fire to clear land for new developments and an increase in the number of hikers, fishermen, and other outdoor recreationists. Wild fires related to agricultural activity are said to have declined, but fires continued to be caused by other land clearing activities, such as burning debris on construction and logging sites. Ignitions from electric fences and machinery also occurred (Bratton and Meier: 14).

Overall Trends in Fire Occurrence in the Appalachians

Overall Trends – Location of Fires

In their study of the vegetation disturbance history of the Chattooga Watershed, Bratton and Meier found that both lightening and arson fires tended to occur on “open higher elevation slopes facing south, southwest or west,” while accidental fires tended to occur at lower elevations where houses, farms, and roads were located (Bratton and Meier 1998: 376-376; see also the tables in Bratton and Meier). The author of a study of fire occurrence in the George Washington National Forest, in Virginia, noted that in this area south facing slopes had higher occurrences of fires, and that “Human caused fires began largely on the lower slopes (following road and settlement patterns) and lightning [fires were] distributed on the higher slopes” (Anonymous: 8). Similarly, a study of fire scars in pine forests in the Great Smokey Mountains found that during the late 19th and early 20th century fires in this area occurred with greatest frequency on south facing upper slopes, followed in descending order by south facing lower slopes, with north facing

upper slopes and north facing lower slopes being the least fire prone (Harmon 1982: 77: 77). And W.W. Ashe wrote in 1895 that “But slight damage is wrought by fire to the forests of the higher mountains on northern slopes, owing to their openness, the dampness of their humus, and their never having been lumbered or extensively culled, and hence not being encumbered with lops or thickets which would furnish fuel for fires” (Ashe 1895: 27).

Mountain top spruce forests were also said to be largely protected from fire in their natural state by their location near the tops of mountains, which tended to receive a great deal of precipitation, and by the dense shade of the evergreen forests (Holmes 1911a: 19).

In the Chattooga Watershed the location of arson fires is said to have changed over time. Prior to 1975 these fires were principally set on open, sheltered slopes. These fires were set in more accessible areas in the mid-1970s, but in more recent years have again been set in higher elevations, although no longer necessarily on open slopes. Bratton and Meier attribute the shift in location in the mid-1970s to a politicization of these fires. In short, rather than being set simply for the joy of burning, arson fires during this period were set to be noticed. Because the fires were noticed sooner (and were sometimes set in less flammable areas) the average size of arson fires also declined during this period (Bratton and Meier: 16). (Bratton and Meier are incorrect in suggesting that political or protest fires are a recent phenomenon in the region. In fact they were widespread in the early days of managed forestry).

Overall Trends – Seasonal Occurrence of Fires

Both burning the woods for pasture and burning off new fields for planting was usually done in the late winter or spring (Silver 1990: 181, Bratton and Meier 1998: 374), resulting in a pronounced spring fire season (Davis (2000: 100) asserts that mountaintop pastures were sometimes burned in late fall). In the George Washington National Forest, in Virginia, “there was a typical spring and fall fire season, attributed mostly to human starts.” Lightning fires occurred mostly in the summer months in this area (Anonymous: 8). Bratton and Meier found that in the Chattooga watershed the lightning fire season “was generally from April through August” with the most lightening fires occurring in April and July. In contrast, most anthropogenic fires occurred in the late fall through the spring. Bratton and Meier note that historically intentionally set fires were most prevalent in the early spring, but suggest that this pattern may be breaking down as fire is used more for “political purposes” (protest fires). They also assert that accidental fires are beginning to be more dispersed throughout the year as agriculture is supplanted by other economic activities, and as farmers engaged in seasonal field clearing are being replaced by suburban or summer residents whose activities are not so tightly constrained by the growing season (Bratton and Meier: 19-20).

Bratton and Meier also note that both accidental and intentional fires tended to be clustered, a fact that they attributed to arsonists setting multiple fires on the same day, and on many people choosing the same days with good weather on which to burn debris (Bratton and Meier: 22).

Late spring fires (April and May) that occurred after the sap had begun to rise in the trees were said to be most severe (Holmes 1911a: 97; Holmes 1912: 59; Kimball 1925: 3). This was due in part to the high winds and sometimes dry conditions that occurred during this season.

Overall Trends – Frequency of Fires

Ashe reported that in North Carolina, in extent of area burned every year the Southwestern Mountains were exceeded only by the counties in the southeastern portion of the state. Ashe attributed this fact in part to the Native American population of the region, asserting that “wherever there are any Indians, the woods are regularly burned,” but conceding that “the Indians are by no means the only offenders.” Topography was also said to be a culprit. According to Ashe, the soil in Southwestern North Carolina was “in many places in a condition in which it holds but little water, so the dry leaves burn well” (Ashe 1895: 54). Whether more fires continue to occur in the Southwestern mountains than in other places is an open question.

A study conducted in the Great Smokey Mountains of North Carolina suggested that during the last half of the 19th century and the first half of the 20th century fires hot enough to create fire scars occurred on average every 12.7 years. However, this figure varied considerably in accord with topographic situation, vegetation type, etc. (in other words, some areas burned more frequently than other areas but on average any given area was subjected to a hot fire ever 12.7 years) (Harmon 1982: 75-77).

Overall Trends – Size of Fires

In the George Washington National Forest of Virginia, 76% of all fires recorded between 1915 and 1993 were small fires, less than 10 acres in size (Anonymous: 8)

Archival Sources - Examined

Source: Forest Service Land Acquisition Records

Location: National Forest Service Office, Asheville, N.C.

Dates: Roughly 1910s to 1940s.

Collection Description/Potential Utility: Each time the Forest Service acquired a piece of land they archived all the records pertaining to the purchase in a separate folder. The folders are shelved alphabetically by the name of the seller, separated by district. Each purchase has a unique number, and is keyed to a plat of the property positioned on a slightly reduced 1:24,000 topo map. So it is easy to locate the properties in space, but there didn't seem to be any easy way to separate the purchases by date, other than to simply look in the folders. Each of the folders contains a hodge-podge of information, with the vast majority of the papers pertaining to establishing legal title to the tract in question. These would be of little use. But in some cases there is some very good land use/land cover information, and in some, but by no means all of the folders there is

information about whether all or part of the tract in question had been burned. This information takes the form of a notation in some version of a standard forest service form; less frequently in the text of a written description of the property, and occasionally (I am told, but didn't find an example) in the form of a plat map that shows areas that had been burned. There was no indication that I could see of fire cause, just presence or absence of fire, and in some cases of fire intensity. I could visualize making some form of spatial/statistical study of fire occurrence using this information.

Disadvantages: This is a very large collection. (The Wayah District in the Nantahala National Forest alone takes up approx 6 x 12 ft. of shelf space). As such, working with the collection would be time consuming, especially if the tracts were to be plotted in space. While copy facilities are available, most of the initial research would have to be done on site.

Source: Records of the North Carolina Geological and Economic Survey, Correspondence; subsumed within the records of the Department of Conservation and Community Development.

Location: North Carolina State Archives, Raleigh.

Dates: Late 19th and early 20th Centuries

Collection Description/Potential Utility: It is possible, though unlikely, that survey documents related to the composition of early 19th century fire studies might be present in this collection. However, an examination of six randomly chosen boxes (out of a total of 96 boxes) suggests that what is most likely to be found in this collection are letters and other documents relating to various aspects of fire and fire prevention, interspersed with a great deal of material that is irrelevant to fire. However, there are bound to be a few gems that provide insights into the fire situation in the mountains.

Disadvantages – A large collection that would be time consuming to wade through. Research would have to be done on site.

Source: Geological and Economic Survey, Miscellaneous (forestry) subject file, 1883 – 1926. Mars ID # 144.7. (Mars ID numbers are a unique number given to some, but not all of the collections in the North Carolina State Archives).

Location: North Carolina State Archives, Raleigh.

Dates: 1883-1926

Collection Description/Potential Utility: Much the same as above. Some interesting odds and ends about fire interspersed with a lot of irrelevant stuff. This is a relatively small collection (9 boxes).

Disadvantages: Material is of sporadic relevance. Research would have to be done on site.

Source: N.C. Forest Service Fire Reports (Mars ID 84.14).

Location: North Carolina State Archives, Raleigh. Collection is in the archives repository and access has to be arranged in advance.

Dates: 1969 –1979. Some forms date back another 10 years or so but it is unclear if any forms from the Southwestern Mountains are available from earlier dates.

Collection Description/Potential Utility: These are the fire reports filed by the N.C. Division of Forestry, and are analogous to National Forest Service fire forms. The forms include data on fire cause, size, etc. However, the most useful information on the forms are brief notations detailing the cause of the fire and in some cases describing the person responsible. This collection is organized by year and county, so it is very assessable. The forms could probably be photocopied or microfilmed relatively cheaply. There looked to be about 20 forms per county per year.

Disadvantages: Narrow time frame. It's not clear how much overlap there is with the forest service forms.

Source: Reports of Fires by Days. Subsumed in Division of Forestry, Fire Prevention Section Records (Mars ID 84.17).

Location: North Carolina State Archives, Raleigh. Collection is in the archives repository and access has to be arranged in advance.

Dates: 1926 - 1951

Collection Description/Potential Utility: This collection simply lists the number of fires that occurred on any given day during the year; for example, March 4, 3 fires, March 5, 0 fires, March 6, 0 fires, March 7, 1 fire, etc. No other information about the fire other than the date of the occurrence is given. The figures are given for multi-county districts. This would be a fairly easy collection to work with, as it is well organized, and could probably be copied/microfilmed at a relatively low cost.

Disadvantages: Limited information. Main value would be in a study in changes of fire seasonality and day of occurrence over time.

Source: Fire Statistics (Mars ID 84.12 – this number may be wrong).

Dates: 1923 - 1976

Location: North Carolina State Archives, Raleigh. Collection is in the archives repository and access has to be arranged in advance.

Collection Description/Potential Utility: Statistics on fire cause and occurrence analogous to the ones clipped into the front of the fire atlas, broken down by district (a multiple county area) and in at least some cases by county. There is a lot of information in this collection which could be used to conduct a statistical portrait of fire occurrence over time.

Disadvantages: Organization of forms changes from year to year. Collection would be cumbersome to work with and would require a large amount of both on site and off site time in order to cull and organize meaningful data.

Potential Archival Sources Not Yet Examined

Source: National Forest Service Records (Record Group 95)

Location: Washington D.C. and Atlanta. Records of the Southern Regional Office, including some land acquisition records are in the branch archives in Atlanta.

Dates: Early 20th century to recent.

Collection Description/Potential Utility: There are various Forest Service records that may hold information about fire, but the most promising records are Annual Fire Reports, 1925-48. According to the published finding aid for Forest Service Records, these records include “Statistical tabulations showing causes of fires, number of acres burned, and costs of fires” (Pinkett and Good 1969: 101). The records are arranged chronologically by state. They are subsumed within the Records of the Division of Cooperative Forest Protection, 1915 – 49 at the National Archives in Washington D.C. Other records of a similar nature may exist. Unfortunately the relevant finding aids are not very good or up to date.

Disadvantages – Having never seen these records it’s hard to say how useful they would be. Largely a fishing expedition for records other than the “statistical tabulations.” Most of these records probably have not been microfilmed and would have to be examined on site.

Source: Western North Carolina Newspapers

Location: Available on microfilm from the North Carolina State Archives, Raleigh.

Dates: Mid-nineteenth century to recent

Collection Description/Potential Utility: The newspapers probably contain scattered references to large fires. In their study of the natural disturbance history of the Chattooga watershed, Bratton and Meier utilized newspaper articles about fires to a limited extent.

Disadvantages – A list of newspapers is available, but no index to articles has been compiled, so this would be a fishing expedition.

Source: 19th Century Agricultural Journals

Location: Many available on microfilm or perhaps hard copy in UGA libraries

Dates: 19th Century

Collection Description/Potential Utility: May contain references to fire.

Disadvantages – Most journals are probably not indexed so this would be another fishing expedition.

Source: W. W. Ashe Papers

Location: Southern Historical Collection, University of North Carolina, Chapel Hill.

Dates: 1859-1932; most late 19th – early 20th century

Collection Description/Potential Utility: Ashe was a forester with the North Carolina Geological Survey and the National Forest Service, and the author of at least one early fire study. Includes personal and professional correspondence, notes, and miscellaneous items. Relevance to this study is not known.

Disadvantages: Papers would have to be examined on site.

Source: Records of the North Carolina Geological and Economic Survey

Location: Southern Historical Collection, University of North Carolina, Chapel Hill.

Dates: 1885-1914

Collection Description/Potential Utility: This was the organization that was responsible for several early 20th century fire studies. It is possible that questionnaires or other information related to these studies may be preserved in this collection.

Disadvantages: Papers would have to be examined on site.

Source: Joseph Holmes Papers

Location: Southern Historical Collection, University of North Carolina, Chapel Hill.

Dates: Principally early 20th century

Collection Description/Potential Utility: Holmes served as State Geologist of North Carolina and was the head of the North Carolina Geological and Economic Survey. Under the auspices of this organization he compiled several of the early North Carolina fire studies.

Disadvantages: Collection appears to be fairly small; no certainty that any fire references would be included. Papers would have to be examined on site.

Source: Carl Alwin Schenck Papers

Location: North Carolina State University Library, Raleigh.

Collection Description/Potential Utility: Schenck was an early forester and founder of the Biltmore Forest School, near Asheville. Collection is fairly large.

Disadvantages: No certainty that any fire references would be included. Papers would have to be examined on site.

A Final Note on Sources

The bibliographic essay in Stephen J. Pyne's Fire in America (Pyne 1982: 618 - 626) includes a list of potential archival sources.

Research Issues, Comments, and General Recommendations

>What is done with this project in the future will depend as much on what is possible as on what may be desirable under ideal circumstances. In particular, I see little future for fire site evaluations such as those contemplated last summer – the fire locations simply aren't plotted with enough precision to allow such a study. In general the entire issue of fire effect – a major focus of the fire literature – is probably out of reach, unless anecdotal or second hand sources such as those cited in the preceding pages are used.

>Some interesting social history could probably be written using the collections of personal and agency papers listed above. The greatest potential for such work would be on examining occurrences during a narrow time frame – most likely the early 20th century. This is an important period in the fire history of the Appalachians, since it was the era of large scale logging; marked the beginning of managed forestry, etc, so some

worthwhile research might be done. However, the time and expense involved in this sort of work should not be underestimated. Alternatively, it might be possible to “cherry pick” these collections – go through parts of them to glean quotes or anecdotes that could be used to “dress up” a larger study.

>While I wouldn't abandon the quest completely, I am not terribly optimistic that much more can be discovered about the fire regime CA 1820 – 1880 beyond what I have written above, and beyond what has been written in various published environmental histories. Searches of various archival finding aids revealed scant mention of fires. It is certainly worth taking a gander at some agricultural journals; newspapers are a much longer shot. I believe that part of the problem is that fire was so institutionalized that it did not merit much mention except in the case of major wildfires.

>I think the most productive goal of this project would be to attempt to construct a statistical portrait of fire in Southwestern North Carolina using the available records. I would focus principally on cause and time of occurrence, but also on the characteristics of fires that are attributed to different causes, occur in different seasons, etc. For instance, what is the average size of arson fires? What is the average elevation of arson fires? When do most arson fires occur? Have, and how have these patterns changed over time?

>I would approach this study with the overriding question, what has changed, and what has stayed the same during the time covered in the records? More specifically, who is causing fires? Why are fires being started? What are the spatial and temporal patterns of fire occurrence? How have economic, demographic, and technological, and historical events affected the frequency of different kinds of fires? For instance, I suspect that the spring-fall fire season is a constant at least up until recently. However, a particularly interesting question would be to see if this pattern has been disrupted in the past two decades with the decline in agriculture and the development of the Southwestern Mountains as a summer vacation/residential destination.

>Another constant that is fairly obvious is that fires increase during drought years. I think it would be interesting, however, to attempt to determine how much of the variation in fire frequency – both number of fires and amount of acreage burned – can be attributed to drought cycles, using annual precipitation as a proxy. A byproduct of this is that years in which the amount of fire was not related to the amount of precipitation might be flagged for closer investigation in order to determine the cause of the discrepancy.

>An important point that could be made from this type of study is that the Appalachian fire regime is a shifting phenomenon. Fire occurrence during the historic period has been tied to social changes (attitudes about fire, attitudes about cigarette smoking, etc.); economic cycles (the logging boom; the Great Depression); technological developments (few people hunt by torch or use muzzle loading rifles any more, for instance, reducing the risk of hunting fires, and the replacement of steam locomotives with diesel locomotives has reduced the risk of fires from railroads). In short, fire during the historical period is more than simply people setting fire to the woods to improve grazing.

>Another important point of emphasis would be to question the validity of reintroducing fire in order to replicate or recreate an historical landscape. Fire was only part of what formed these landscapes – livestock also played a significant roll, as did shifting agriculture and the fires that resulted therefrom. In fact, the 19th and early 20th century “fire landscape” was a patchwork, while the reintroduced “fire landscape” would be (as I understand it) fairly homogeneous.

>I think it would also be useful to make some comment on how fires have been reported over the years – in other words to critique or question the categories that have been used. The N.C. Forest Service Fire Reports would be particularly useful for this type of study, since they contain slightly more detail about the actual cause of fire. Brush burning, for instance, is a very broad category which seems at various times to encompass a wide range of behaviors. Are a farmer burning his fields and a summer home owner burning rubbish in their backyard really engaging in the same behavior? Are the differences meaningful?

>A related issue would be to make some suggestions about changes in the ways that fires are recorded. For instance, the (now) simple expedient of carrying a GPS unit around the circumference of a burned area might open up a host of research options in the future – in a sense the entire National Forest would become a laboratory for the study fire occurrence and effect. Minor changes in the fire databases might allow for a better understanding of the human behaviors that cause fires.

>A specific single study that I think would be of some interest would be to look at the days of the week (Monday, Tuesday, Wednesday, etc.) on which fires have occurred over time. This would highlight the human dimension of fire, and how social changes affect fire occurrence (lightening doesn't know what day it is, but people do). My specific hypothesis is that fires would tend to be clustered during the week up to the last 30 years or so but during the last 30 years as agriculture declined and vacation/weekend visitation increased fires would to begin to be clustered on the weekends. This change might also reflect changing social norms – a growing disregard for Sunday as a day of rest.

Specific Recommendations

I would try to find out more about the Annual Fire Reports, 1925-48, in the National Archives. Of the various unexamined records, these would appear to hold the most promise. I would also attempt to secure a copy of the unpublished report:

Adams, Steve

Fire History in the George Washington National Forest: 1915 – 1995. This report apparently documents a statistical study of fire based on fire records in the George Washington National Forest. However, the report is not listed in Worldcat and probably would have to be obtained from the George Washington National Forest office.

Of the records that I have examined, N.C. Forest Service Fire Reports (Mars ID 84.14), and Reports of Fires by Days (Mars ID 84.17), would appear to have the most potential. Fire Statistics (Mars ID 84.12?) also is worth a second look, but the organization of the collection might make the use of these materials unduly cumbersome. As for everything else, it depends on how much money you have...

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