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Nova Scotia's Fiery Past: Why early wildfires ignited by our ancestors should not justify modern clearcutting practices

Written by MCFC Board Member, Donna Crossland

Nova Scotia forests were heavily impacted during European settlement by frequent wildfires caused by a variety of human activities that far outweighed any direct impacts from early logging or shipbuilding activities. A retrospective glimpse of Nova Scotia during the 1700-1800s reveals important information otherwise lost from our modern understanding of what is 'natural' Acadian forest and the kinds of human impacts it has witnessed. R. Lyons provides an insight from 1783:

"It is a matter of record that the forests of Nova Scotia had not been visited by any great fires until 1784, just 100 years ago. [] The aborigines, as well as the French settlers, were careful never to make fires in the woods in the dry season of summer. In 1783, however, a great number of refugees and discharged soldiers came into the country and many new settlements were formed. The following year no rain fell in June, the latter part of

Titus Smith, an early botanist and surveyor, while conducting the first survey of the provinces interior, referred to these same fires:

“The great influx of inhabitants in 1783 produced, in the course of a few years, a complete change in the appearance of the forest” (Smith 1835).

The carnage did not end with the loss of two-thirds of our forests burned in 1784. The next century witnessed still more fire, as lands were extensively subjected to more European settlement, railway fires, etc. By the early 1900s our forests had been heavily altered by repeated fires. Bernhard Fernow, in his report on the forest condition in 1912, estimated that by then, approximately one fourth of the forest area of NS was semi-barren, attributed mainly to repeated wildfires (Fernow 1912). Catastrophic wildfires destroyed vast tracts of majestic, centuries-old hemlocks, tall red spruce, grand sugar maple, and yellow birch in the virgin Acadian forest, prior to it ever being subjected to the axe or saw. Most of these fires were never recorded, or records did not survive through time. Nothing has been comprehensively compiled or analysed on this tragic turning point in our forest history.

Many 18th and 19th century forest observers commented on the increased frequency of fires following European settlement; the fires being nearly entirely generated from human activities rather than ‘natural’ causes. In the Acadian forest; *“Forest fires, practically without exception, are the result of human agency”* (Bruncken 1900). Titus Smith pointed to two basic human causes of fire: fires ignited by (1) *“design”*, or (2) *“negligence”*. There were compelling reasons for purposefully setting fires. Land grants stated the terms and conditions in which the forests must be cleared by early settlers. Within five years, for every 50 acres of land considered arable, three were to be cleared for cultivation. Non-compliance resulted in lands reverting to the crown. Settlers equipped with only an axe utilized fire as a necessary tool to rapidly clear land to meet the terms of their grants. Trees were an obstacle to cultivation. Every field was created through aid of fire, and countless land clearance fires escaped to surrounding forests without any means of control.



Swidden Agriculture Eero Järnefelt, 1892 This painting illustrates fire being used to aid land clearance activities (i.e. ‘swidden agriculture’), a practice carried out to create (https://web.archive.org/web/20180928093059/http://www.medwaycommunityforest.com/wp-
nearly all fields throughout Nova Scotia during the 17-19th centuries

Early wildfires raged through forests unheeded until they met with some natural fire barrier (a lake, bog, river, or coast). Not all stand types are equally susceptible to burning. Fires were observed to often stop at the edge of hardwood stands, the canopy of moist green leaves less flammable than resin-filled needles of conifer-dominated stands. Young, early successional forests that grew up following fire or other disturbances featured dense growths of balsam fir and other species whose fine branches, being closer to the ground, were more vulnerable to the flame than the smooth, tall trees of shaded and more humid old-growth forests. Thus new forests were even more fire susceptible and often burned uncontrollably once ignited. Fires were particularly frequent near more settled areas along the coast and on lands near Halifax and other communities. Only after the 1940s did we gain the technical support to effectively control wildfires using better means of fire detection, aerial support, and mechanized tools. Smokey Bear (adapted from the US Forest Service in the 1940s) sensitized us to be more careful in the woods: “Only YOU can prevent forest fires”.

Drought periods presented conditions for more intense, deep-burning fires that destroyed the very soil and humus layers on which the forests grew. Repeated fires had similar impacts on soil humus and nutrients, stunting forest growth for centuries. Such is the situation we see today on the fire barrens, largely the result of our misuse through previous centuries. During the 1840s, Lyons stated that a many miles of wilderness east of Halifax that once supported forests with large trees now consisted of “open barrens. The burnt stumps, trunks, roots of spruce and white pine trees, many of large dimensions, were [] scattered all over the barrens [] although the surface has been burnt over many times within the last 45 years, still the forest goes on reproducing itself and being burnt down and will continue to do so until active means are resorted to for having the forest fires put out as soon as observed”. Some of the barrens in southwest Nova Scotia were repeatedly burned to aid blueberry production; selling blueberries being one of few early means of earning real cash.

This brief synopsis of the post-European settlement fire regime can be summed up as a time of frequent, large scale wildfires, the vast majority caused by human activity. But what do we know of the pre-European (or ‘natural’) fire regime? Fires, along with other disturbance agents, such as wind, insect infestations, and ice storms, periodically occur in the Acadian forest. Such events serve an important function in forest renewal and contribute to the mosaic of diverse stand compositions and age classes inherent in the Acadian forest. Very often, disturbances open up small gaps as one tree or a small group die or are blown over. Other times, the entire stand is replaced (i.e. a ‘stand replacement’ event), perhaps the result of a hurricane or intense fire. Just how often did stand-replacement fires shape the natural forest condition? Only two natural ignition sources existed: (1) fire use by the Mi’kmaq; and (2) dry lightning strikes. Very little is known about the relationship of Mi’kmaq people with wildfire. Titus Smith spoke of the “habits of the Indians, who carefully avoided setting the woods on fire” (Smith 1835). Lightning-caused forest fires were relatively infrequent, with only ~ 3 % of fires reportedly caused by lightning in NS (NS DNR 2009). While lightning strikes are common, most of them are followed by heavy rainfall, thereby curtailing potential wildfires. ‘Dry lightning’ strikes are less common, and most strikes do not cause fire though they may splinter a tall tree into astonishingly tiny shards and splinters. Dry lightning strikes are more frequent in drier climatic regions, such as the boreal forest, or at higher altitudes, such as the Rocky Mountains, where a single electrical storm can cause multiple wildfires. Natural fire regimes vary widely across North America. Research shows that the Acadian forest prior to European interventions was characterized by some of the longest fire-free

How is any of this historical information pertinent to today's forest management practices? The cornerstone to 'ecologically-based' forest harvesting is to lessen its impacts by more closely approximating natural disturbance events. The harvest practice of clearcutting more closely mimics a stand-replacement wild-fire event (although the effects are not identical), while partial harvests emulate small blow downs or tree mortality caused by insects or diseases. Thus you can see why it is important to accurately define the natural disturbance dynamics that characterize Acadian forests.

Since clearcutting is the preferred harvest method (being the cheapest), industry finds it is in their best economic interest to declare that large portions of Nova Scotia are 'naturally' predisposed to frequent, stand-replacement events. In the absence of published and peer-reviewed scientific research, an astoundingly large percentage of the province is declared to operate under 'frequent' stand replacement natural disturbance cycles, which give rise to younger, even-aged forests. In the absence of objective academic research, historical references on wildfires have sometimes been misquoted, with the human causes of these fires downplayed or omitted. The "Guide to FSC Certification" (MTRI 2011) nonetheless states that "*as natural disturbances in the Acadian Forest are mostly small and frequent, harvesting based on natural disturbance should usually create only small gaps in the forest canopy, as might be created by the death of one or several trees. [] Large natural disturbances were historically rare...*".

Nova Scotia's human-altered fire regime shares a similar fate with other regions within the Acadian forest in PEI, NB and Maine. From forest ecology research completed in eastern New Brunswick, I concluded that vast forest tracts dominated by old-growth hemlock-red spruce-white pine were rapidly transformed in as little as 200 years to forest types dominated by young stands of low quality jack pine-aspen-black spruce; the agent of change was human-caused fire (Crossland 2006). Short cutting rotations of 40-60 years continue to be 'justified' based on perpetuating modern day forest stands that are adapted to repeated fire (ignoring the inconvenient truth that humans caused the fires that created such stand types).

We must insist upon using more peer-reviewed, science-based evidence (mixed with healthy portions of common sense and ecological deduction) to guide forest harvesting. Historical forest ecology provides clear evidence that NS forests were dominated by late-successional, shade-loving species of hemlock, sugar maple, red spruce, yellow birch and beech. Such species are highly sensitive to fire and could not survive the new disturbance regime created by our ancestors. Furthermore, forests were dominated by much larger trees and older growth stands than presently (Mosseler *et al.* 2003). To achieve such conditions, long intervals between intense disturbance events were necessary. Recent scientific research indicates that the key agent of forest disturbance was perhaps not fire at all, but high wind events (Seymour *et al.* 2002; Ponomarenko 2009).

Wise management of Nova Scotia forests for the future requires an accurate understanding of our past and a more science-based analysis of Acadian forest disturbance dynamics using a variety of research methods.

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