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Early Fire History near Seguin Falls, Ontario

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Introduction

This report is one of a series of site-specific fire histories being developed for red oak (*Quercus rubra* L.)-pine ecosystems in central Ontario. Collectively, these studies document the role of fire in upland oak forests. This information also provides an ecological basis for developing silvicultural prescriptions that use prescribed burning to promote oak regeneration, and to maintain or restore fire dependent forests by emulating natural disturbance processes. A fire history from old white pine (*Pinus strobus* L.) stumps is presented for an oak-mixed hardwood-conifer stand near Seguin Falls, Ontario for the period 1656 to 1861.

Methods

The study site is about 0.5 km² in area and is located just south of the Seguin River (45° 24' N, 79° 39' W), 30 km northeast of Parry Sound, Ontario. The area is surrounded by low hills and level areas at an elevation of about 300 m.

Fire scars were dated for cross-sections cut from 15 white pine stumps in a mixed hardwood-conifer forest using sampling and dendrochronological methods reported by Guyette et al. (1995). The site ring-width chronology was dated in absolute time with a nearby (85 km east) white pine chronology derived from old, living white pine at Dividing Lake, Ontario. In addition, the Seguin Falls chronology was crossdated with a white pine chronology from Bracebridge, Ontario (Guyette et al. 1995). The computer program, COFECHA (Holmes et al. 1986), was used to correlate ring-width series and ensure the accuracy of both relative dating among the samples and absolute dating of the site chronology. The average length of a ring-width series was 138 annual rings. The average between tree correlation was 0.47. Fire scar years were identified and combined to produce a composite fire scar chronology. FHX2, a tree-ring fire history program (Grissino-Mayer 1996), was used to graph the fire chronology.

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Results and Discussion

The fire chronology for this site covered the period 1656 to 1861 (Figure 1). The mean fire-free intervals (MFI) were: 24 years for the period 1656 to 1740, 10 years between 1741 and 1779, and 70 years between 1780 and 1849. These fire-free intervals represent maximum estimates of the true intervals because some fires may not have scarred any of the sample trees. Some charcoal was mixed with the soil around all the sample stumps and layers of it were present in some of the soil profiles.

The period of most frequent burning at the Seguin Falls site, which begins in 1741, parallels that of another fire history site near Bracebridge, Ontario, 50 km to the southeast (Guyette et al. 1995). Fires occurred at both sites in 1741, 1744, and 1761. In addition, a fire occurred in 1741 near Papineau Lake (Dey and Guyette 1996a) 145 km east of Seguin Falls. This coincidence of fires in the same years may be the result of a combination of climatic and anthropogenic factors. Drought may have been a factor contributing to fires that burned extensively throughout central Ontario in 1741 and 1744. White pine ring-width chronologies from Seguin Falls, as well as Dividing Lake, Bracebridge, Swan Lake, Jocko Township, Hobbs Lake, and Papineau Lake have narrow rings in 1741 and 1744 indicating a regional drought in those years (Guyette and Dey 1995, Guyette et al. 1995, Dey and Guyette 1996a,b).

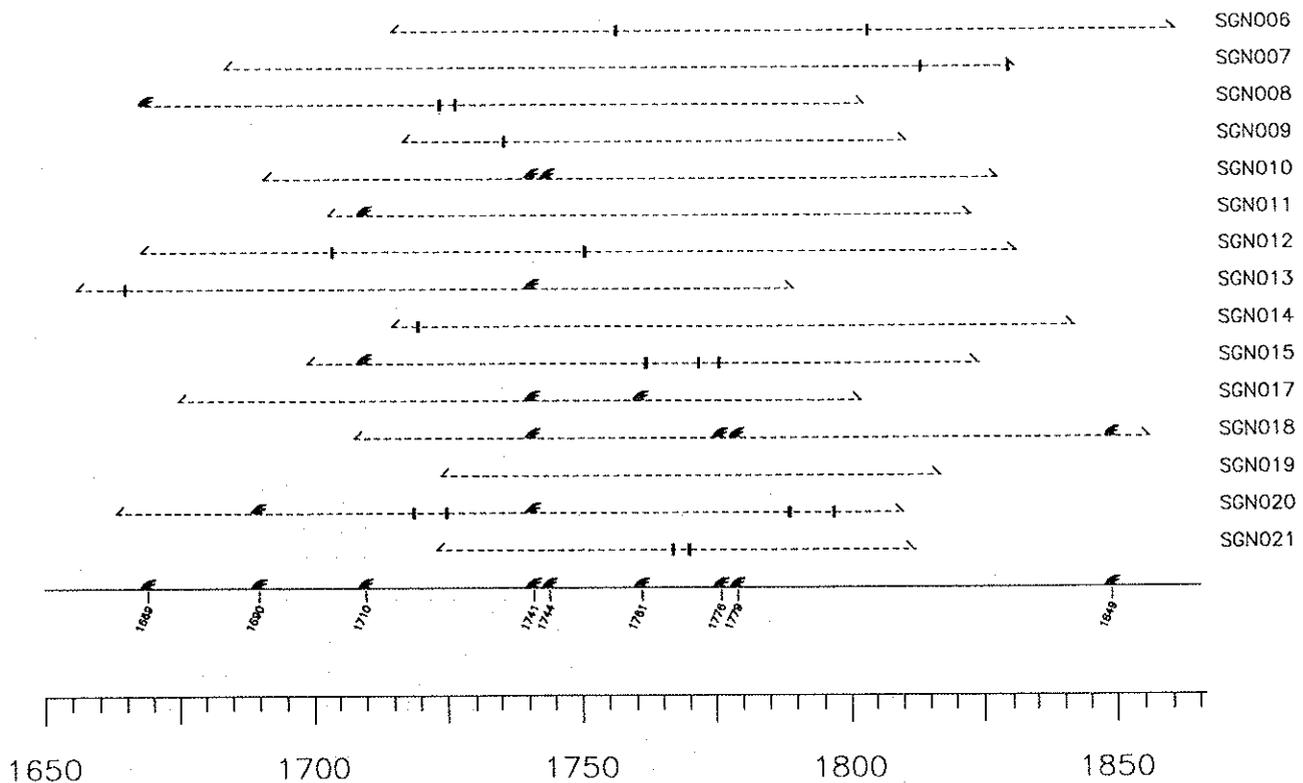


Figure 1. Time lines of dated white pine cross-sections and their associated fire scars and injuries. A composite fire chronology is given at the bottom. Flames indicate fire scars. Vertical bars indicate injuries that may or may not have resulted from fires. Vertical lines at the beginning of the time lines indicate pith dates with approximate germination dates. Slanted thin bars indicate inside and outside ring dates of the sample.

During the 17th and 18th centuries, the frequency of fires near Seguin Falls was likely influenced by the surrounding topography and distribution of lakes. Although the site is somewhat insulated from the spread of fire by the several small lakes less than 3 km to the west and northeast, there are large areas of nearly level land to the north and south. Fires could spread rapidly through these level areas, especially during major droughts, which would have dried the ground fuels even in bogs and swamps.

Humans probably affected the fire history near Seguin Falls. Native peoples no doubt used the Seguin River as a travel corridor, and thereby contributed to the frequency of ignitions near the study area. A large (> 16,000 people) and highly mobile population of Iroquois occupied an area to the south of the Seguin River (Harris 1987). Travel through the study area increased when the Hurons traded corn and European goods for furs with the Nippissings and other nations throughout central Ontario. Within 30 km of the study site, Ojibwa villages of up to 500 people were located along Georgian Bay in the present day Parry Sound area. Anthropogenic ignitions probably increased during periods when people lived closer to the study area and travelled through it more frequently.

Long before the first loggers and settlers arrived in central Ontario, the area was being extensively exploited for fur-bearing mammals, such as beaver. Beaver abundance depended primarily upon the biomass of young hardwood trees and sprouts (e.g., aspen), which are most abundant after disturbances such as fire. The relationship between fire and condition of beaver habitat has been documented and discussed by several authors (Patric and Webb 1953, Rowe and Scotter 1973, Wright and Bailey 1982). With the growing importance of the fur trade in the 1700s, fire probably was used by indigenous people and French fur traders to improve beaver habitat, as well as that of other mammal species used for food, clothing and shelter (Pyne 1982).

During the mid-18th century, the Michilimackinac District, in which the Seguin Falls site lies, was one of the leading fur production regions of all the French trade districts in Canada (Harris 1987). The increased fire frequency at the Seguin Falls site between 1740 and 1755 may be attributed to its proximity to a major travel route that connected the fur trade districts of the west with Montreal.

In addition, war and conflict have often resulted in extensive wildland fires (Pyne 1982). Competition during the fur trade era led to heightened conflict among the French, English, and indigenous peoples that may have resulted in the abrupt increase in fire frequency around 1740 at the Bracebridge and Seguin Falls sites.

Conclusion

A fire chronology was developed for an oak-mixed hardwood-pine site near Seguin Falls, Ontario for the period 1656 to 1861. Mean fire-free intervals for selected periods varied from 10 to 70 years, but averaged 22.8 years for the entire chronology. The period of most frequent fires (MFI=10 years) was 1741 to 1779.

Man-caused fires were probably largely responsible for the variability in fire occurrences. The Seguin River and surrounding area were used as travel routes and village sites by Native peoples. Trade between the Huron, Nippissing and Ojibwa nations, among others, affected the fire regime at Seguin Falls, especially during the fur trade era (circa 1600s to 1800s). Conflict among First Nations, and French and English fur traders may have resulted in the increase in fires at the study site beginning in the mid-1700s. Similar trends in fire activity have been observed at other nearby sites in central Ontario.

Topography and distribution of lakes also influence fire frequencies. Large relatively level areas with few lakes usually have high fire frequencies because individual fires burn extensively, especially in drought years. In contrast, fires in areas of rugged terrain and/or with an abundance of lakes are limited in size and this increases the variability in fire frequencies between sites. During the period of 1741 to 1779, increased fires occurred throughout central Ontario, including the Seguin Falls, Bracebridge and Papineau Lake areas, likely due to drought.

This fire history study showed that fire was the major disturbance agent in an oak-hardwood-pine forest near Seguin Falls. Managers should consider prescribed burning to maintain or restore these fire-dependent forests. The exclusion of fire has altered natural ecosystem disturbance processes, and has resulted in the conversion of these forest to more shade tolerant species such as sugar maple (*Acer saccharum* Marsh.).

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