

# EXTENSION NOTES



## FOREST HISTORY IN EASTERN ONTARIO

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A few centuries ago, eastern North America was covered by deciduous forests. Similar forests once grew in western Europe and eastern Asia. Because of extensive logging and land clearing, only scattered remnants of these original forests remain.

While this Extension Note describes the historical forests of eastern Ontario, forests throughout southern Ontario were shaped by similar geological and climatic changes and the impact of settlement was virtually the same.

### BACKGROUND

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The type of forest which grows in a specific area is strongly influenced by the bedrock, glacial deposits and soil found on the site. A variety of geological influences are evident in eastern Ontario.

In the Brockville-Gananoque-Kingston areas, Precambrian Shield can be found. This Shield is made up of some of the most ancient rock on earth — nearly four billion years old. Once Himalayan in scale, the Shield has



Photo: National Archives of Canada

eroded over time to its present condition. Composed of granite and gneiss-type rocks which produce thin, acidic soils, the Shield has served to prevent the spread of agriculture.

The remainder of eastern Ontario is underlain by sedimentary rocks which are from the Paleozoic era. These rocks are much younger than the Precambrian bedrock and are about half a billion years old. The fossil evidence found in these sedimentary rocks, composed mainly of sandstone and limestone, indicates that they

were formed at a time when shallow, warm oceans covered much of eastern North America. These rocks produce soils which are neutral to alkaline.

There are numerous physiographic regions of eastern Ontario, with specific soil characteristics, which have been shaped by the underlying bedrock. These include: Precambrian Shield overlain with shallow till, Shield with clay deposits, limestone plains, till plains, clay plains, sand plains and drumlin fields. Different physiographic regions would result in a variety of forest types.

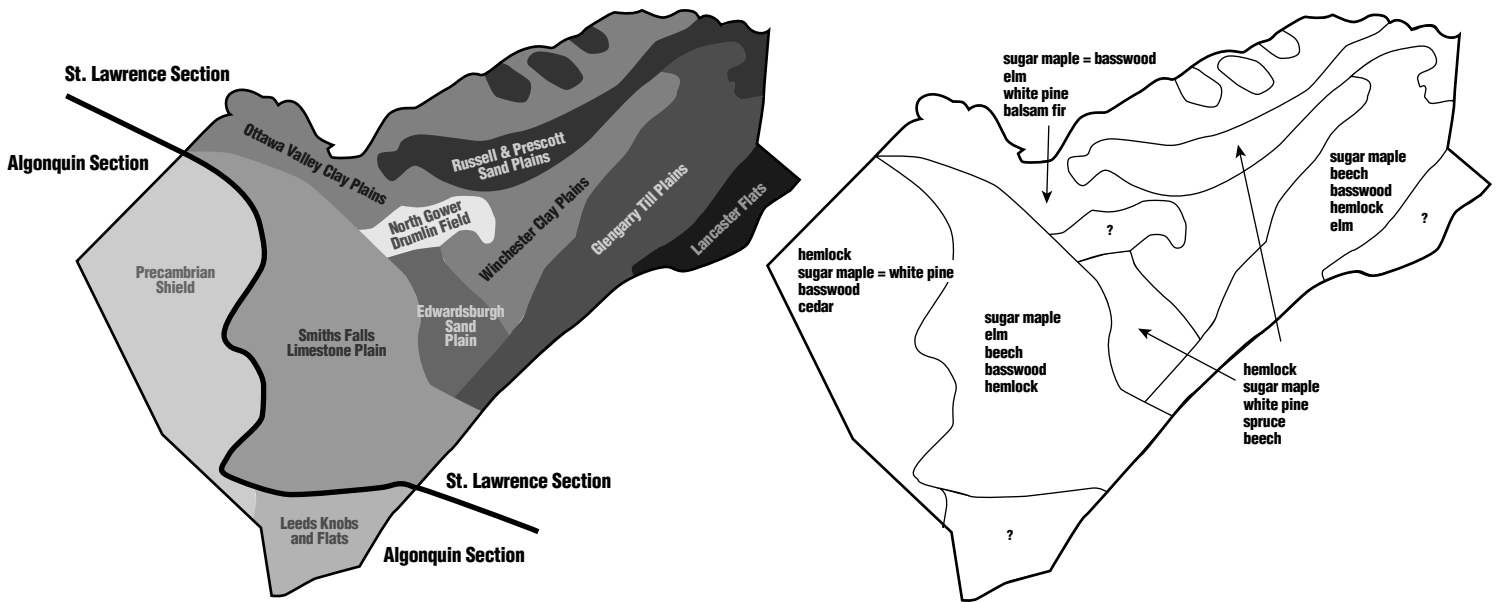
## PHYSIOGRAPHIC REGIONS

<b>Precambrian</b>	Ridges of Precambrian bedrock, composed of granite and gneiss, may be exposed or covered by deposits of shallow till.
<b>Leeds Knobs and Flats</b>	Flats of clay lie between the knobs of granite and other Precambrian rocks. Where the soils are deep enough, agriculture is practised.
<b>Smiths Falls Limestone Plain</b>	This is the largest and most continuous tract of shallow soil over limestone in southern Ontario. Due to the gentle gradient, the drainage is poor and wetlands are numerous. The only areas of deep soil occur on old marine beaches.
<b>Edwardsburgh Sand Plain</b>	The bedrock and most of the boulder clay are covered by sand. The sand surface is largely level but slightly undulating in some areas. The soils are acid and deficient in nutrients.
<b>North Gower Drumlin Field</b>	This area features drumlins on a clay plain. Although the drumlins are well-drained, the surrounding clay soils are low and wet.
<b>Glengarry Till Plain</b>	The undulating to rolling surface consists of drumlins with clay flats. The loamy till is often less than eight metres deep, but does reach a depth of 30 metres in some places. The most noticeable feature of this till plain is the stoniness.
<b>Winchester Clay Plain</b>	This area is low in relief and is generally poorly drained. Where drainage is adequate, these clay soils are very productive agricultural areas.
<b>Ottawa Valley Clay Plain</b>	This clay plain is interrupted by ridges of rock and sand. The proportion of acid soil is greater than in the Winchester Clay Plain. When artificially drained, these soils are highly productive.
<b>Russell and Prescott Sand Plains</b>	These large sand plains which are old deltaic deposits vary in texture from coarse in the north to fine in the south. These soils are well drained and reach a maximum depth of nine metres.
<b>Lancaster Flats</b>	The surrounding till plain has been buried under water-laid deposits of clay and sand. The soils in this lowland are poorly drained.

## RECONSTRUCTING FORESTS FROM THE PAST

The most dramatic change in forest cover in eastern Ontario has occurred in the past two centuries. Most of the original forest was used in the lumber trade or for manufacturing potash, and the land was then converted into agricultural production. As a result, there is very little old-growth forest in the region.

To gain insight into forests from the past, researchers draw on three main sources of information: pollen analysis from lake sediment, historical documents such as letters describing the landscape, and descriptions of existing old-growth forest remnants.



Physiographic regions of the Eastern Ontario Model Forest Region (from Eastern Ontario Forest Resources Stewardship Council 1992).

Tree species in upland forests prior to European settlement. For each region, the five species most frequently mentioned in surveyors' notebooks are listed in order of abundance.

## GENERAL HISTORICAL FOREST PATTERNS

As the last ice age retreated from eastern North America 10,000 to 15,000 years ago, trees began to spread northward. The weight of the ice cap depressed the land and, as the ice melted, eastern Ontario was flooded by the Champlain Sea. The land rose slowly, and the retreating sea exposed deposits of sand, gravel and clay. The early plants, which grew on these barren areas, were tundra-like species: willows, grasses and sedges intermingled with birch, alder and juniper. These gave way to spruce and poplar woodlands. As the climate continued to warm, other coniferous tree species from the south like pine and hemlock moved northward. Over time, deciduous varieties replaced them and became the dominant trees in the landscape. The various types of bedrock and soils determined the local distribution of these tree species. This process continues today in the Arctic, in areas where glaciers are still retreating.

When it comes to researching historical forests, scientists rely heavily on pollen evidence found in lake sediment to reveal a true picture of the past. Pollen is produced by plants on an annual basis as part of their reproductive cycle. Each plant has a very distinctive pollen "fingerprint" which allows researchers to identify the various tree species present at a given time. Each year pollen from trees and plants falls into

lakes and sinks to the bottom where it's covered by sediment. By taking a core sample of this sediment, and identifying the grains of pollen, scientists are able to date and reconstruct the history of the forests.

Pollen samples indicate that just after the last glaciation, around 11,000 years ago, eastern Ontario was sparsely vegetated by a herb-shrub tundra. This eventually was replaced by a mixture of dwarf shrubs with spruce. About 9,500 years ago, a coniferous forest of pine covered the region. Then around 7,500 years ago, there was a shift to hemlock-dominated forests with mixed hardwoods. The pollen research shows that a major event occurred about 5,000 years ago when hemlock trees died off. This die-off was widespread throughout eastern North America and was likely due to a rapidly spreading disease. With the decline of hemlock, there was an opportunity for hardwood to increase in abundance. Then about 3,500 years ago, hemlock began to recover and oak started to decline.

Pollen analysis shows a dramatic drop in tree pollen in the last 150 years as the forest is cleared for logging and agriculture, and weeds invade the landscape. Ragweed pollen increased in abundance so dramatically that it is used as a marker separating European settlement from previous history.

The one drawback of palynological data is that lakes accumulate pollen from a large geographic area making it difficult to obtain information on a specific region from lake pollen. To get information on a finer scale we must look to other sources such as historical papers and references. Early newspapers and settlers' journals or letters provide some impressions of the nature of the forests that Europeans found on arriving in eastern Ontario. But since European settlers were far more interested in removing the trees than in noting their qualities and composition, historical accounts of the forests are sketchy and often negative.

“There is something in the ponderous stillness of these forests — something in their wild, torn, mossy darkness, their utter solitude and mournful silence which impresses the traveler with a new aspect each time he sees them,” wrote an early settler of Lanark County. “In Upper Canada, the endless hills of pine give way at least, or at most, stand thinly intermingled with gigantic beeches, tall hemlocks and ash, and underwood of maple, birch and wild sycamore.”

As surveyors of the Crown began laying out the boundaries of counties and townships in the late 1700s, they described the vegetation, water bodies, topography and soils. However, the quality of these early records does vary. Depending on the time of year, tree species identification was often difficult, and cold weather discouraged note-taking. But the surveyors' information does give us a snapshot of species found in a specific location. For example, surveyors' notes from this era show a range of nine tree species found on till plains, and up to 19 species



Rough estimates of standing timber were made prior to cutting the original forest.

found on clay plains. There are seven species which occurred in all physiographic areas: sugar maple, beech, elm, basswood, hemlock, cedar and ash. In lowland areas, alder, ash, tamarack, spruce, white oak and willow were evident.

Another method used to determine what historic forests looked like is to examine older tracts of existing woodlands and assume that they represent the original forests. Since eastern Ontario has been so thoroughly disturbed by settlement and agriculture, there is little evidence of old-growth forests. A few mature stands, which exhibit characteristics of old-growth forests, can be found in areas of Renfrew County and Frontenac County.

## PRE-EUROPEAN SETTLEMENT

The human impact on the forest of eastern Ontario can be grouped into three main eras: pre-European, post-European settlement and logging. Although archaeological and historical data on indigenous people is limited, we do know that the Algonquins and St. Lawrence Iroquois were the main groups who lived in eastern Ontario. The Algonquins settled along the Madawaska River and the South Nation River. Although there is some evidence that they did create small fields which were planted with corn, beans and squash, the impact on the forest was minimal as they were mainly hunter-gatherers.

The Iroquoian settlements were located along the St. Lawrence River. By 1350 A.D., the natives had developed an agriculturally-based society and had cleared land around their settlements. Indigenous people throughout much of eastern North America often used fire to remove trees for their crops.





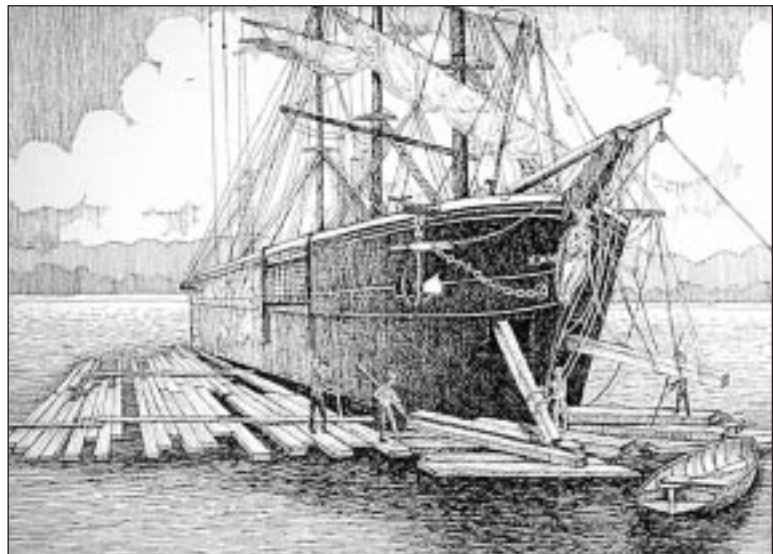
Team of horses pulling sleigh-load of logs.  
Opeongo, Ontario. March 1920

## POST-EUROPEAN SETTLEMENT

The first Europeans explored Ontario in the late 1600s. Along with the fur traders, a small number of settlers came to Canada. During the next century French and British armies fought for control of North America. One of the biggest influx of settlers to eastern Ontario came in the late 1700s following the American War of Independence.

Ten thousand United Empire Loyalists, who were loyal to the British Crown, fled the United States after the war. Land along the St. Lawrence River was settled first.

In 1800, the Rideau River still formed the northwestern boundary of the settled lands. As settlement continued to move northwest and the best land for agriculture had been claimed, settlement roads extended to the edge of the Precambrian Shield. In 1856, the Hastings Road was opened northward into the Shield region and the Mississippi Road extended east into Lanark County. By the late 1800s, so much forest land was gone that many farms were not able to meet their own needs for fuel and construction wood.



Loading squared timber on a ship bound for Europe.

## LOGGING

The beginning of the 19th century saw logging companies hard at work in the Ottawa Valley, and cutting accelerated in the 1800s when the Napoleonic Wars blocked access to the traditional British timber sources in the Baltic areas. White pine was in demand while hardwoods were viewed as mere obstacles in the way of harvesting the pine. Trees were felled, squared, and floated down rivers and assembled into large rafts and floated to Montreal for export to Europe.

In 1845, the upper Ottawa River watershed was the source of more than 12 million cubic feet of squared pine timber. Eastern Ontario was the source of an additional several million cubic feet. In the mid-1800s, up to 7,000 raftsmen were employed in the lumber trade along the Ottawa River.



Photo: National Archives of Canada

A square timber raft in the Ottawa River at Nepean Point. c. 1900.

## CONCLUSION

By the 1880s, only 20 to 30 percent of eastern Ontario was covered in forests. Although revenue from the forest resource was used to build the province's infrastructure, there were many detrimental environmental effects. Rapid exploitation of the forests resulted in soil erosion, reduced water quality and a reduction in the amount of water available. In this century, there has been a small recovery in the amount of forest land in eastern Ontario. With a decline in agricultural activity following World War II, natural regeneration has occurred on marginal farmland. As well, the provincial government, in conjunction with municipalities and volunteer organizations, has put significant effort into reforestation in the region during the past fifty years. As a result, forest cover in eastern Ontario is now estimated at about 38 percent, a level which should remain stable into the next century.

The following information will further assist you to understand the features of Ontario's original forests:

- Extension Note *The Old-Growth Forests of Southern Ontario*
- Extension Note *Restoring Old-Growth Features to Managed Forests in Southern Ontario*
- Extension Note *Do You have a Healthy Woodlot?*
- Keddy, Cathy. *Information Report No. 1: Forest History of Eastern Ontario*. Eastern Ontario Model Forest. 1994.

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