

**Mount Allison**  
Dendrochronology Lab

THE VAL COMEAU CANOE:  
Construction Date

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## Abstract

The goal of this project was to establish an eastern white pine chronology for New Brunswick to date a historical First Nation's dugout canoe. Sites were sampled around the central and northern regions of New Brunswick, as well as the eastern coast to create a master chronology extending back in time 324 years. In the end however, the New Brunswick chronology did not match the canoe's chronology, so it was extended as far back in time as possible using Nova Scotia chronologies. One of the chronologies used to extend the date was from an Acadian sluice found in the Grand-Pré region. This sluice provided a growth range from 1686 back to 1413, which was in the approximate range from the carbon date retrieved on the canoe. The growth patterns exhibited in the sluice chronology had a strong visual match to the canoe chronology. After the Grand-Pré sluice was locked in time using other Nova Scotia chronologies, a fell date for the tree used to construct the canoe was determined to be 1557. There are some regional variations exhibited between the modern day Nova Scotia and New Brunswick chronologies, indicating that the canoe may have moved to the Val Comeau location over time, and that the tree used to construct the canoe may have grown nearer to the Cumberland Basin area of Nova Scotia.

## **Introduction**

During the summer of 2003, a dugout canoe was discovered slightly buried on a beach in Val Comeau. It measured approximately 4.8m long and has been identified as one of the few large First Nation's artifacts to be found in New Brunswick. The canoe is now kept at the Provincial Museum where it is undergoing a preservation technique. The Museum has had the artifact dated through a radiocarbon process, and the age has been determined to be approximately 440 years  $\pm$  50 years.

The purpose of this research project is to determine the exact age of the canoe so that the museum can determine whether the canoe is pre or post contact. To accomplish this goal, a dendrochronological analysis was undertaken on the wooden structure. The Mount Allison Dendrochronology Lab (MAD Lab) had been contacted to date the canoe using a master chronology of tree-ring growth that extended far enough back in time to the period of the construction of the canoe. Once a base chronology was constructed, the lab hoped to match the patterns of growth between the canoe and the master chronology to provide an annual resolution date of when the wood was cut to build the canoe.

## **Sampling Sites**

Samples were taken from sites on the eastern, central and northern areas around New Brunswick, from live and detritus trees, as well as old structures. Past chronologies were also used from both New Brunswick and Nova Scotia to try and help crossdate the canoe. Figure 1 shows the locations of the sites used in this study throughout the two provinces. Structures were key components within the sampling strategy because both provinces have very little old growth forest left which limits the possible recorded length available from live trees. These older structures provide representative examples of the radial growth pattern from what would have been the areas of old growth forests, if they were standing today. The field work portion of this project was undertaken throughout the summer and fall of 2007.

The New Brunswick sites include the Val Comeau area where the canoe was found, Powell Barn (07BGS400), Gucci Pines (07BRL400), Sheephouse Falls (07BAD400), Haute-Aboujagane (00AL400), Babineau Farm (05OS400), Jardine (07BCL400) and Fredericton (07BKL400). The Nova Scotia sites include the Grand-Pré site, NS Government House, Sporting Lake (06AKL400) and the Old Meeting House (06LS400).

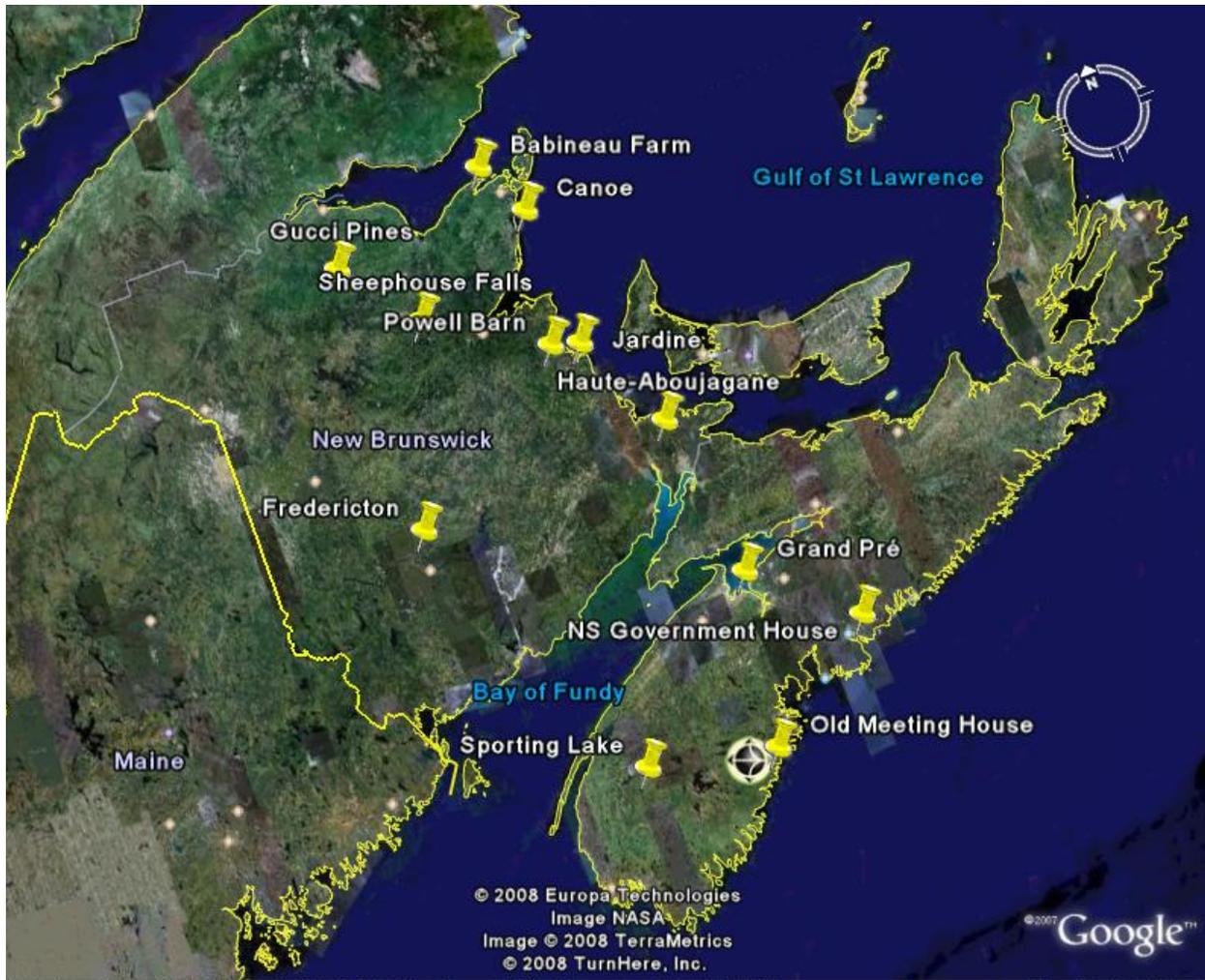


Figure 1: Location of the study sites and associated chronologies used to crossdate the canoe.

## Methods

Before initiation of the preservation techniques on the canoe at the New Brunswick Provincial Museum, three cores were taken: one from the bow, one from the stern and one from the center of the canoe (Figure 2). One of the cores was used to identify the wood species (Core #07A001) which was determined to be eastern white pine (*Pinus strobus* L.) (MAD Lab Report 2007-01). The other two cores were used to determine the number of years available to be used for crossdating (MAD Lab Report 2007-07). These other two cores were averaged to create a chronology for the canoe so that the growth patterns could be matched against any white pine master chronology that was created.



Figure 2: Sampling the canoe at the stern of the craft with a standard increment corer at the New Brunswick Provincial Museum.

Samples were taken from three live sites, nine structures (only one of which was built of white pine logs) and one detritus site throughout New Brunswick. At each site, samples were retrieved using an increment borer with a diameter of 5.1 mm (Figure 3).



Figure 3: An example of a sample being extracted from a live tree using an increment borer.

At the Jardine site, a half set (10 trees with 2 cores from each tree) was sampled from a white pine stand located near the water of an inlet from the Northumberland Strait. A full set (20 trees with 2 cores from each tree) was sampled at the Fredericton site which consisted of a white pine stand growing on a slope near the roadway and the Saint John River. At the final live site, Gucci Pines, a full set was sampled from a mixed forest in northern New Brunswick with the pines growing on a rocky ridge area. The Powell Barn was thought to be built in the 1850's out of large, roughly hewn white pine logs, with three inch upright planks on the walls pegged into the main beams. Eleven of the beams were sampled, chosen according to their structural integrity (i.e., absence of rot and presence of bark) (Figure 4). At the Sheephouse Falls site, there was one felled large detritus tree that was sampled.



Figure 4: Structural beams available to be sampled from the Powell Barn used in the construction of the New Brunswick master chronology

Samples were stored in plastic straws and transported back to the lab to be prepared for analysis. Each core was glued into mounting boards, lining up the cells so that the radial sections were visible. The boards were then sanded through successive rounds of sandpaper up to 600 grit, so that the samples were very smooth and the radial cell structures of the wood were easily visible under a microscope. The cores were then measured using a 63X light microscope coupled to a Velmex stage measuring system which measures annual tree rings to a precision of 0.001mm. Prior to further analysis of cores from the various structures, the species of all wood sampled had to be determined to be white pine by using a scanning electron microscope procedure (Figure 5).

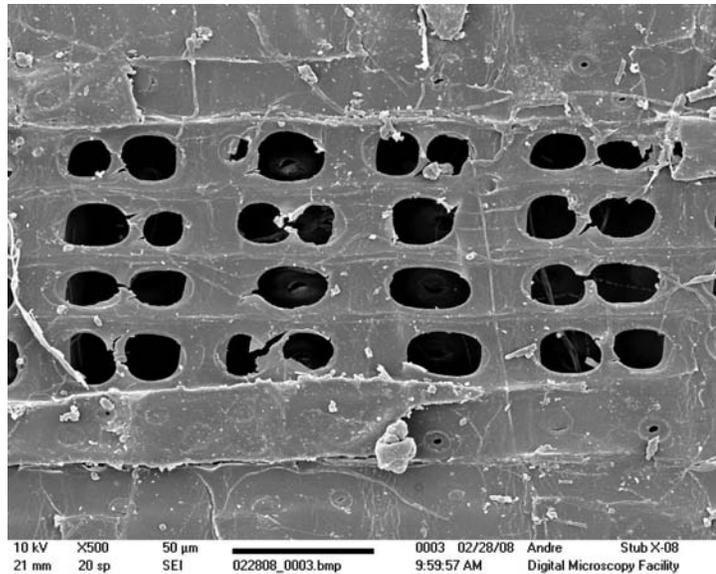


Figure 5: A radial view showing a ray with window-like pits which is distinctive of the white pine species. This sample was taken from the Powell Barn.

For each site, the samples were crossdated against each other to ensure significant correlations amongst the trees growing at a site or from the structure, as a stand of trees growing in the same location should have similar growth trends. In the end, a white pine master chronology was created from the three live, one detritus and one structure site collected during the field work portion of the project. As well, past white pine chronologies from New Brunswick including the Babineau Farm from the northern coast, and Haute-Aboujagane near the Nova Scotia border were used.

To extend chronologies as far back in time as possible, a series of chronologies from Nova Scotia were also developed. The samples used consisted of wood taken from the Nova Scotia Government House in Halifax, an Acadian sluice from Grand-Pré, a live series from Sporting Lake, and the logs from within a church at the Old Meeting House (MAD Lab Report 2006-33).

## Results and Discussion

Statistical and visual methods were used to crossdate the structural samples, and establish cut dates for each location. The construction date of the Powell Barn was determined to be 1858 (Figure 6). The year of felling of the Sheephouse Falls tree was determined to be 1952 (Figure 6). The live samples from the Gucci Pine site had growth extending over 324 years. At the Fredericton site, the trees were 144 years old, and at the Jardine site, the trees were 153 years old. The Sheephouse Falls log extended from a time period of 1952 back to 1701, and the beams sampled from the Powell Barn had growth extending from 1858 to 1683. The chronologies created from all NB sites sampled in the project extended from 2007 back to 1683 (Figure 6). The other New Brunswick sites from previous studies were used to correlate the sites developed within and around the province to help expand spatial patterns within the white pine growth signals.

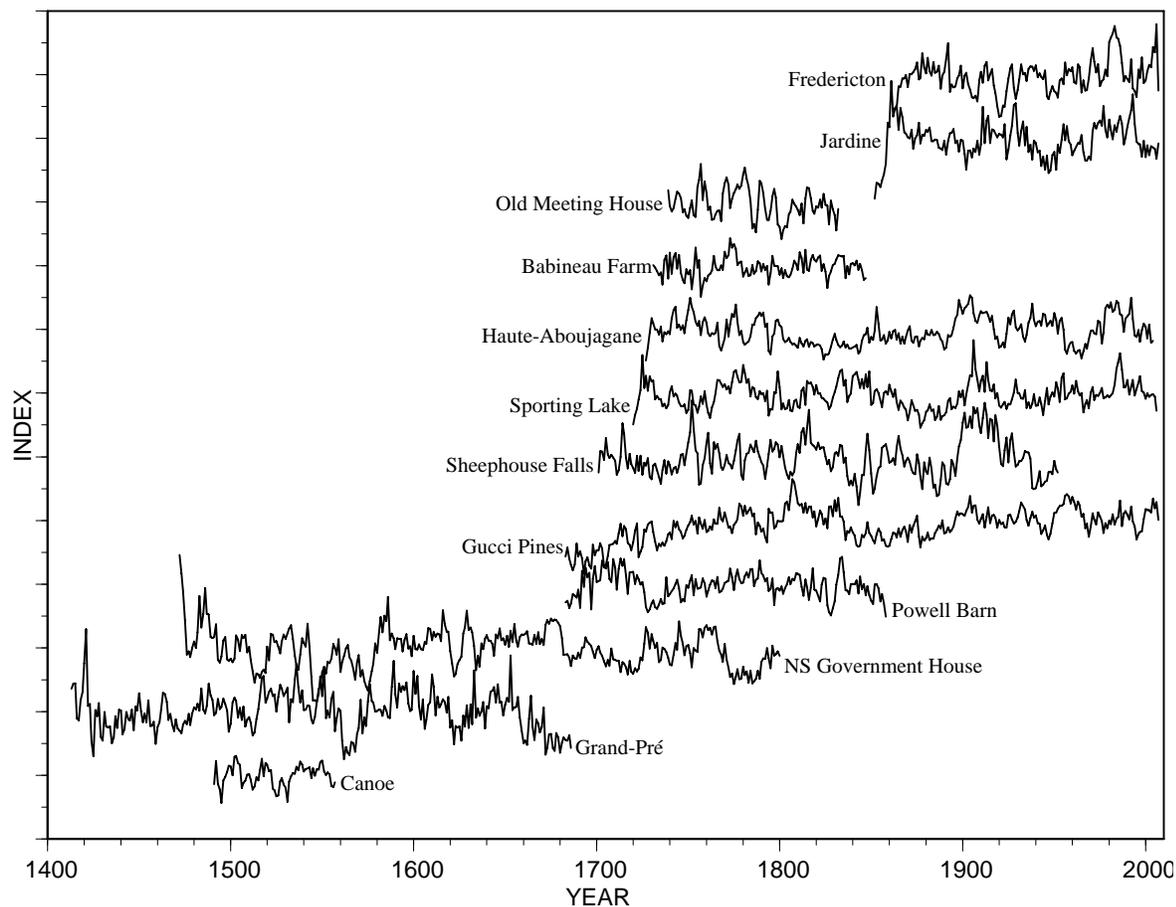


Figure 6: Individual chronologies from sites around New Brunswick and Nova Scotia used in this study.

Since master chronologies for New Brunswick did not extend far enough back in time to pattern match the canoe, efforts were switched towards the Nova Scotia chronologies. Of particular interest was a chronology from an Acadian sluice discovered in the Grand-Pré region and approximately dated using a red spruce chronology. The sluice was dated using a red spruce chronology as the sides of the sluice were made from red spruce, and assumptions at the time thought that it was highly likely that the whole structure was constructed around the same time. With this assumption made, the white pine trough part was tentatively assigned a construction date of 1686.

The growth patterns exhibited by the sluice had a very strong visual match to the canoe's growth pattern, as illustrated in Figure 7. This pattern match therefore placed the tree used to build the canoe at fell date of 1557. To back up this date, the Grand-Pré sluice chronology was further locked in time using the Nova Scotia Government House chronology and chronologies from the Old Meeting House and Sporting Lake (Figure 6).

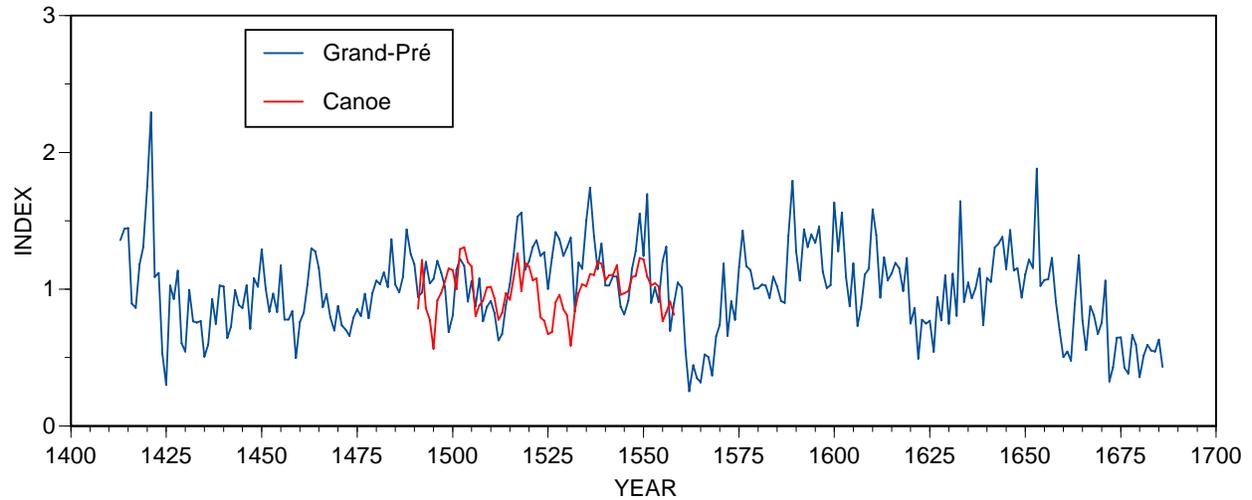


Figure 7: Pattern match between the Grand-Pré sluice and the Val Comeau canoe.

### Spatial patterning

It is interesting to note that there are some slight regional variations between certain areas of white pine growth patterns in New Brunswick and Nova Scotia. This poses an interesting question as to where the canoe may have actually originated from. If the canoe fits in very well with a pattern from the Grand-Pré region, and modern day chronologies from Grand-Pré do not match modern day chronologies from the Val Comeau region with as close a match, it is possible that the canoe wood grew in an environment more similar to the growing environment around Grand-Pré than Val Comeau. Since the watercraft in question was made for the purpose of transportation, it also follows that it is possible the canoe was constructed in the Cumberland Basin region and eventually moved to the location near Val Comeau where it was found in 2003. The only way to ever know will be to continue to search for wood from New Brunswick to help push local chronologies further back to the 1500s to see if a better match can be found in New Brunswick.

### Conclusions

Through measurements conducted by the Mount Allison Dendrochronology Lab, a master chronology was created from the samples throughout New Brunswick, as well as past white pine chronologies which extend back in time to 1683. These chronologies provided no match to the wood from the canoe.

The canoe was finally dated using a chronology from a Grand-Pré sluice which illustrated a strong visual and statistical pattern match to the canoe chronology, placing the canoe at a date of felling of 1557. The modern day patterns existing within white pine growing in New Brunswick and Nova Scotia also suggest that the tree used to make the canoe may have originated closer to the Grand Pre region, then where it was found in the Val Comeau region.