

**A Dendroarcheological Analysis of the Burpee-Bridges House,
Sheffield, New Brunswick**



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Contents

Table of Contents	2
Abstract	2
Introduction	3
Methods	4
Results and Discussion	10
Conclusion	14
References	15
Appendices	16

Abstract

The Burpee-Bridges house is a historic building in the Fredricton area. It is believed to be one of the first buildings constructed post-expulsion when a group of Americans settled the area near Sheffield. Due to the uncertainty of its age the home owner, Richard Hornsby, and Carlo Laforge requested dendrochronological dating be conducted on the house. Twenty-one samples were collected from the structure. Six were collected from the house, one from the annex and fourteen from the barn. Samples were processed and cross-dated to a regional master chronology of red spruce (*Picea rubens*). Beams from the three structures varied in age: the beams sampled from the house suggest construction in 1846/7, while the single beam from the annex came back as 1833. The barn was a mix of dates from 1762 to 1831. The range of dates is potentially due to using recycled wood in the structure from other structures and potentially from replacing beams as they rotted out.

Introduction

The Burpee-Bridges house is a designated provincial historical site, recognized for its architecture and its name sakes. The house is known as a two story Georgian/ Picturesque House (Figure 1) (Canada's Historic Places 2009). The Mount Allison University Dendrochronology Laboratory (MAD Lab) sampled the house in December of 2008 via the request from the owner Richard Hornsby and from the request of the provincial government through Carlo Laforge. The Burpee-Bridges house is thought to have been constructed soon after expulsion of the Acadians when an American group of settlers came to the Sheffield area.

The house is thought to have gone through a number of different states of construction (Figure 2). The initial structure was the barn (c.1765), and it is believed that the family lived in the structure initially due to a section of the structure that is partitioned off with lathe and plaster siding (C. Laforge. Pers. Comm.). The second section of the house to be built was the annex between the barn and the newly built old kitchen (c.1825) (C. Laforge. Pers. Comm.). The remaining portion of the house was built in the 1840s with further renovations in the 1880s. A number of boards (especially floor and sills) were replaced after a 1973 flood (Canada's Historic Places 2009).



Figure 1. Burpee-Bridges House, Sheffield, NB.

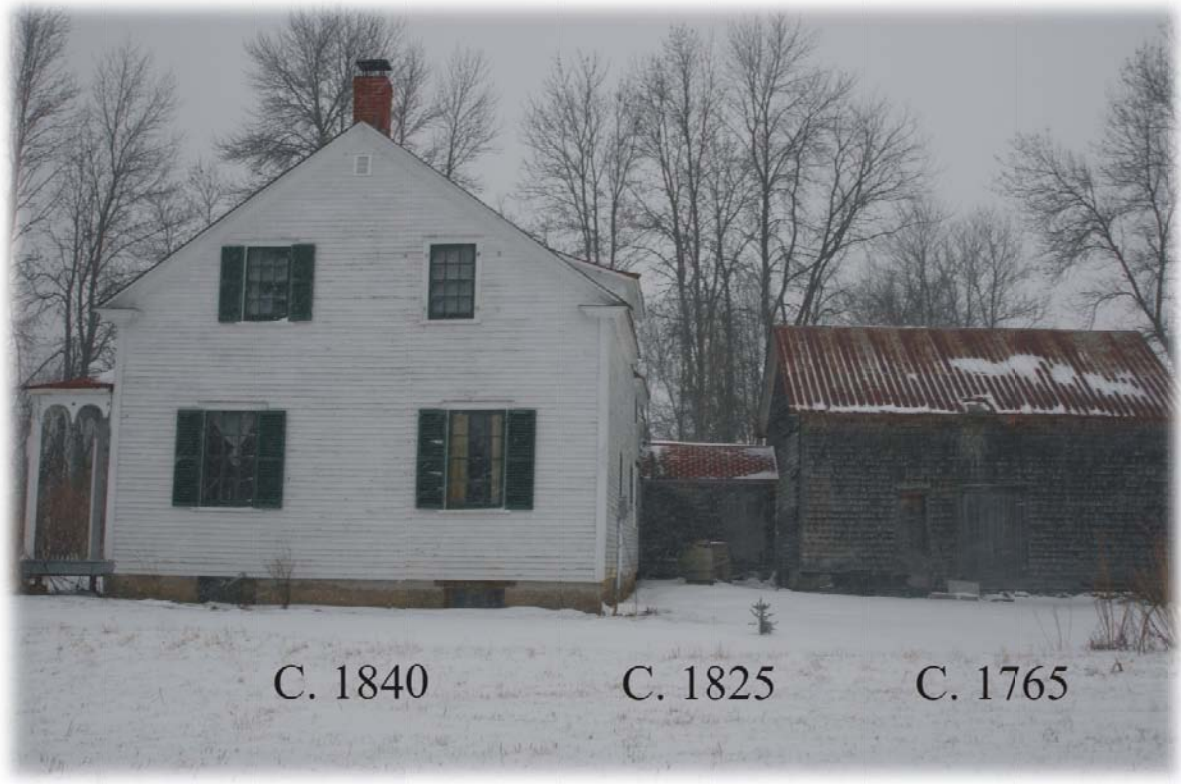


Figure 2. Side view of the Burpee-Bridges House in late 2008, with the annex and barn illustrated along with suggested construction dates of each section.

Methods

The Burpee-Bridges House is located along the St. John River, southeast of Fredericton (Lat. $45^{\circ} 53'07.73''N$, Long. $66^{\circ} 21'32.98''W$). The house is divided into three portions: house, annex, and barn. Samples were taken from each of the sections. In total, 21 samples were collected from the Burpee-Bridges house 20 cores and one cookie. Six samples were taken from the house, one from the junction annex between the house and barn and the remaining 14 were taken from the barn. Samples from the house came from a variety of rooms; the cold room, the attic (Figure 3), the room with the fireplace (Figure 4), and old kitchen closet (Figure 5). Samples from the barn came from a variety of beams that fell into four groups; large vertical beams (Figure 6), large horizontal beams, small vertical beams and small horizontal beams (Figure 7). Samples were labeled with the MAD Lab code 08BNS000 and location and condition of each sample was noted (Figure 8).

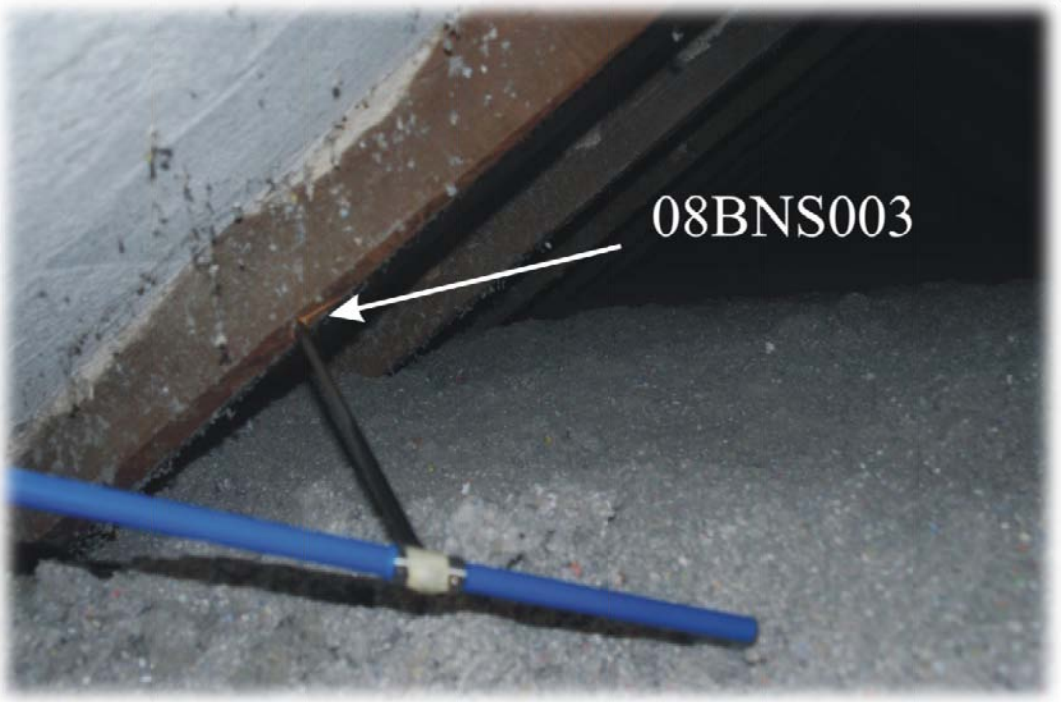


Figure 3. Sample 08BNS003 taken from the attic.



Figure 4. Sample 08BNS006 from a beam near the back door connecting to the annex breezeway from the room with the fireplace.



Figure 5. Samples 08BNS004/005 in the old kitchen wood closet next to the fireplace, both cores were taken from the same beam.



Figure 6. Sample 08BNS008 being taken from a large vertical beam in the barn. Samples 08BNS011 and 08BNS12 were taken from the large horizontal beam above 08BNS008.

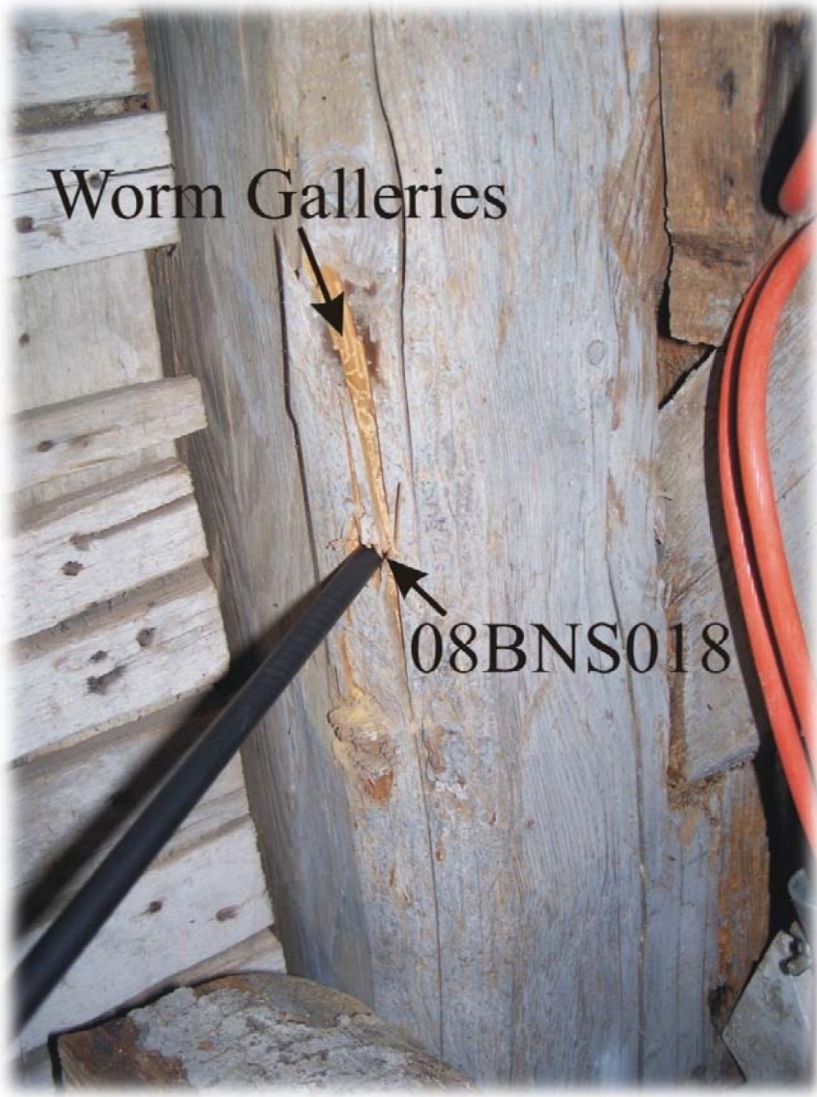


Figure 7. Sample 08BNS018 being taken from a vertical beam in the barn near the lathe and plaster section. Worm galleries near the sampling point signify that the bark/wood interface was present for this sample.

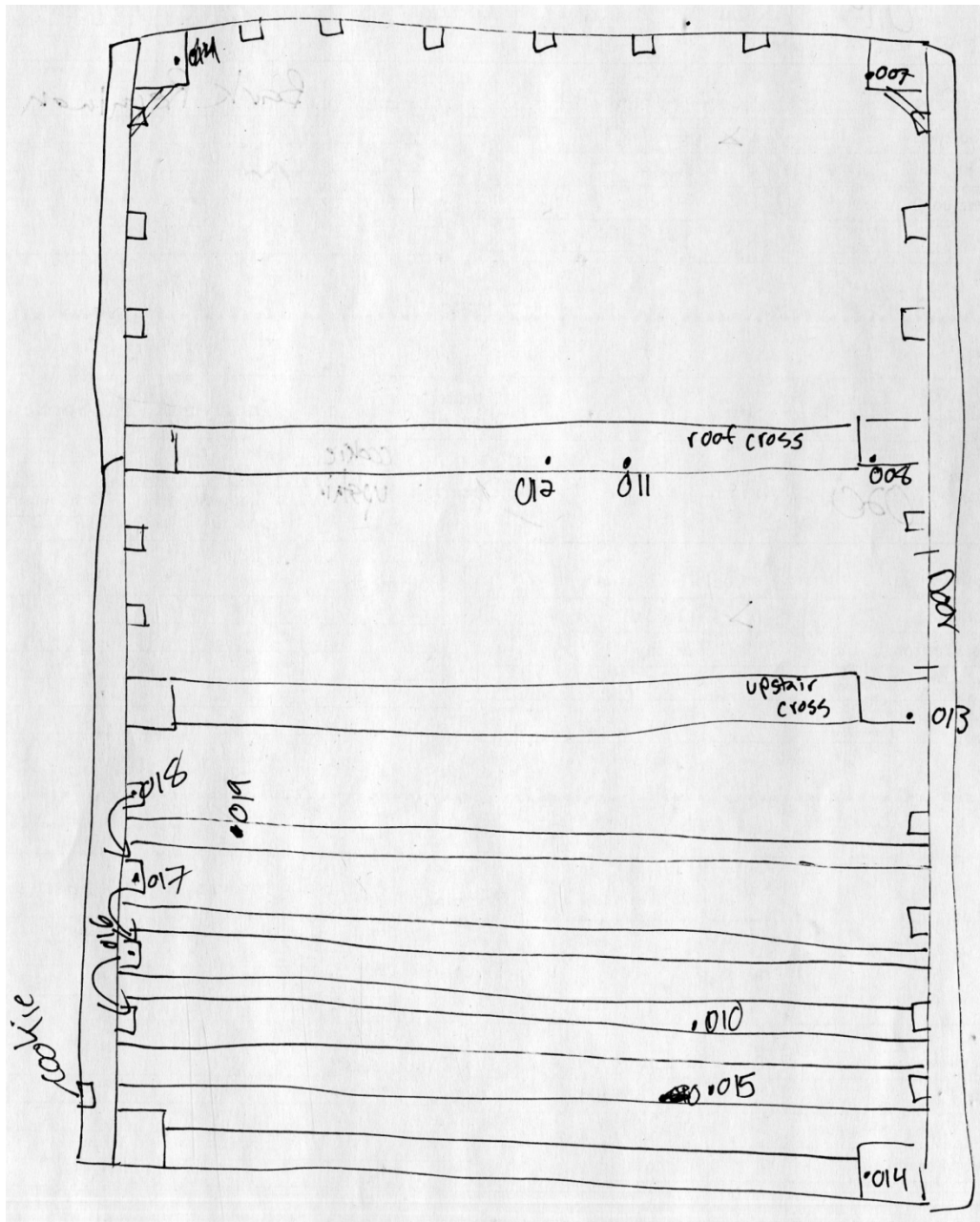


Figure 8. A hand sketched map of the barn of the Burpee-Bridges House. Numbers denote where samples were taken.

Samples were processed in the lab by mounting them in slotted mounting boards, then sanding them with progressively finer sand paper (80-400 grit) to bring out the cellular structures and annual rings of the wood. Rings were counted and measured from the bark to the pith (middle) of each core sample using a Velmex measuring system with an accuracy of 0.001mm. Not all the cores were sound (Appendix 1), some of them had broken or rotten pieces in the outermost perimeter of wood.

Time series of measurements from the house were pattern-matched to each other, thereby creating floating chronologies (chronologies that are not attached to a specific period of time).

The floating chronologies were then cross-dated to a previously established master chronology that was locked in time from the area. Cross-dating is the practice of taking the pattern of growth from one sample and comparing it to that of another (Figure 9).

To assist in the cross-dating procedure, the statistical cross-dating program COFECHA (Holmes, 1986a) was used. COFECHA uses correlation values to assist in accurately dating samples. Higher correlation values indicate that the floating chronology corresponds well to the master chronology. Lower correlation values can indicate a variety of things such as ecological or climatic variation from the norm or that the sample is inaccurately dated. The floating chronology was run against a red spruce (*Picea rubens*) master chronology available from the MAD Lab archive. Each of the floating and master chronologies was standardized to have a mean of one by using a negative exponential curve in the program ARSTAN (Holmes, 1986b). This standardization was completed to allow samples of different ages to be compared.

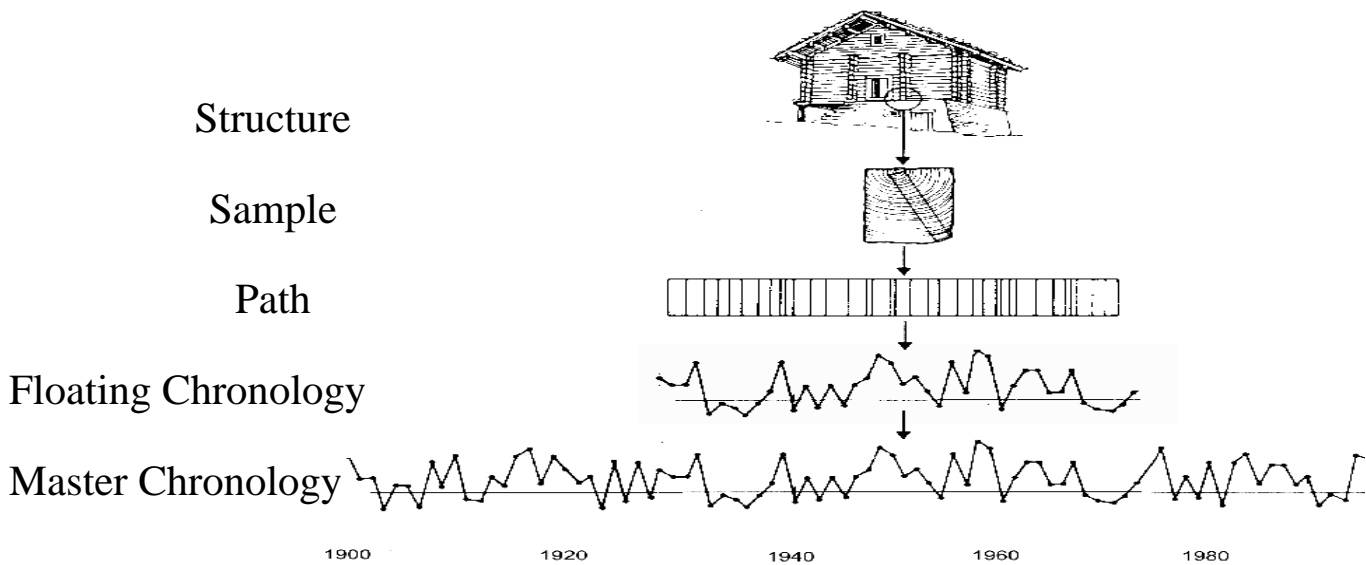


Figure 9. Example of cross-dating by using patterns from a structure (floating chronology) compared to the dated master chronology.

Results and Discussion

During initial observations of the house and barn, there appeared to be a good quantity and quality of beam material for a chronology to be created. However, once coring began in the barn, a high level of rot was encountered making sampling considerably more difficult. During the overall assessment, a number of beams in the barn were seen that did not fit well into their mortise and tenon joints. These joints almost always fit snugly in buildings, but in the barn many did not or had open mortise joints with no adjoining beam. This indicated that the barn was probably created using recycled wood. The recycled wood could have come from anywhere, and from multiple structures. There were roman numerals found on a number of beams joints that did not line up with partner numerals on the adjoining pieces. Roman numerals are typically

found on both sides of the joint in early post and beam structures, thus some of the beams in the barn are not properly matched and give more evidence for the recycled wood theory (Figure 10).



Figure 10. Photo of potentially recycled wood. The diagonal beam has roman numerals on it that do not match to either of the beams it is attached. Roman numerals are typically found on early post and beam structures.

The samples from the Burpee-Bridges house had a variety of ages (Table 1, Figure 11). The house samples dated to 1846/47. There was only one sample from the annex and it was not of the highest quality but it dated to 1833. The barn had a variety of ages of wood from the mid-1700s to early-1800s. There were four large vertical beams dated and they had the most variation in age from 1782-1811. Two samples were taken from one large horizontal beam which dated to 1824. The small vertical beams came from a section of the barn where there were two levels or stories, these beams dated back to 1762-67. The small horizontal beams were the support beams for the second story; they dated from 1824-31. In the barn there was additionally a small cookie taken from one of the large horizontal beams that ran along the side of the building, this sample dated from 1779. The overall correlation within the plot was significant at 0.335. The dated samples matched well to the master red spruce chronology as illustrated in Figure 12.

Table 1. Correlation, time spans, location and condition of samples taken from the Burpee-Bridges House.

Series	Time Span	# of Years	Correlation	Structure / Location		Condition
08BNS001	1802-1847	46	0.645	House	Cold Room	end year
08BNS002	1777-1841	65	0.604	House	Cold Room	broken near end
08BNS003	1786-1846	61	0.497	House	Attic	end year
08BNS004	1735-1847	113	0.508	House	Fireplace Room	end year
08BNS005	1724-1847	124	0.428	House	Fireplace Room	end year
08BNS006	1770-1820	51	0.294	House	Fireplace Room	broken
08BNS007	1690-1811	122	0.137	Barn	Large Vertical Beam	choppy
08BNS008	1747-1805	59	0.54	Barn	Large Vertical Beam	broken with gap, choppy
08BNS009	1746-1800	55	0.174	Barn	Small Horizontal Beam	choppy, broken
08BNS010	1794-1831	38	0.307	Barn	Small Horizontal Beam	broken end
08BNS011	1777-1823	47	0.377	Barn	Large Horizontal Beam	choppy
08BNS012	1771-1824	54	0.44	Barn	Large Horizontal Beam	choppy
08BNS013	1637-1806	170	0.154	Barn	Large Vertical Beam	end year
08BNS014	1726-1782	57	0.475	Barn	Large Vertical Beam	end year
08BNS015	1772-1825	54	0.473	Barn	Small Horizontal Beam	end year
08BNS016	1684-1762	79	0.375	Barn	Small Vertical Beam	end year
08BNS017	1695-1765	71	0.282	Barn	Small Vertical Beam	end year
08BNS018	1650-1767	118	0.101	Barn	Small Vertical Beam	end year, small rings
08BNS019	1763-1824	62	0.375	Barn	Small Horizontal Beam	end year, choppy
08BNS020	1704-1833	130	0.215	Annex	Vertical Beam	broken, choppy
08BNS021	1672-1779	108	0.319	Barn	Cookie - Large Horizontal	end year, some worms

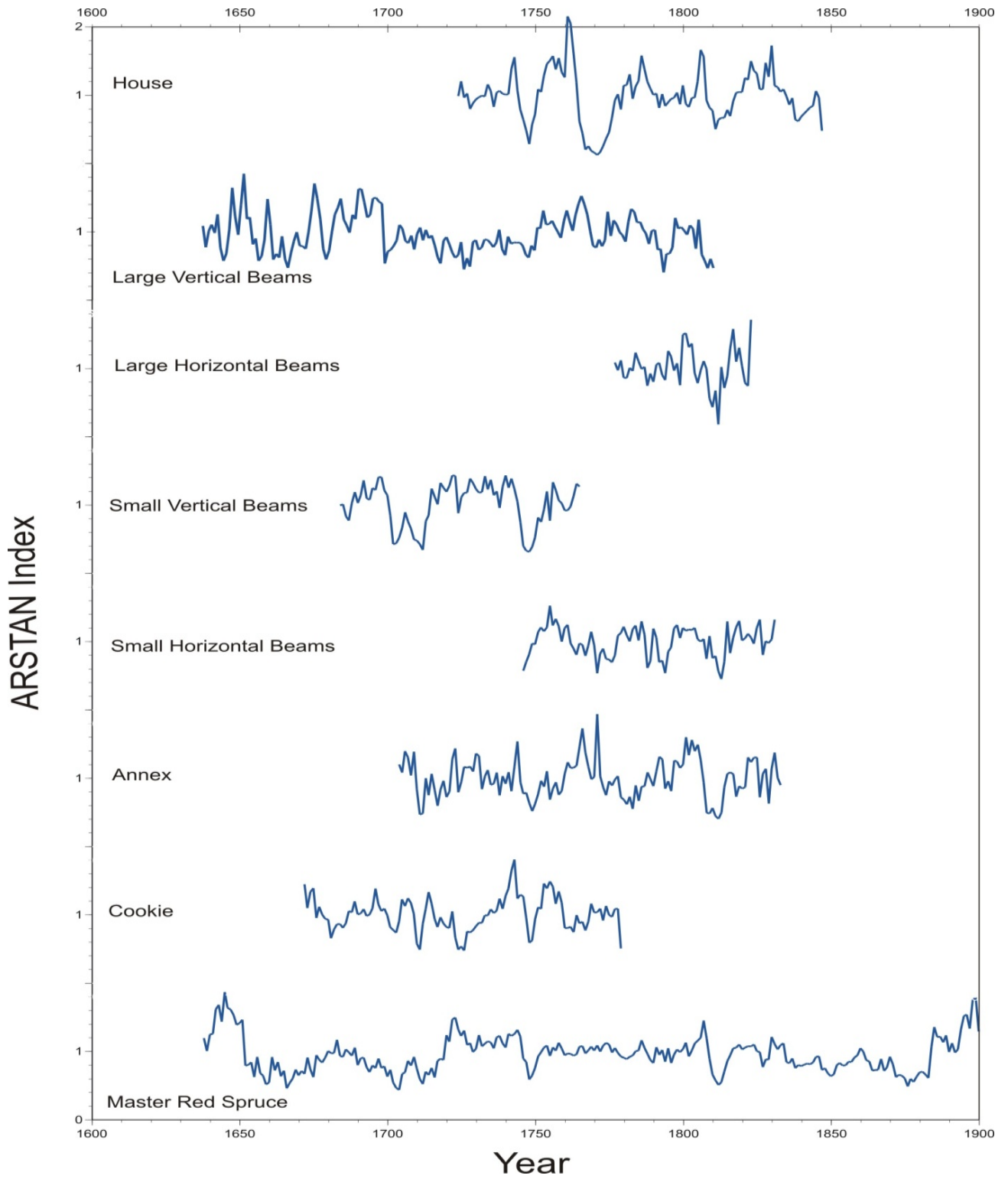


Figure 11. A comparison of the master red spruce chronology and the floating chronologies for the different sections of the structures.

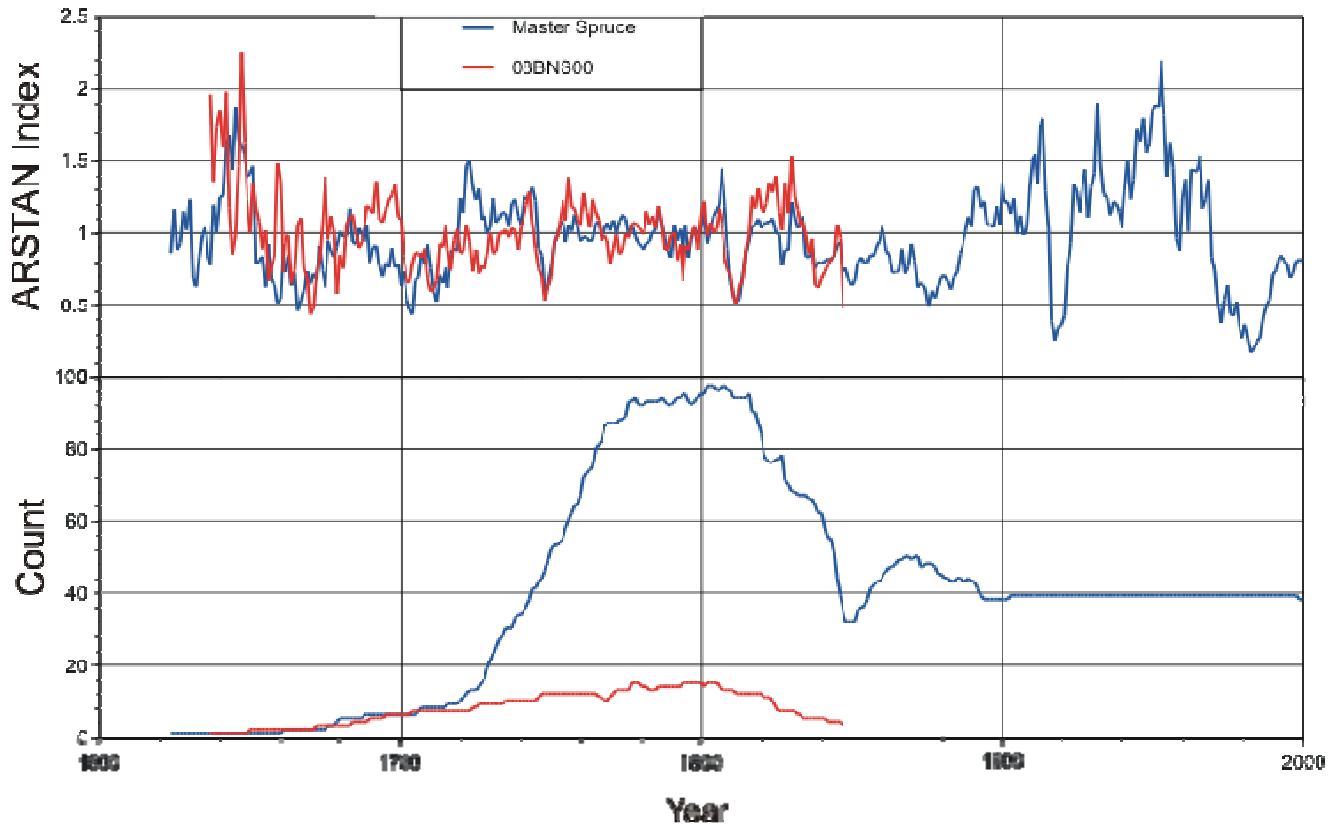


Figure 12. Comparison between the master red spruce chronology and the floating chronology, with the the sampling depth illustrated.

Conclusions

The construction dates of the Burpee-Bridges House fall near the suspected dates of construction. The barn was constructed with timber that was killed sometime between 1762 and 1831. The early dates falls into the estimated c. 1765 date of construction, but the later dates suggest that the barn may have continued to evolve through time. The later dates may be a result of replacing beams as they rotted away or that the barn continued to be expanded or contracted through time. The poor quality of the wood from the annex and barn clearly illustrate the level of protection from the elements, and limited the sampling.

The annex date of 1833 is similar to the expected date of construction of this structure (c. 1825). Because only one sound sample could be collected in the annex, the single date cannot be seen as definitive, especially with so much recycled wood used in the adjoining barn (see Appendix 2).

The new part of the house was supposedly to have been built in the 1840s, with the fireplace section of the house that we sampled supposedly having been built in the 1820s. The dates of 1846/7 we obtained from the attic, cold room and fireplace room are all similar and significantly later than the 1820s. What is interesting, is that the roof structures above the new part of the house (attic) and the old part of the house (cold room), both point to a new roof spanning both parts of the house being added in 1846/7. The one fireplace room ceiling beam/second floor

floor joist (08BNS006) and the corner post from the closet next to the fireplace (08BNS004/5) were both cut in 1846/7. For this evidence to work well in the existing Burpee-Bridges house story, new material would have had to be added to the old structure when the house addition was made, or the age of the old section of the house may need to be upgraded.

References

Canada's Historic Places (2009) <http://www.rhp-rlp.gnb.ca/Page1.aspx?bInLanguageEnglish=True&RID=61&VER=1&dp=1> Department of Wellness, Culture and Sport, New Brunswick, Canada. February 24, 2009.

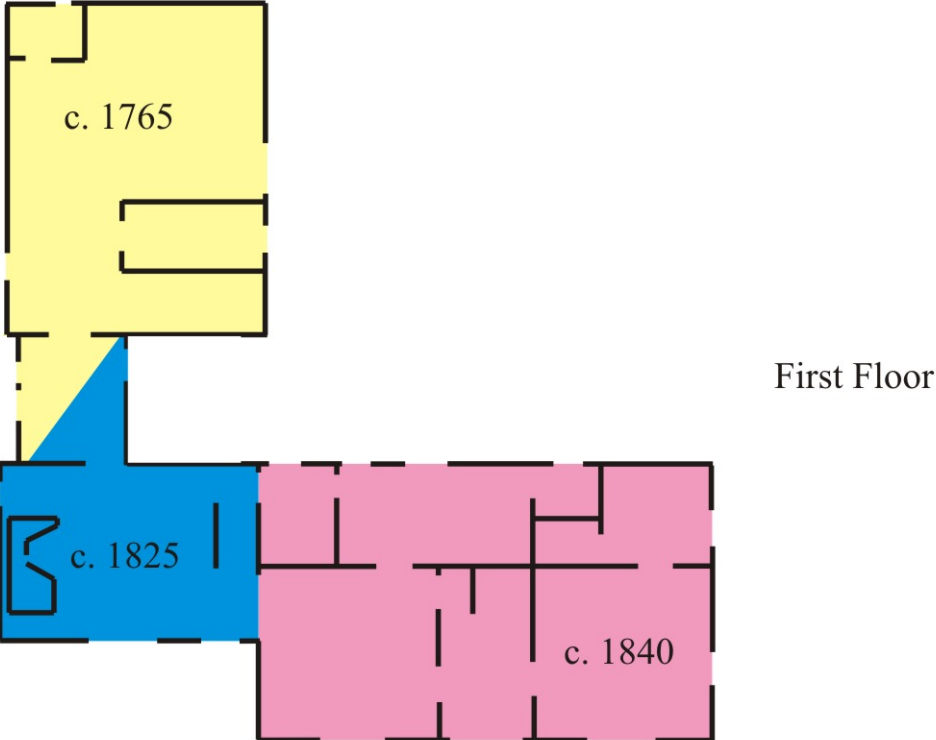
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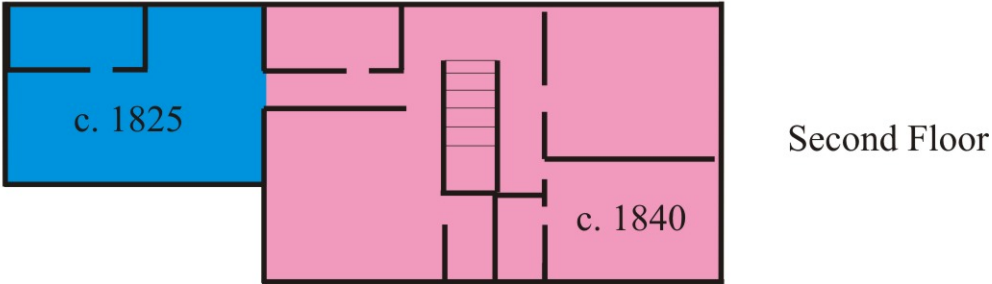
Appendix 1. Scanned samples mounted on boards for stability.



Appendix 2. Floor plan for the first and second floors of the Burpee Bridges House.



First Floor



Second Floor