

Dendrochronology of the buildings at the Mabee Farm Historic Site,
Rotterdam Junction (Schenectady County), New York

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The dendrochronological analysis of wood samples from the three original buildings of the Mabee Farm (original house plus addition, tavern/inn portion that is attached to the addition, and the separate servant's quarters/summer house) give four construction dates spanning the 18th century. The original house was built in 1705 or soon thereafter; a rebuild of the original house plus the addition occurred in 1761, the servant's quarters was built in 1767 or soon after; and the tavern/inn was built in 1795. While a possible earlier original building date has been indicated by the stone basement plus historic land use records, there is no evidence from the wood that any of the current buildings were constructed prior to 1705.

Fourteen cores and six sections were collected from four buildings in November 2007 with the help of Pat Barrot, Merritt Glennon, and Mike Kowalski of the Mabee Farm, and Ronald Kingsley of Schenectady County Community College. Samples were collected by Jen Watkins, Carol and Bill Griggs, Charlotte Pearson, Peter Brewer, and Sturt Manning of the Cornell Tree-Ring Laboratory. Samples were cored from beams and rafters in the three extant buildings. In the original house seven beams in the basement and two rafters in the attic were cored. In the tavern/inn attic one beam and one rafter were cored, and sections were cut from the remains of four beams that were believed to be remnants of the original floor of the tavern (now stored in one of the sheds). In the servant quarters/summer kitchen building cores were taken from a basement beam, from the beam above the basement fireplace and from one of the attic rafters. In addition, two sections were sawn from loose boards, one found in the original attic and one located in the tavern attic. All the samples are either oak (*Quercus* sp. – the basement beams of the house and the servant's quarters, and all the tavern floor beams) or pitch pine (*Pinus rigida* – the roof rafters and boards in the attics, and the fireplace timber and roof rafter in the servant's quarters) with the exception of the house basement beam near the stairway, which is hemlock (*Tsuga canadensis*).

Methods:

At the lab, cores were glued onto core mounts and all samples were sanded down to be able to clearly see the rings. The ring-widths were measured under a microscope on a moving table. The patterns in the ring-widths of each species were compared to each other, focusing on their sources (original house and tavern basements, servant's quarters, and original and tavern attics). When two samples' patterns matched securely (= "crossdated"), they were combined into sub-chronologies. Each sub-chronology was then compared with other sub-chronologies and the other single samples, using both statistical tests and visual comparisons, until all securely-crossdated samples had been combined into chronologies according to species and their location in the buildings.

Then the chronologies of each species were combined and each compared to the same species' securely-dated historic and forest site chronologies from eastern New York and New England to place them in time.

Results and conclusions:

The history of this site indicates that the land was first settled and acquired by Daniel Janse Van Antwerpen, who established it as a fur trading post in the second half of the 17th century AD, receiving a deed for the land in 1671 (<http://www.mabeefarm.org/>). From the dendrochronological analysis, it appears that any wood components used in the earliest building(s), whatever they were, are not present in the current buildings. Perhaps all of the early structures were burned down during one or more raids, not uncommon at that time and place. Jan Pieterse Mabee bought the property in 1705, and the earliest dates from two wood samples do indicate that a few beams in the original house were felled and used for its construction at that time. The **1705** date can be seen in one oak beam in the basement, sample MBF-1, whose outer ring dates to 1705v ("v" = at, or very close to, bark date), and in one pine rafter in the original roof, sample MBF-11, whose outer ring dates to 1703v. Since both samples contain substantial sapwood, their felling dates are most likely 1705 or possibly a few years later (5 maximum). The basement oak cannot have been felled any earlier than 1705.

The construction of most of the current house was in **1761**. This is indicated by the outer ring dates of the other 5 oak beams in both parts (original and addition) of the basement (samples MBF-2, 3, 4, 5, and 6). The outer dates of several samples have a waney edge (only bark removed), indicating that these trees were felled in the late spring or summer of 1761 and the building was constructed soon after that. The sample from the one basement hemlock beam near the staircase has too few rings to date it securely, but the use of hemlock suggests it was added much later.

The oak sample collected from the basement of the servant's quarters nicely matches the patterns in the house oak chronology (Figure 1), and the presence of its sapwood rings gives it a felling date of **1767 or soon after**. The tree-ring sequences from the pine logs that were used above the basement fireplace and in the attic match each other very well; their outer ring dates to 1692 but no sapwood is present in either. With the large amount of sapwood rings normal in pitch pine (45-100 rings), it is most likely they were felled at the same time as the oak, 1767 or after.

The four oak samples from the remnants of the beams thought to be the tavern's original floor beams contain sapwood and waney edges, and their patterns match the other Mabee buildings' oak chronologies. Their outer rings indicate a felling date of spring or early summer 1795, thus **1795** is its building date. The one pine sample from the attic of the tavern is unfortunately hard to crossdate securely. Possible dates are 1767 and 1773, but more comparisons with other pitch pine chronologies are needed to be sure of any date. The sample's data has been added to our "needs more analysis" list.

The two loose boards with many rings that were collected from the two attics supplied adequate ring counts to strengthen the pitch pine chronology, but since they contain no sapwood, they do not supply any more information about when the buildings were constructed.

The length and dates that are covered by each building phase and the complete chronologies are listed below. The ending year of each sequence is the outer ring of the sequence and is the key to the building date of that phase.

Definitions of terms used in the following lists: B= bark present; W= only bark removed (“waney edge”); v = very close to bark; vv = unknown number of rings missing; p = pith (center of tree) present; +p = pith absent but close to innermost ring; n+ or +n = incomplete unmeasured ring present before or after measured ring sequence.
 For the oak sapwood count, there are generally between 5 and 20 sapwood rings in oaks; 7-13 is the most normal range. If sapwood rings are present, but no bark, then we extrapolate for a more exact felling and building date using the 7-13 year range. The sapwood in the *Pinus rigida* samples in our collection contain anywhere from 45 to 100 rings.

<u>Description</u>	<u>Ring Count</u>	<u>AD Dates</u>
Original house:		
First built in 1705 or a few years later:		
One basement oak beam with sapwood	10+115+1v	1580-1705+v
Attic pine rafter with sapwood	1+117+1v	1585-1703+v
Second construction, done in 1761:		
Basement oak beams, both original and addition, with sapwood (= construction of present basement)	212+1W	1549-1761+W
Tavern, built in 1795:		
Attic pine rafter with sapwood	+p+1+91+1v	<i>possibly 1767 or 1773</i>
Four oak original floor beams, with up to 13 sapwood rings	p+234+1W	1561-1795+W
Servant’s quarters, built 1767 or soon thereafter:		
Basement oak beam with 13 sapwood rings	1+150+1v	1616-1767+v
Roof rafter and fireplace beam, pitch pine (no sapwood so unknown number of rings removed)	+p+105+1vv	1586-1692+vv
Loose pine board in original attic	+p+1+148+1vv	1573+p-1722+vv
Loose pine board in tavern attic (neither contain sapwood, so unknown number of rings missing)	1+87+1vv	1556 - 1644+vv
Mabee Farm Oak Chronology (13 samples)	246	1549-1794
Mabee Farm Pine Chronology (5 samples)	165	1557-1721

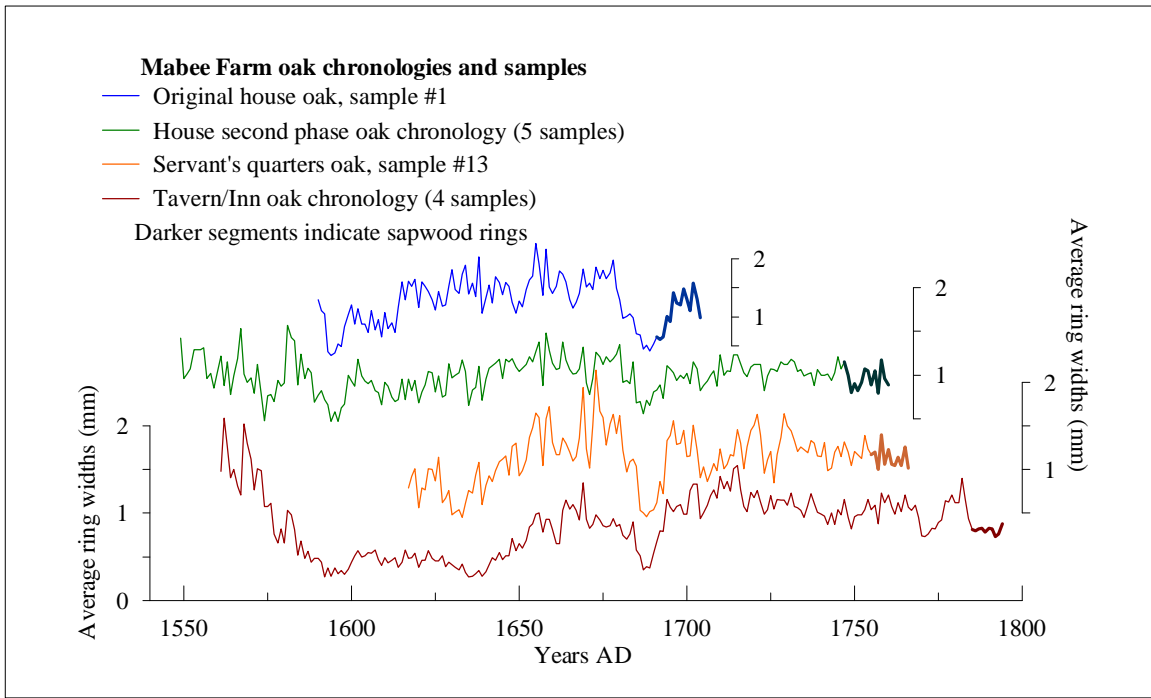


Figure 1. These are the oak samples and chronologies built of the oak samples from each building phase, and their relative placement in time. The Y-axes are the average ring widths in the samples over time. The calendar dates were assigned only after comparing them all with our regional and other securely-dated historic oak chronologies, as shown in Figure 2.

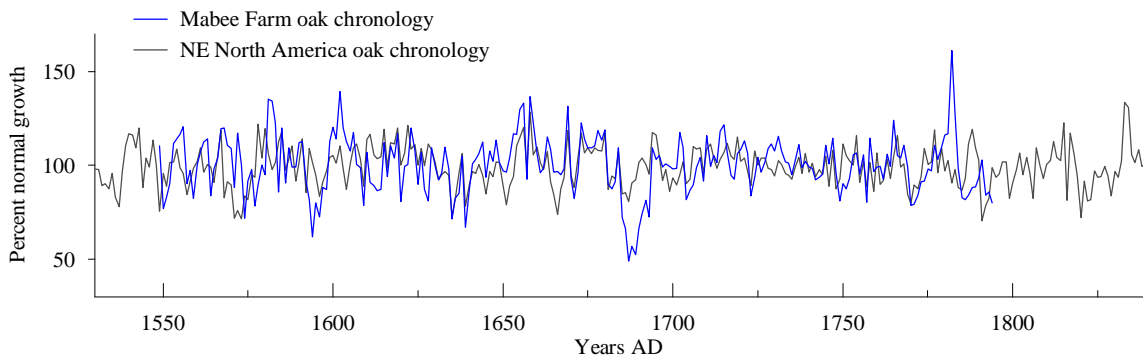


Figure 2. The complete oak chronology (N=246) compared to the regional oak chronology including oaks from Boston, MA, to Syracuse, NY, and from Kingston to Watertown, NY, showing how well their patterns match visually. Between the two chronologies, the Student's t-score is 7.52, correlation coefficient is 0.43, and trend coefficient is 68%. With 246 years in common, all values are significant at the 0.05 probability level. In this figure, both data sets have been detrended to remove the normal tree-ring growth trends unique to each tree to emphasize their common signal.

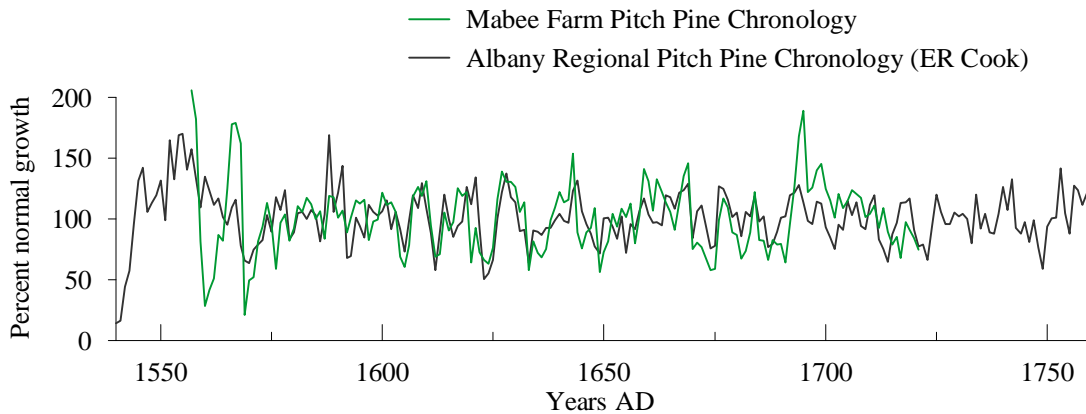


Figure 3. Shown above is the Mabee Farm’s pitch pine chronology fit to a regional historic pitch pine chronology provided by ER Cook. An individual pitch pine’s ring-width data is much more variable than that of the oaks, but the average of the five samples indicates good correlation between site chronologies within this region. Supporting statistics: Student’s *t*-score:5.98, correlation coefficient 0.42, trend coefficient 70%, all significant at the .05 probability level.

The table below gives a description of the individual samples and their tree-ring dates:

<u>Sample Number</u>	<u>Description</u>	<u>Number of rings</u>	<u>Absolute Dates</u>
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From the original house, both original and second phase constructions:

“Original” basement

- | | | | |
|---|----------------------------------------------------------------------------------------------------------------|--------------|-------------|
| 1 | Partially squared N-S beam, 3 rd from west wall. F.H. core, <i>Quercus</i> sp.
15 sapwood rings. | N= 10+115+1v | 1580-1705+v |
| 2 | Partially squared N-S beam, 4 th from west wall. F.H. core, <i>Quercus</i> sp.
12 sapwood rings. | N= 1+111+1v | 1548-1760+v |
| 3 | Squared N-S beam, next to west basement wall. F.H. core, <i>Quercus</i> sp.
10 sapwood rings. | N= 1+136v | 1623-1760v |
| 4 | Partially squared N-S beam, 2 nd from west wall. F.H. core, <i>Quercus</i> sp.
8 sapwood rings. | N =1+154+1W | 1606-1761+W |

“Addition” basement

- | | | | |
|---|------------------------------------------------------------------------------------------------------|---------------|---------------|
| 5 | Squared N-S beam, westernmost beam in addition. F.H. core, <i>Quercus</i> sp.
17 sapwood rings. | N=+p+1+180+1W | 1580+p-1761+W |
| 6 | Squared N-S beam, 3 rd beam east of #5, F.H. core, <i>Quercus</i> sp.
29 sapwood rings | N= 1 +172+1W | 1588-1761+W |

Samples, continued:

<u>Sample Number</u>	<u>Description</u>	<u>Number of rings</u>	<u>Absolute Dates</u>
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“Addition” basement, continued:

7	Squared N-S beam at bottom of stairs, F.H. core, <i>Tsuga canadensis</i> .	N= 1+72+1vv	Not datable
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Original house attic:

10	Whole rafter, ~ 14cm diameter. F.H. core. <i>Pinus rigida</i> , all sapwood.	N= +p+1+26B	Too few rings
11	Whole rafter, ~ 14cm diameter. F.H. core. <i>Pinus rigida</i> , sapwood included.	N= 1+117+1v	1585-1703+v
12	Loose board in floor of original attic. 44 cm wide, 3.5 cm thick. <i>Pinus rigida</i> , no sapwood.	N=+p+1+148+1vv	1573-1722+vv

From the Tavern/Inn:

Remnants of beams thought to have supported the original floor of the tavern.

16	Squared beam section, max radius 14 cm. <i>Quercus</i> sp., 7 sapwood rings.	N = p+131+1v	1663p -1794+v
17	Squared beam section, max radius 21cm. <i>Quercus</i> sp., 2 sapwood rings.	N = ±p+219+1vv	1560p -1780+vv
18	Squared beam section, max radius 21cm. <i>Quercus</i> sp., 12 sapwood rings.	N = +p+~30+141+1W	1624+p-1795+W
19	Squared beamsection, max radius 18.5cm. <i>Quercus</i> sp., 13 sapwood rings.	N=p+214+1W	1580p -1795+W

Tavern attic:

8	Loose board on attic beams. 32.5 cm wide, 3.5 cm thick. <i>Pinus rigida</i> .	N= +p+1+87+1vv	1556-1644+vv
9	Squared rafter. F.H.core, <i>Pinus rigida</i> . Sapwood present. Possibly dates to 1767 or 1773, needs comparisons with more samples.	N=+p+1+91+1v	Not dated

Samples, continued:

<u>Sample Number</u>	<u>Description</u>	<u>Number of rings</u>	<u>Absolute Dates</u>
From the servant's quarters:			
13	Partially squared beam in basement. F. H. core. <i>Quercus</i> sp., 13 sapwood rings.	N= 1+150+1v	1616-1767+v
14	Squared beam above basement fireplace. F. H.core, <i>Pinus rigida</i> . No sapwood.	N= +p+1+47+1vv	1614-1662+vv
15	Squared attic beam. F. H.core, <i>Pinus rigida</i> . No sapwood.	N= +p+1+47+1vv	1586-1692+vv

The sapwood in the *Pinus rigida* species samples that we currently have is anywhere from 45 to ~100 rings. Thus the "1767 or later" date of the oak is very likely when these trees were felled and the building constructed.

Analysis was done at the Cornell Tree-Ring Lab, Cornell University, Ithaca, NY (website <http://dendro.cornell.edu/>).

Note 17 March 2006. Tuller PIRI chron puts 9 at 1795 also (same as tavern oaks).