

## **Dendrochronology of the Beardslee House and Tavern, Otsego County, New York**

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The Beardslee buildings, owned by Bill and Nancy Beardslee, are located on the east side of the Unadilla River, where the river is the county line between Chenango and Otsego Counties, across the river from the town of New Berlin. The buildings include a tavern (now the garage attached to the house), a house built in two sections, and a hop barn.

According to the Beardslees, the historical records of the tavern indicate that it was probably built in the late 1780s-early 1790s, and was originally located closer to the river than its current location. It was owned by Matthew Bennett, who had a tavern license for it in the 1790s. It was bought by Jabez Beardslee and rolled from there to its current position, on the north side of the the Beardslee house at some time, possibly when the one-story section of the house was built in the late 1790s-early 1800s.

The two-story house section was added to the south side of the one-story section in 1810, a historically secure date in the family records.

The hop barn (not sampled as of March 2007) is made entirely of hemlock, and is listed in the National Historic Register. That building is on our list of buildings-to-be-dated.

### **Dendrochronological Summary:**

From the collected samples, we were able to construct lengthy chronologies for each of three species: pine (195 years), hemlock (189 years), and oak (150 years). Each species chronology was compared with our modern and historical northeastern North America chronologies of the same species to determine the calendar dates of the chronologies and thus the dates of each sample's tree-rings. The dates covered by the chronologies are pine, 1629 – 1823; hemlock, 1626 – 1814; and oak, 1660 - 1809.

The end dates of the samples collected from the tavern (pine and hemlock) indicate that the tavern was built in or after 1783, with the staircase added after 1814. All samples are squared with unknown numbers of rings removed by the squaring, but the presence and number of sapwood rings in the pine sample with the 1783 outer ring indicates that its felling date was most probably no later than 1788. It was uncommon for timbers to be seasoned when used for construction, so the building date would have been within one year of the felling date. In this case, the most likely building dates are 1783-1789.

The outer ring dates from one pine floor board and the hemlock beam along the south wall of the staircase, both post-1800, indicate some repair or change in the structure over time. The later additions could be due to anything from a minor replacement, in terms of the floor board, to a change in the location of the stairwell, but they also suggest that perhaps the addition of the tavern onto the house occurred sometime in the mid-1820s or later. Hemlocks have little or no differentiation between sapwood and heartwood rings, thus its 1814 outer ring date may or may not be close to its felling date and is only a “terminus post quem” (= felled after) date.

The end dates of the oak and hemlock samples collected from the attic of the two-story section of the house corroborate nicely with the historic building date of 1810. Two cores that have bark or a waney-edge (only bark removed) are from two main vertical posts on the outer frame. Both are oak (as are all four sampled vertical posts) and their outer rings both date to 1809 with

complete rings, indicating that the trees had been felled between September 1809 and March 1810.

A squared horizontal beam, a squared roof rafter, and a board from the side of the chimney are of hemlock. The outer ring of the beam gives an 1807 date, close to the oak building date with only a few rings removed from the sampled area.

### The samples

**N.B.** The terms below are: **p** - presence of pith; **±p** - inner ring close to pith; **+n** – number of partial and unmeasured rings at beginning or end of sequence; **vv** – unknown number of rings removed; **v** – close to bark; **W** – waney edge (only bark removed); and **B** – bark present. For the calendar dates, the **+v** or **+vv** indicates that the outer dated ring is partial only and not measured due to an incomplete ring.

Sample No.	Description	Radii and Ring Count	Calendar Dates
Samples collected from the Tavern:			
T1	Floor board from attic of tavern, 0.40 x 0.022m. <i>Pinus strobus</i> . Possible sapwood rings, but no bark – the outer ring has the latest date of the securely-dated tavern pines.	AB= ±p+1+ 53 +1vv CDE= ±p+1+ 61 +1vv ABCDE = ±p+1+ 61 +1vv	1721±p- 1783+vv
T2	Floor board from attic of tavern, 0.33 x 0.025m. <i>Pinus strobus</i> , same tree as OBH-T6.	A= ±p+1+ 100 +1vv B= ±p+ 74 +1vv	(see OBH-T6)
T3	Floor board from south attic of tavern, 0.415 x 0.025m. <i>Pinus strobus</i> .	A = ±p+1+ 84 +1vv B = ±p+1+ 60 +1vv AB = ±p+1+ 84 +1vv	1739±p- 1824+vv
T4	Floor board from south of staircase in tavern attic, 0.44 x 0.025m. <i>Pinus strobus</i> , same tree as OBH-T5.	A = +1+ 96 +1vv B = ±p+1+ 66 +1vv	(see OBH-T5)
T5	Floor board from attic of tavern, 0.475 x 0.025m. <i>Pinus strobus</i> , same tree as OBH-T4.	A= ±p+1+ 111 +1vv B = ±p+1+ 72 +1vv Combination of OBH-T4 and T5 = ±p+1+ 111 +1vv	1628±p- 1740+vv

Sample No.	Description	Radii and Ring Count	Calendar Dates
Tavern samples, continued.			
T6	Floor board from attic of tavern, 0.32 x 0.025m. <i>Pinus strobus</i> , same tree as OBH-T2.	A = ±p+ 79 +1vv B = p+ 106 +1vv Combination of OBH-T2 and T6 = p+ 106 +1vv	1650p- 1756+vv
T7	Core from roof beam above north wall, 0.075m radius, <i>Pinus strobus</i> . Very short sequence, too short to date accurately	A= p+ 41 +1B	Too few rings
T8	Core from roof rafter above north wall, 0.075m radius, <i>Pinus strobus</i> .	A= ±p+1+ 28+1v	Too few rings
T9	Core from sill beam, ground level of tavern on north wall, 0.074m length. <i>Pinus rigida</i> , a pine species that doesn't crossdate with the <i>Pinus strobus</i> or <i>Pinus resinosa</i> chronologies. Tentative dates are given due to its crossdate with the Mohonk Lake <i>Pinus rigida</i> chronology from the Catskill Mountain region in New York.	A = +1 131 +1vv tentative 1620 -	1752+vv
T10	Cores from top horizontal beam in north wall on ground floor, A is 0.15m length, B is 0.153m length. <i>Tsuga canadensis</i> .	A = +1+ 126vv B = p+ 99vv AB = p+ 150vv	1625p- 1775vv
T11	Cores from top squared sill beam, on south wall by stairs, A is 0.12m, B is 0.143m in length. <i>Tsuga canadensis</i> .	AA = +1+ 17+1vv AB = +1+ 121+1vv B = +1+ 154vv Combination of AA, AB, and B = +1+ 158vv	1656 - 1814vv

The sequences of the two cores from timbers with outer rings and bark (OBH-T7 from a beam with bark and OBH-T8 from a roof rafter) are too short to date securely. The most recent date of the pine boards indicates that the tavern was built in 1783 or after, the outermost ring date of OBH-T1. Due to the possible sapwood rings of that sample, the timber was probably felled within 5 years of 1783, but both the “possible” and “probable” indicate some uncertainty. The 1814vv outer date of the top sill beam by the stairs (and the 1824vv date of one floor board) is at also an “on or after” date of repair. The stairway may have been built at the time the tavern was acquired and moved, which would put its acquisition date to “on or after 1814,” which is after the building dates of the two house sections.

**Sample**

No.	Description	Radii and Ring Count	Calendar Dates
Samples collected from the attic of the two-story section of the house:			
H12	Core from horizontal E wall beam, 0.17m length. <i>Tsuga canadensis</i> .	A= +1+ 170v	1637 - 1807v
H13	Cores from board at ~60° from horizontal, on one side of the chimney that sits at the same angle. The A core is 0.105m, B core is 0.115m length, <i>Tsuga canadensis</i> . This board was either very hard or perhaps there were knots: the samples are fractured. The possible dates of the short sequences of tree-rings indicate that this board was probably put in sometime in the mid-1800s. This sample is not included in the chronology.	AB= +1 + ~82+1vv	not dated
H14	The collection straw contained 2 segments of different species: it is uncertain whether this was due to the length of this sample being beyond the width of the vertical post, or whether we mistakenly put a segment from another sample into this straw. The former is most likely, because the second segment does not crossdate well enough to be the same tree with any other.		
H14A	Vertical post on north side of east wall, 0.101m length. Outer segment containing starter hole is <i>Quercus</i> sp., with 5 sapwood rings, including complete outer ring.	A = +1 + 127W	1682 - 1809W
H14B	Included in the straw used for sample H14A was a segment of hemlock ( <i>Tsuga canadensis</i> ), 0.042m length. This segment could possibly be from a board on the inner side of the post, or possibly an inner segment of another sample mistakenly put into this straw.	B = +1 + 56+1vv	1703 - 1760+vv
H15	Core from vertical post on north side of west wall, 0.158m length. <i>Quercus</i> sp. Contains 8 sapwood rings with complete outer ring plus bark.	A = +~20 + 150B	1640- 1809B
H16	Core from vertical post on south side of east wall, 0.125m length. <i>Quercus</i> sp. No sapwood. Tentative date only, sequence is short, and growth is mainly juvenile.	A = p+1 + 55+1vv	1720p - 1776+vv
H17	Core from squared roof rafter on north roof, 0.085m length. <i>Tsuga canadensis</i> .	A = p+1 + 50+1vv	1717p - 1768+vv
H18	Core from 2 <sup>nd</sup> vertical post on north side from west wall (supporting purlin), 0.126m length. <i>Quercus</i> sp, no sapwood.	A = +20 + 88+1vv	1664 - 1772+vv

**SPECIES CHRONOLOGIES AND DATES FOR EACH BUILDING AND PHASE:**

**Tavern:**

***Pine***

OBH-T1, T2&T6, T4&T5, all floor boards of the original construction. Not included are the roof rafters OBH-7 and 8, both with too few rings to date securely.

Original construction: N = 154+1vv 1629 – 1783+vv

OBH-T3, floor board, possibly added when current stairwell was built

N = 84+1vv 1739- 1824+vv

OBH-T9 is of a different pine species (*Pinus rigida*, pitch pine) and does not crossdate with any eastern white pine or red pine chronology from this area. Its crossdate with the Mohonk Lake pitch pine chronology gives a possible date of 1621-1751vv.

***Hemlock***

OBH-T10 and T11, the north and staircase first floor beams, below the attic floor and roof. The date for the staircase beam indicates that it was put in later, perhaps when or after the building was moved:

North wall beam (original) N = 150vv 1626 - 1775vv

Beam next to staircase N = 158vv 1657 - 1814vv

**House, two-story section:**

***Oak***

OBH-H14A, H15, and H18. All are vertical posts - H14 and H15 on the outer walls, and H18 from one inner post supporting the north purlin. The bark or Waney edge, sapwood rings, and complete outer rings on two samples indicate that their felling date was sometime between September 1809 and March 1810.

N = 150B 1660 - 1809B

***Hemlock***

OBH-H12A, H14B, and H17. H12 is a horizontal beam, H14B from an unknown source, and H17 is a roof rafter.

N = 170v 1638 - 1807v

**N.B.** OBH-H16A (oak) not included due to juvenile growth. OBH-H13AB (hemlock), the roof support board adjunct to the chimney, has no secure crossdating due to the nature of the sample.

**THE BEARDSLEE HOMESTEAD SPECIES CHRONOLOGIES:**

**N.B.** Dates of outer partial rings not included in these chronologies.

***Pine:*** Original and repair of tavern N = 195vv 1629 - 1823vv

***Hemlock:*** Tavern, house, and tavern repair N = 189vv 1626 - 1814vv

***Oak:*** House N = 150B 1660 - 1809B

**Supporting Statistics:**

Statistics are used to look for possible placements where the patterns in the Beardslee samples match with each other (internal, see Figures 1-3) and then with other site and regional chronologies (external, see Figure 4). The ultimate choice of which is the right date takes a visual inspection of graphs of the data sets and experience with the nature of crossdating.

The four values between each set of two samples in the following tables are:

**Student's *t*-score**, a combination of the correlation coefficient of five-year sequences, adjusted by their amplitude over time and the number of years of overlap: established by Baillie and Pilcher (1983).

**Correlation coefficient**, the standard linear Pearson correlation between the two samples.

**Trend coefficient**: the percentage of times that the ring widths of two samples both increase or both decrease from year to year over their overlap.

**Overlap** – the number of years that the samples have in common.

PINE	OBH-T2&T6 1650-1755			
				Statistics are: <i>t</i> -score correlation trend coefficient overlap
OBH-T4&T5 1629-1739	11.05 0.76 84.3 90	OBH-T4&T5 1629-1739		
OBH-T1 1722-1782	4.82 0.65 84.8 34	2.16 0.47 82.4 18	OBH-T1 1722-1782	
OBH-T3 1740-1823	3.25 0.66 73.3 16	No overlap	5.08 0.62 66.7 43	OBH-T3 1740-1823
Each with the chronology of all others	12.33 0.77 83.3 106	10.48 0.75 84.3 90	6.33 0.64 78 61	5.07 0.62 71 43

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HEMLOCK	OBH-H12A				
	1638-1807				
OBH-H14B	5.81				
1704-1759	0.62	OBH-H14B			
	69.1	1704-1759			
	56				
OBH-H17A	4.28	4.67			
1718-1767	0.53	0.59	OBH-H17A		
	73.5	78	1718-1767		
	50	42			
OBH-T11	5.25	3.05	6.48		
1657-1814	0.39	0.38	0.68	OBH-T11	
	74.7	76.4	85.7	1657-1814	
	151	56	50		
OBH-T10	5.91	3.96	7.89	10.05	
1626-1775	0.45	0.47	0.75	0.68	OBH-T10
	69.3	69.1	71.4	77.1	1626-1775
	138	56	50	119	
Each with	8.38	5.77	9.4	9.61	11.09
chronology	0.54	0.62	0.8	0.62	0.69
of all others	76.3	80	0.88	0.84	0.75
	170	56	50	151	138
OAK	OBH-H14A				
	1683-1809				
OBH-H18	5.00				
1684-1771	0.47				
	73	OBH-H18			
	88	1684-1771			
OBH-H15	11.22	4.37			
1660-1809	0.71	0.43			
	78.6	70.1	OBH-H15		
	127	88	1660-1809		
Each with	10.08	5.12	9.41		
chronology	0.67	0.48	0.64		
of others	79.4	69	77		
	127	88	127		

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Correlations between each Beardslee genus chronology and others of the same genus from forest and historic building chronologies around NE North America. (Authors of indicated chronologies below are: + D Miles, \* ER Cook, and # M Kudish; all others were built by CB Griggs and colleagues at the Cornell Dendrochronology Laboratory.)

	<i>t</i> -scores	Corr coeffs	Trend Coefficients	Overlap
<b>Oaks, 1660-1809</b>				
NY oak chronology	5.14	0.39	63.1	150
Fire Tower, Clarion, PA*	4.78	0.37	59.7	150
Hiram Edson bldng, Phelps	3.07	0.31	66.5	92
Wixson cabin, Campbell	3.57	0.33	68.1	103
Patterson Inn, Corning	3.45	0.30	60.7	122
Hull House 9, Lancaster	2.77	0.25	72.1	121
Boston Oak +	3.07	0.28	51.8	110
<b>Hemlock, 1626-1823</b>				
NY Hemlock chronology	11.43	0.65	70.0	177
Hiram Edson bldng, Phelps	5.64	0.44	71.9	138
McGraw Hall, Ithaca	6.62	0.44	68.9	189
Evan's House, Ithaca	5.04	0.40	67.4	136
Boston Wharf	4.15	0.29	63.3	189
Hull House, Lancaster	9.22	0.56	71.3	189
<b>Pine, 1629-1782</b>				
NY Pine chronology	7.47	0.47	69.6	195
Longfellow, Clarion, PA*	4.66	0.36	62.2	145
Houghton RR, Houghton	5.21	0.40	66.2	143
Wixson Cabin 7, Campbell	2.66	0.30	65.8	74
Evan's house, early, Ithaca	5.27	0.41	67.0	136
Evan's house, late, Ithaca	5.76	0.44	70.7	139
Shawangunk Mtns, Catskills#	5.55	0.37	58.2	195
Hull House, Lancaster, NY	7.18	0.46	66.8	195



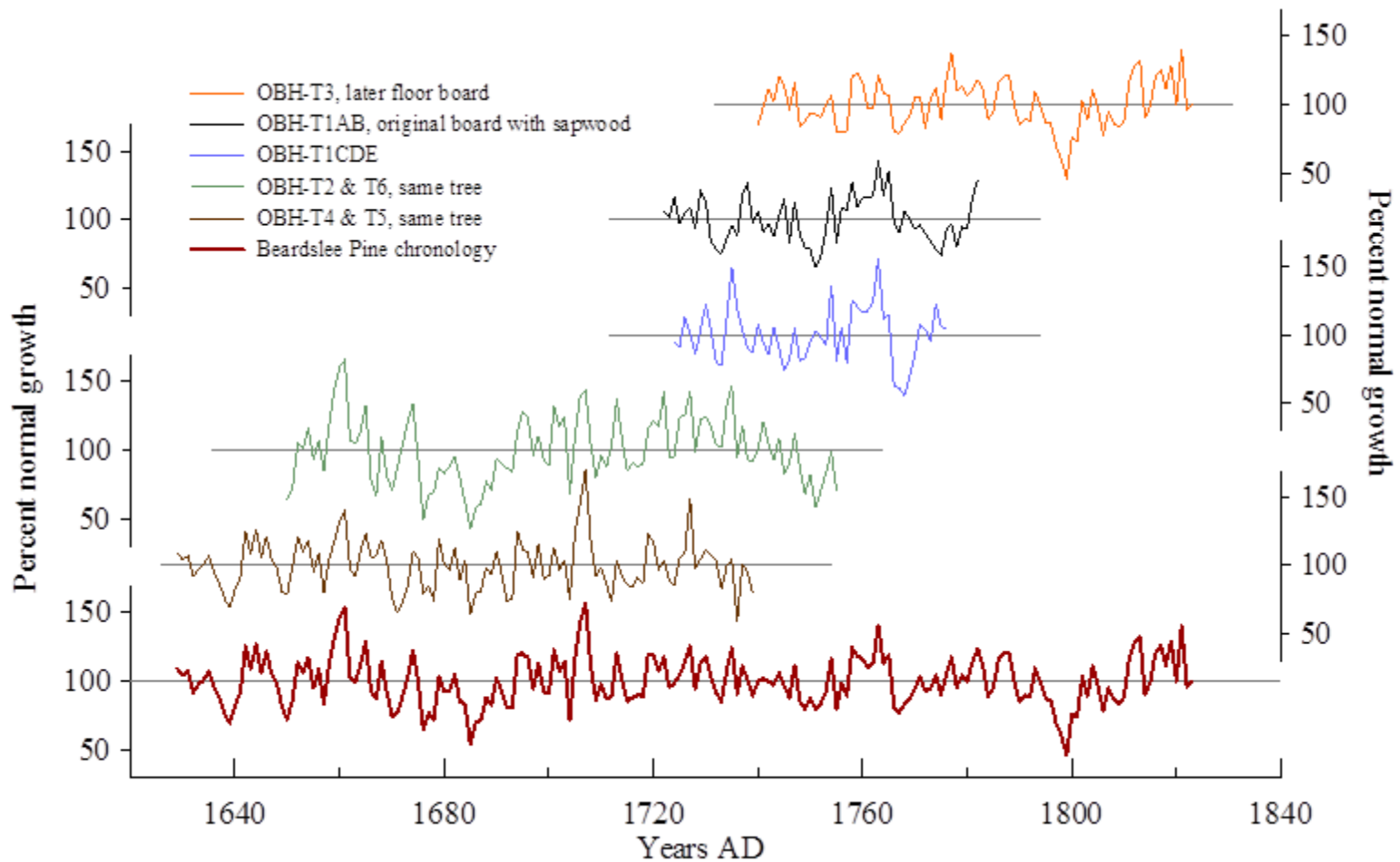


Figure 1. The pine sample data sets with the normal growth trend removed. See Figure 4 to compare the pine chronology from the Beardslee samples to the NE North American pine chronology.

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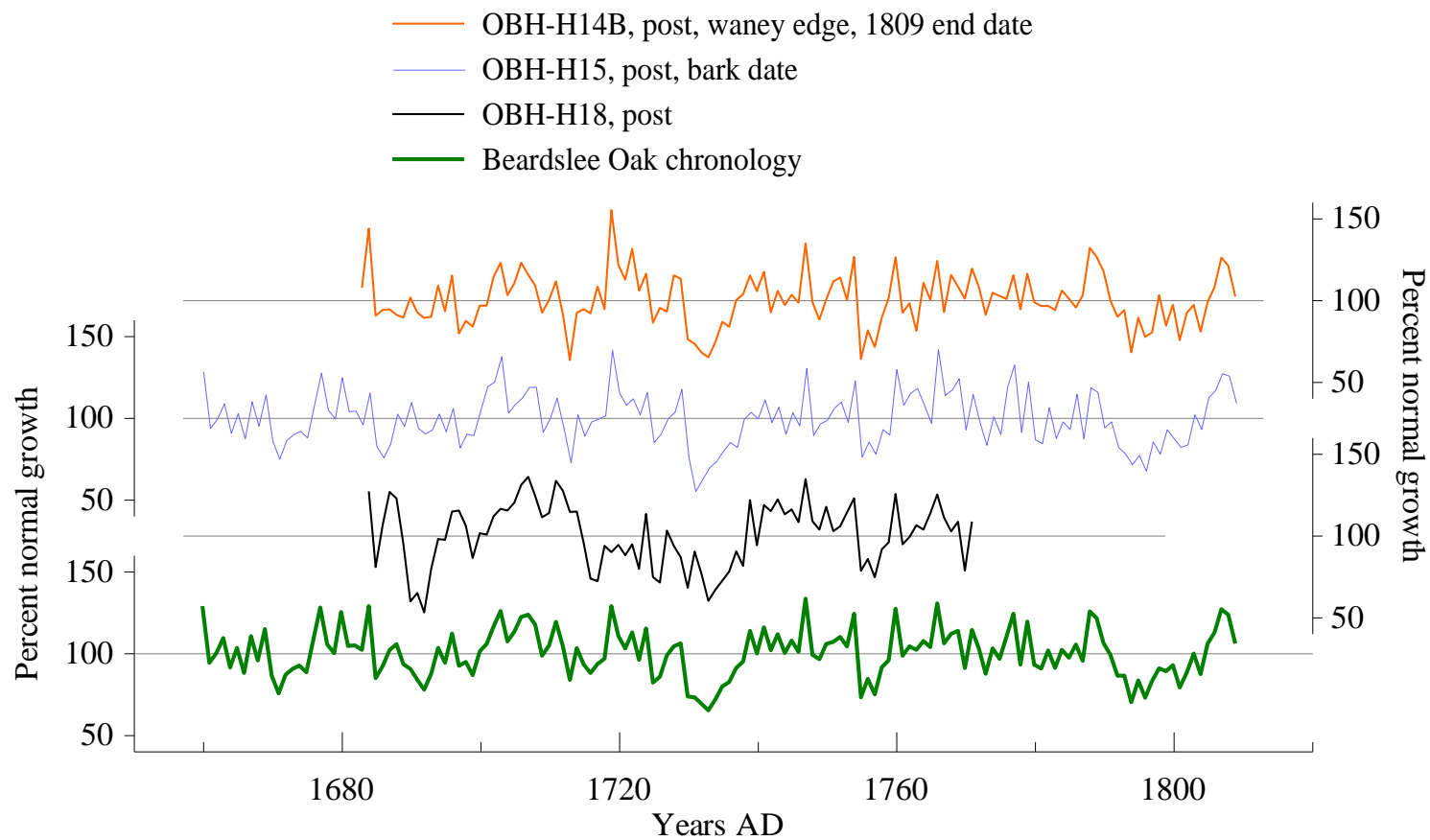


Figure 2. The oak sample data sets with the normal growth trend removed. See Figure 4 for a comparison of the Beardslee Oak Chronology with the NE North American oak chronology.

Beardslee House, Tavern, and Hop Barn, New Berlin, Otsego County, New York

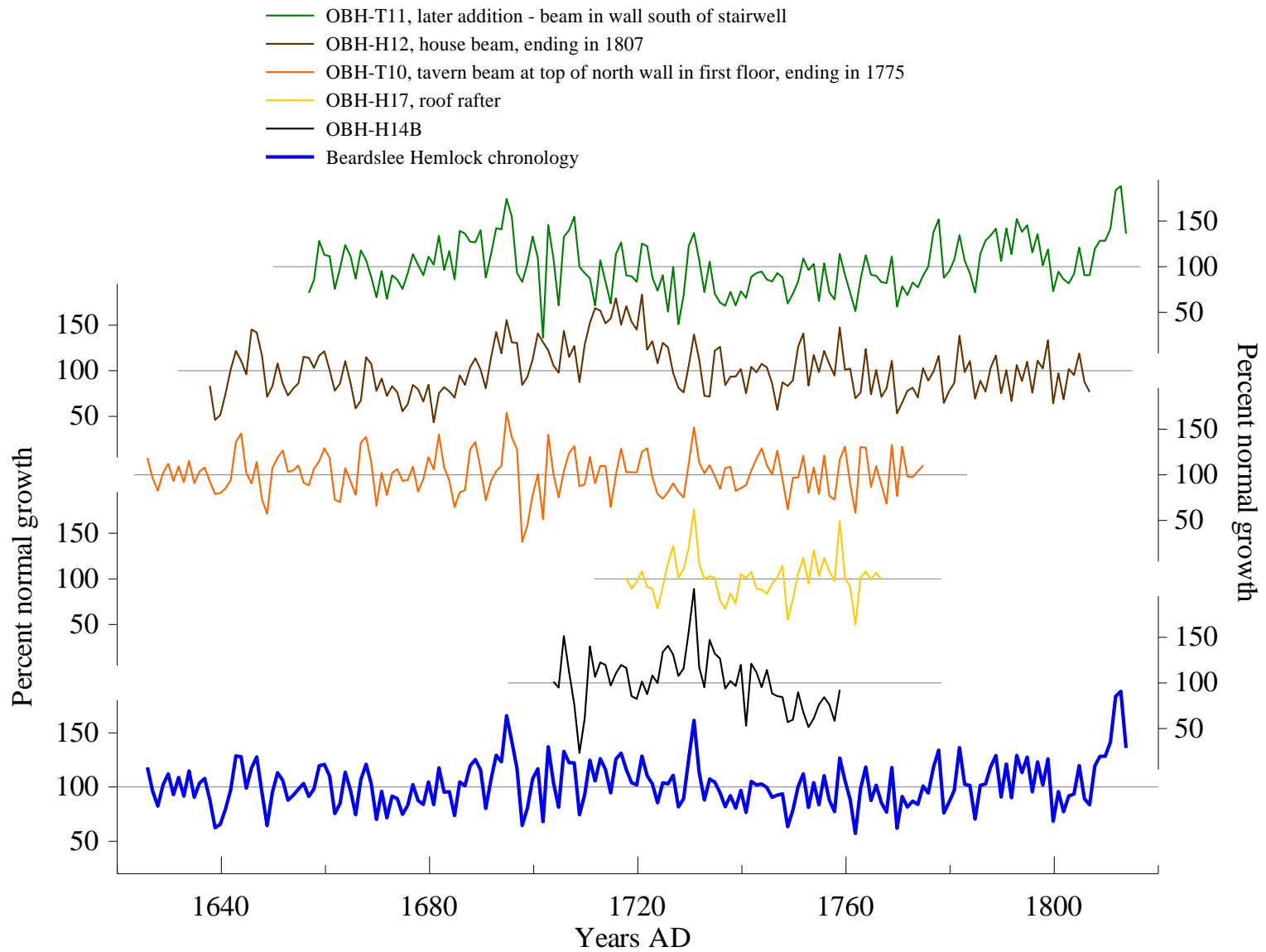


Figure 3. The hemlock samples, both from tavern and house, and the Beardslee hemlock chronology. See Figure 4 for comparison with the NE North American hemlock chronology for placement in time.

Beardslee House, Tavern, and Hop Barn, New Berlin, Otsego County, New York

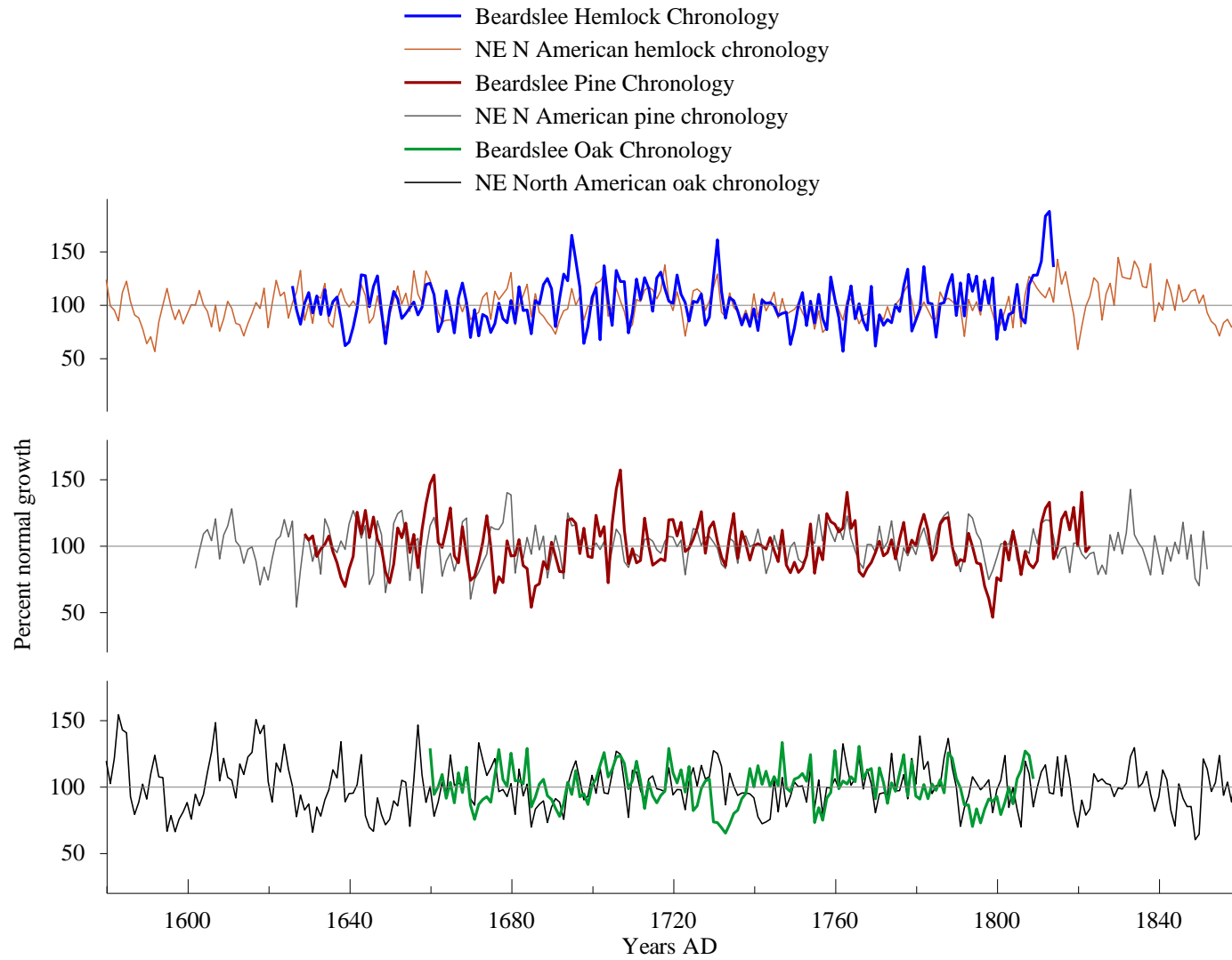


Figure 4. Each species chronology containing the appropriate Beardslee samples compared with that species chronology for northeastern North America. Statistical test values between the site and regional chronologies are listed on page 8.