



The Historical Dendroarchaeology of the Hoskins House, Tannenbaum Historic Park, Greensboro, North Carolina



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Abstract

The Hoskins House is a two-story, single pen log structure located in Tannenbaum Historic Park, Greensboro, North Carolina. The house is thought to have been built by Joseph Hoskins, who lived in Guilford County from 1778 until his death in 1799. Previous archaeological testing of soil around the house yielded over 1000 artifacts, and the ceramics of these gave a Mean Ceramic Date (MCD) of 1810 as a possible initial year of construction. Our objective was to date the outermost rings on as many logs as were accessible in the Hoskins House to determine the year or range of years when the house was likely built. We compared 37 ring-width measurement series from 28 logs with a composite reference chronology created from three individual oak chronologies from Virginia. We found that the majority (if not all) of the 28 logs were cut over a 3-year period from 1811 to 1813, verifying the initial MCD of 1810. Independent verification of our crossdating of these cores was performed by members of the Oxford Dendrochronology Laboratory working in nearby High Point, North Carolina.

Introduction

The Battle of Guilford Courthouse in Guilford County, North Carolina, took place on March 15, 1781 (Baker 2005), and is considered "... the largest, most hotly-contested action of the Revolutionary War's climactic Southern Campaign" (National Park Service (NPS) 2006). Approximately 1,900 British soldiers marched up New Garden Road toward the small, log-house

style courthouse that formed the judicial seat of the county, and faced a much larger army of 4,500 American militia made up of companies from neighboring states. A two and a half hour battle eventually forced the American militia led by General Nathaniel Greene into retreat. Today, the battle site is preserved and maintained by the National Park Service's Guilford Courthouse National Military Park (NPS 2006). Adjacent to this park, Tannenbaum Historic Park preserves the place where the Battle of Guilford Courthouse began (Greensboro Parks and Recreation (GPR) 2006).

This 7.5-acre park is dedicated to sharing the story of the Hoskins family and colonial life before, during, and after this pivotal battle in the American Revolution. Joseph Hoskins, his wife Hannah, and their family left Chester County, Pennsylvania, in the spring of 1778, mainly to escape the difficulties brought on by the Revolutionary War as their home was located in close proximity to Valley Forge (GPR 2006). The main structures in the historic park currently consist of a two-story, single-pen, 18 X 24 ft log house (Figure 1), a renovated kitchen (called the "cookhouse" in the original Register of Historic Places registration form, NPS 1988) placed adjacent to this house, and an impressive double-pen cantilever barn known as the "Coble Barn" (NPS 1988). The kitchen structure had been brought in from a location outside the park, while the barn had been relocated from southern Guilford County (NPS 1988; Stine et al. 2003). Only the two-story log house is likely original to the property. The year of construction of this log house is the focus of this study.

In 1999, three 5 x 5 ft test units were excavated around the log house which yielded 1,435 artifacts ranging from the Revolutionary War era through the 20th century (Stine et al. 2003; Stine 2005). Many of these artifacts were wire nails (n = 185, dating ca. post-1830) and machine cut nails (n = 94, dating ca. 1790 to ca. 1830). Curiously, no 18th century hand-wrought nails

(ca. pre-1790) were located in any surveys, suggesting that a date of construction for the log house contemporary with the Revolutionary War was not likely. Most important, however, were the ceramics. The ranges of years for the manufacture of specific ceramic types can be averaged to provide a Mean Ceramic Date (MCD, after South 1977). The ceramics in the 1999 collection of artifacts provided a MCD of 1810 (Stine 2005).

Historical Dendroarchaeology

Dendroarchaeological research on historic structures in the southeastern U.S. has increased dramatically in recent years. Bowers and Grashot (1976) first analyzed the possible construction years for structures at President Andrew Jackson's First Hermitage plantation just outside Nashville, Tennessee, but were not able to develop cutting dates for logs used in these structures. Later, Stahle (1979) formalized methods and techniques used in dendroarchaeology in the southeastern U.S. by evaluating the construction histories of numerous log buildings throughout Arkansas. Mann (2002) was the first to combine techniques commonly employed in historical archaeology (assessing the range of years associated with recovered ceramics, nails, and window glass) with tree-ring dating techniques to accurately date the year of construction of a supposed historic blockhouse in eastern Tennessee. Such studies are proving invaluable because many agencies charged with managing historical sites wish to authenticate the reported dates of construction on these log structures. Occasionally, these accepted dates of construction are questionable (e.g., Mann 2002; Grissino-Mayer and van de Gevel 2006) and many structures throughout the Southeast require verification. This verification can be accomplished using dendrochronological techniques that use reference tree-ring chronologies that currently exist for much of the U.S. The process is simple: determining the degree of clustering associated with

crossdated cutting dates on logs used in these structures can provide a reasonable range of years when the structure was completed and later occupied (Stahle 1979).

Objective

Our primary objective was to determine the exact year or years when logs were cut and eventually used to build the two-story log house known as the Joseph Hoskins House at Tannenbaum Historic Park. We will use established dendrochronological techniques to date the tree rings in the sampled logs to their exact year of formation. We will then evaluate the outermost partial or complete rings on all sampled logs to assess when the trees were cut that were eventually used to construct this house.

Methods

Field Methods

We extracted at least one core from all accessible logs in the cabin using a custom-made tubular drill bit attached to a variable-speed power hand drill (Figure 2). Cores were taken from both the first and second floors. Cores were labeled by building code (HOS), compass direction of the side of the house (1 letter), log number (beginning with the bottom log = “01” and numbering sequentially upward), and core letter. By convention, “A” is a core taken from the left side of the log and “B” is a core taken from the right side of log, as one faces the log. Cores extracted in intermediate locations are assigned letters “C” and higher. For example, “HOSS09A” represents a core taken from Hoskins House, South side, log 09, core A (left side).

Cores were taken primarily from the lower curved surfaces of the logs, although some cores extracted from logs sampled in the second floor were taken from the upper curved surface.

These lower and upper curved surfaces are sampled because often complete sapwood is present and the outermost rings were likely preserved because of the mud chinking that was always placed between logs to insulate the structure. On logs with clearly defined outer surfaces, we drilled into the log approximately 0.25 inch, then removed the bit and marked the outer surface of core with black ink to verify that the outermost rings remained intact after coring. We then reinserted the drill bit and drilled until we reached the center portion of the log based on a visual assessment. The core was then separated from the log using a special cutting tool inserted alongside the core, extracted, and immediately fastened with wood glue to specially-designed wooden core mounts. The mounted cores were appropriately labeled and allowed to dry several days before sanding with progressively finer grit sandpaper (Orvis and Grissino-Mayer 2002) back in the laboratory.

Internal Crossdating

Absolute dating was accomplished by first dating each series of tree rings against all others (“internal crossdating”) using both graphical and statistical crossdating techniques to create an undated (or “floating”) tree-ring chronology (Swetnam et al. 1985; Stokes and Smiley 1996; Grissino-Mayer 2001). Once the tree-ring series had been temporally placed relative to each other, this floating chronology was crossdated against a set of regional oak tree-ring chronologies (“external crossdating”). The internal crossdating process began by assigning the innermost complete ring on each core the relative year “1” and marking every subsequent tenth ring with mechanical pencil. We then created skeleton plots of all cores to relatively crossdate the tree rings of each series against all others. Skeleton plots rely on matching patterns of the narrower tree rings in one series against plots of the other series to ensure correct temporal

placement. We then measured the widths of all tree rings to 0.001 mm accuracy with a Velmex measuring stage coupled with MEASURE J2X software.

Statistical Verification of External Crossdating

Absolute (“external”) crossdating was accomplished by using COFECHA to compare the undated master chronology with a composite chronology created from three regional oak chronologies from Virginia, archived in the International Tree-Ring Data Bank (ITRDB). All three chronologies were collected and created by Dr. Edward R. Cook of the Lamont-Doherty Earth Observatory at Columbia University:

1. VA009, Blue Ridge Parkway, chestnut oak (*Quercus montana* Michx.), located at 37°33’N, 79°27’W, spanning 1587 to 1982;
2. VA016, Watch Dog, Massenhutten Mountain, chestnut oak, located at 38°30’N, 78°21’W, spanning 1642 to 1981; and,
3. VA017, Patty’s Oaks, Blue Ridge Parkway, white oak, (*Quercus alba* L.), located at 37°55’N, 79°48’W, spanning 1569 to 1982.

We confirmed the graphical crossdating and relative placements of all tree-ring series using COFECHA, a quality-control program that uses segmented time-series correlation techniques to confirm the temporal placements of all tree rings (Holmes 1983). Because crossdating is essentially a “high-frequency” process (pattern matching of sequences of individual rings), COFECHA removes all low-frequency trends using both spline-fitting algorithms and autoregressive modeling (Grissino-Mayer 2001). Such trends could also arise due to natural and human disturbances that otherwise could mask the climate signal desirable for accurate crossdating. COFECHA then tests consecutive 40-yr segments (with 20-yr overlaps) on

each series with a temporary master chronology created from all other series. Crossdating is verified when the correlation coefficient for each tested segment exceeds 0.37 ($p < 0.01$), although coefficients are usually much higher (for example, $r > 0.55$, $p < 0.0001$). The final placement made by COFECHA had to be convincing graphically (similar patterns in wide and narrow rings) and statistically. Once confirmed, we assigned absolute years to all individual rings in each measurement series.

Cutting Dates for Logs

Cutting dates for logs were obtained by noting the outermost ring on all cores extracted from logs that had intact outer surfaces. By convention, symbols are assigned to help evaluate the possible year of cutting (Bannister 1962; Nash 1999):

- B: bark is present, indicating the outer ring is fully intact (certainly a cutting date);
- r: outermost ring is continuous and intact around a smooth surface, but no bark is present (considered a cutting date);
- v: the date is within a few years of the cutting date, based on presence of sapwood (near cutting date);
- vv: impossible to determine how far the outer ring is from the true outer surface (no sapwood and rings in the heartwood could also be missing).

Results

Descriptive Statistics

The average mean sensitivity was 0.21 (lowest = 0.12 for core HOSS07A; highest = 0.33 for core HOSE10B; Table 1), higher than the average reported for 16 other white oak

chronologies from the eastern and central U.S. (average of 0.16, with upper 95% confidence limit of 0.20; Dewitt and Ames 1978). The average interseries correlation for the 37 cores was 0.65 (lowest $r = 0.29$ for core HOSW06B, $n = 105$ years; highest $r = 0.86$ for core HOSN09B, $n = 41$ years, Table 1). This value is exceptional by dendrochronological standards, and especially considering that hardwood species generally have lower interseries correlations than do conifer species.

Internal Crossdating

Most logs sampled were cut from species in the white oak group, most likely white oak (*Quercus alba* L.). Of 53 cores extracted from the cabin, 37 samples from 28 logs could be conclusively crossdated (their measurements are included in Appendix 1). Of 105 40-yr segments tested by COFECHA in these 37 measurement series, only eight segments were flagged by the COFECHA software because of possible errors (Table 1; Appendix 2), but inspection of these segments indicated correct temporal placements. Such flagged segments occasionally arise due to erratic ring sequences caused by local disturbances affecting the ring patterns (such as wildfires) rather than representing misdated ring segments. Sixteen cores could not be crossdated, either internally against other cores or externally against the reference chronologies, and were excluded from further analysis. These cores included those that (1) contained an insufficient number of rings (less than 30), (2) contained injuries that caused erratic ring sequences, or (3) represented tree species with rings that were barely discernible (e.g., tulip poplar, *Liriodendron tulipifera* L.).

External Crossdating

Comparison of the standard index chronology created from the Hoskins House measurement series graphically with the composite reference chronology created from the three oak chronologies in Virginia revealed a strong agreement (Figure 3). This graphical agreement was verified statistically using the COFECHA by first comparing the undated chronology created from the Hoskins House with the composite reference chronology. We found that that all 40-yr segments (lagged 10 yrs) tested significantly (average $r = 0.51$, $n = 40$, $t = 3.65$, $p < 0.001$) against the composite chronology with a dating adjustment of +1723, suggesting that our chronology for the Hoskins House was now anchored from 1723 to 1831. The correlation between the two data sets was statistically significant over the period 1723 to 1813 ($r = 0.45$, $n = 89$, $t = 4.7$, $p < 0.0001$). This shorter period was used for statistical testing because only one sample (HOSW06B, likely a replacement log) extended the chronology from 1813 to 1831.

Discussion

The trees that were harvested and eventually used to construct the Hoskins House were clearly cut within a three-year period in the years 1811, 1812, and 1813. Four oak trees had outermost dates of 1811, which indicated the initial cutting of trees, but the majority of trees used in the log structure were cut in the year 1812 (13 trees). Eight trees in our final sample of 28 logs were then harvested in the year 1813. Closer inspection of the 1813 tree rings on these eight logs suggest that the 1813 ring may be a partial ring. The earlywood is clearly formed on all eight logs, but the latewood on all eight appears narrower than on preceding rings, suggesting the latewood is partial. This strongly suggests that these eight oak trees were likely harvested in the

late spring or early summer of the year 1813. No earlywood vessels for the year 1814 were found on any core. We propose that the Hoskins House was completed in the summer or fall of 1813.

Only three logs had outermost dates other than the 1811–1813 range of years. One log (HOSN06) had an outermost ring of 1810, which occurred because the outer rings had obviously disintegrated during sampling (no ink mark was visible on the outer ring on the core). Another log (HOSE10) had an outermost ring in the year 1806 but the additional outer rings were indistinct on this core due to decay. Finally, one log (HOSW06B) curiously had an outermost ring of 1831. We believe this core may have been extracted from a partial log (number 6 on the west wall) that had been inserted as a replacement log, as partial replacement logs were common in the structure. To support this, the log was also the oldest of any log sampled in the Hoskins House, suggesting that it was not part of the original log structure. The rings in this log also had a lower than average interseries correlation with the other logs (0.29) which further suggests this tree came from a different stand of trees than those used in the log structure. However, because the series of rings in this log still has a statistically significant correlation, despite it being lower, we believe this tree came from the immediate vicinity of the region.

To ensure the veracity of the dates of tree rings obtained for the 37 cores sampled from the Hoskins House, we passed our tree-ring measurements to an independent tree-ring expert who is currently analyzing the construction years for many historic structures throughout the eastern United States. Mr. Daniel Miles is a co-founder (along with Michael J. Worthington) of the Oxford Dendrochronology Laboratory in Oxford, England, an independent tree-ring dating facility that maintains close ties with the Research Laboratory for Archaeology and the History of Art at Oxford University. Mr. Miles has recently been examining the years of construction for another famous historic structure located in nearby High Point, North Carolina. He was able to

verify, using his recently developed tree-ring data, that the outermost rings on the logs from the Hoskins House did indeed date to the period 1811 to 1813 (Daniel Miles, personal communication, 25 March 2006).

The early 1800s construction date is also supported by the number of rings found in each log. We have found that log structures built from the oldest trees in a region that had not witnessed considerable settlement-era logging often display a considerable number of rings in the logs. For example, 30 oak logs at the Rocky Mount historic site in northeastern Tennessee had an average of 99 rings per log (Grissino-Mayer and van de Gevel 2006). Ring counts on logs from Abraham Lincoln's Boyhood Cabin, located just north of Hodgenville, Kentucky, showed an amazing 150 rings per log, strongly suggesting the cabin was constructed from old-growth oak and tulip poplar logs. Alternatively, the number of rings on logs used to reconstruct Abraham Lincoln's birthplace log cabin averaged only 40 rings, indicating this structure could not date to the year 1809, the year of Lincoln's birth (the trees were in fact, cut in the 1840s and 1850s, proving the cabin is a hoax). The average number of rings found in the 28 logs in the Hoskins House was 61, strongly suggesting that these trees had not been growing in an old-growth stand of trees when harvested. Instead, these oak trees could have been come from a second-growth forest in the vicinity, or these trees could represent residual trees left over from the initial cutting that took place on the property during the early phases of settlement. The property was believed settled as early as 1762 by Robert Mitchell, who at one time was thought to be the builder of the Hoskins House (NPS 1988).

After the death of Joseph Hoskins in 1799, the property was passed to his two sons, Joseph and Ellis (Stine et al. 2003). The will stipulated that the portion of the property with the house go to his son Joseph, but the property must have eventually passed into the hands of his

son Ellis who eventually deeded the property to his son J.E. Hoskins (Stine et al. 2003). Therefore, the log house located at Tannenbaum Historic Park may be more correctly called the “Ellis Hoskins House” rather than the “Joseph Hoskins House” (Adrienne Byrd, personal communication, 3 April 2006).

The correspondence of the 1811–1813 cutting dates for the logs used in the Hoskins House with the Mean Ceramic Date of 1810 (Stine et al. 2003) is nothing short of remarkable and a testament to the efficacy of dating techniques based on the assessment of historical artifacts recovered from soil tests at historic sites. Mann (2002) summarized the techniques used to develop a MCD, after South (1977). The MCD is obtained by taking the sum of the artifacts making up the median date for the manufacturing date range for each ceramic shard and then multiplying by the total frequency, or the count in any given interval, and dividing the sum by the number of shards in the total population. Using these techniques, Mann (2002) obtained a MCD of 1852 for the Swaggerty Blockhouse in eastern Tennessee. Tree-ring dating of 10 logs from this historic structure revealed all trees had been cut in the spring of 1860, and not in 1787 as was once believed. Mann (2002) and Stine et al. (2003) clearly demonstrate the importance of using complementary techniques from both historical archaeology and dendrochronology to establish (1) construction dates of historic structures, (2) the duration of occupation of historical sites, and (3) how such historic sites were used by its occupants.

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Table 1. Descriptive statistics for all 37 crossdated cores extracted from 28 logs from the Hoskins House.

Core Number	Core Identification	Begin Year	End Year	Total Rings	Segments Tested	Segments Flagged	Series Intercorrelation	Mean Sensitivity
1	HOSN03A	1755	1800	46	3	0	0.835	0.253
2	HOSN03B	1754	1813	60	3	0	0.751	0.250
3	HOSN04A	1763	1803	41	2	0	0.741	0.172
4	HOSN06B	1761	1810	50	2	0	0.609	0.275
5	HOSN07A	1735	1785	51	3	0	0.585	0.210
6	HOSN08A	1750	1796	47	2	0	0.656	0.222
7	HOSN08B	1749	1813	65	3	0	0.750	0.228
8	HOSN09A	1759	1812	54	3	0	0.748	0.190
9	HOSN09B	1767	1807	41	2	0	0.863	0.208
10	HOSN11A	1743	1812	70	3	0	0.745	0.197
11	HOSN12B	1736	1813	78	4	0	0.692	0.225
12	HOSE04B	1723	1811	89	4	0	0.568	0.194
13	HOSE05A	1732	1812	81	4	0	0.667	0.202
14	HOSE07A	1772	1807	36	1	0	0.704	0.232
15	HOSE08A	1739	1805	67	4	0	0.644	0.203
16	HOSE08B	1751	1812	62	3	0	0.708	0.205
17	HOSE09A	1755	1812	58	3	0	0.759	0.195
18	HOSE10B	1761	1797	37	1	0	0.655	0.325
19	HOSS03A	1761	1813	53	2	0	0.787	0.196
20	HOSS05A	1733	1813	81	4	1	0.491	0.202
21	HOSS05B	1733	1795	63	3	1	0.540	0.199
22	HOSS06A	1742	1812	71	3	0	0.752	0.224
23	HOSS06B	1752	1802	51	3	0	0.826	0.243
24	HOSS07A	1745	1812	68	3	1	0.433	0.124
25	HOSS07B	1752	1812	61	3	1	0.405	0.177
26	HOSS08A	1760	1812	53	2	0	0.752	0.199
27	HOSS09A	1749	1806	58	3	0	0.724	0.197
28	HOSS09B	1744	1811	68	3	0	0.758	0.212
29	HOSW06A	1760	1812	53	2	0	0.805	0.222
30	HOSW06B*	1727	1831	105	4	2	0.293	0.207
31	HOSW06C	1760	1812	53	2	0	0.777	0.184
32	HOSW07C	1747	1813	67	3	0	0.723	0.163
33	HOSW09A	1750	1813	64	3	0	0.548	0.176
34	HOSW10A	1763	1812	50	2	0	0.793	0.174
35	HOSW11A	1745	1811	67	3	2	0.310	0.203
36	HOSW12A	1728	1812	85	4	0	0.613	0.239
37	HOSW14A	1742	1800	59	3	0	0.470	0.207
Total or Mean					105	8	0.647	0.207

* HOSW06B is not similar in length or appearance to cores HOSW06A and HOSW06C, suggesting to us this could be a core extracted from a (partial) replacement log.

Table 2. Cutting or outermost dates for the 28 logs sampled from the Hoskins House.

Log Number	Log Identification	Inner Ring	Last Measured Ring	Outer Ring	Outer Ring Type	Comments
1	HOSN03	1754	1813	1813	r	Cutting date
2	HOSN04	1763	1803	1813	r	Outer rings crossdated, not measured. Cutting date.
3	HOSN06	1761	1810	1810	v	Near cutting date
4	HOSN07	1735	1785	1812	r	Outer rings crossdated, not measured. Cutting date.
5	HOSN08	1749	1813	1813	r	Cutting date
6	HOSN09	1759	1812	1812	r	Cutting date
7	HOSN11	1743	1812	1812	r	Cutting date
8	HOSN12	1736	1813	1813	r	Cutting date
9	HOSE04	1723	1811	1811	r	Cutting date
10	HOSE05	1732	1812	1812	r	Cutting date
11	HOSE07	1772	1807	1812	r	Outer rings crossdated, not measured. Cutting date.
12	HOSE08	1739	1812	1812	r	Cutting date
13	HOSE09	1755	1812	1812	r	Cutting date
14	HOSE10	1761	1797	1806	vv	Outer rings unclear, not measured.
15	HOSS03	1761	1813	1813	r	Cutting date
16	HOSS05	1733	1813	1813	r	Cutting date
17	HOSS06	1742	1812	1812	r	Cutting date
18	HOSS07	1745	1812	1812	r	Cutting date
19	HOSS08	1760	1812	1812	r	Cutting date
20	HOSS09	1744	1811	1811	r	Cutting date
21	HOSW06A	1760	1812	1812	r	Cutting date
22	HOSW06B*	1727	1831	1831	r	Cutting date, likely a portion of replacement log.
23	HOSW07	1747	1813	1813	r	Cutting date
24	HOSW09	1750	1813	1813	r	Cutting date
25	HOSW10	1763	1812	1812	r	Cutting date
26	HOSW11	1745	1811	1811	r	Cutting date
27	HOSW12	1728	1812	1812	r	Cutting date
28	HOSW14	1742	1800	1811	r	Outer rings crossdated, not measured. Cutting date.

* HOSW06B is not similar in length or appearance to cores HOSW06A and HOSW06C, suggesting to us this could be a core extracted from a (partial) replacement log.



Figure 1. The Joseph Hoskins House, located at Tannenbaum Historic Park, Greensboro, North Carolina. The log structure is currently covered with clapboard siding. The house is believed to date to the Revolutionary War period (ca. 1781), but archaeological testing suggests a later date of construction (Stine 2005).



Figure 2. Joe Henderson shown extracting a core from the rounded portion of a log in the Hoskins House with a hollow tubular drill bit.

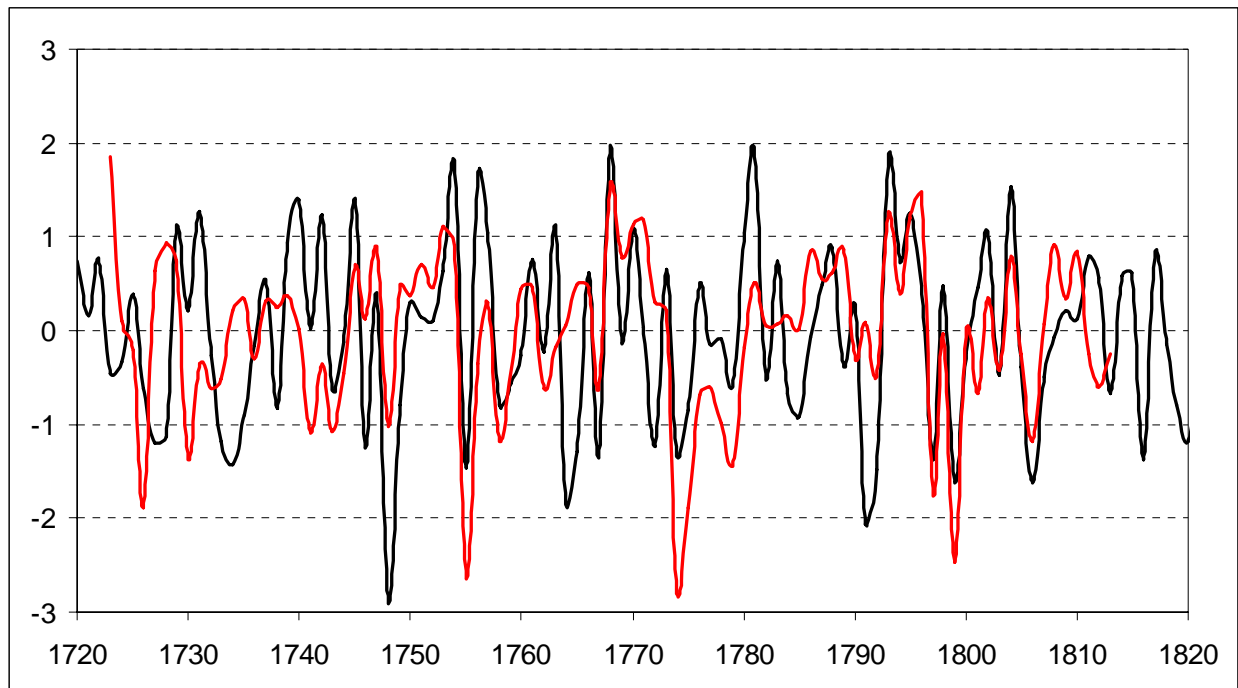


Figure 3. Comparison of the Hoskins House master chronology (red) with the composite created from the three oak chronologies located in Virginia (black). Values on the y-axis are dimensionless indices.

Appendix 1. Ring-width measurements for the 37 series from 28 logs sampled at the Hoskins House, Greensboro, North Carolina. The data are archived in internationally accepted Tucson (or Decadal) format for tree-ring data. Measurements below are in 0.001 mm format, e.g. a value of 1705 is actually 1.705 mm in width. The value “-9999” is an end-of-series sentinel.

HOSN03A	1755	653	1850	1705	934	1655					
HOSN03A	1760	2225	2068	1754	1312	1388	1516	2024	1517	2246	2042
HOSN03A	1770	2973	3182	2485	2367	870	1252	1715	1793	1601	1440
HOSN03A	1780	1926	2819	2123	2226	2148	2170	2476	2186	2608	2238
HOSN03A	1790	1827	2247	1681	2033	1479	2171	1642	1089	1330	935
HOSN03A	1800	1102	-9999								
HOSN03B	1754	2539	706	1659	1943	1283	1938				
HOSN03B	1760	2447	2237	1959	1399	1740	1514	1778	1295	2339	1925
HOSN03B	1770	2725	3464	2608	2843	939	1511	2001	1997	1737	1435
HOSN03B	1780	1792	2651	1990	2214	2243	2320	2763	2419	2617	2210
HOSN03B	1790	1774	1940	1524	1725	1191	1891	1185	844	1379	991
HOSN03B	1800	1482	1448	1744	1466	1642	1465	1543	1700	1725	1224
HOSN03B	1810	1239	1318	1306	1129	-9999					
HOSN04A	1763	4009	3966	3786	3885	2511	2950	2321			
HOSN04A	1770	2531	2851	2059	1855	1147	946	983	978	1082	1332
HOSN04A	1780	1804	2103	1368	1866	1470	1449	2280	2391	2615	2694
HOSN04A	1790	2741	2415	2716	3014	2498	2894	2909	1869	2245	1596
HOSN04A	1800	1983	1570	1722	1821	-9999					
HOSN06B	1761	887	671	965	611	1445	1833	1662	3668	1602	
HOSN06B	1770	1781	1125	1134	1148	803	925	929	1658	1398	995
HOSN06B	1780	1177	1972	1474	1287	1519	1667	1928	1635	1646	1636
HOSN06B	1790	1527	1755	2700	4662	3626	4593	3743	1747	2823	1775
HOSN06B	1800	2688	2007	2448	2104	2657	2254	2527	3277	2727	2260
HOSN06B	1810	2673	-9999								
HOSN07A	1735	1398	1053	1074	705	1150					
HOSN07A	1740	1002	1028	979	779	743	671	952	1292	1391	1472
HOSN07A	1750	1631	2183	2384	1951	2464	1007	1253	1188	863	1467
HOSN07A	1760	1400	1151	900	1373	1338	1197	1303	975	1688	1153
HOSN07A	1770	1659	1488	1142	979	834	1115	1131	1141	1096	905
HOSN07A	1780	1281	1239	998	1291	1317	955	-9999			
HOSN08A	1750	1892	2746	2342	3274	1500	960	1152	1262	1033	1324
HOSN08A	1760	1629	2093	2074	2416	2304	1952	1976	1569	2679	2305
HOSN08A	1770	2785	2291	1802	2025	963	1690	1914	1705	1531	1116
HOSN08A	1780	1948	1872	1703	1837	1896	2197	3339	2355	2130	1661
HOSN08A	1790	1571	1310	1272	1460	2110	2316	2642	-9999		
HOSN08B	1749	2363									
HOSN08B	1750	2783	2694	1927	2611	1450	1039	1428	1267	998	1392
HOSN08B	1760	1590	1909	1742	2028	2009	1678	1650	1330	2408	2558
HOSN08B	1770	2107	2801	1809	1910	762	1467	1573	1540	1280	889
HOSN08B	1780	1902	2134	1871	1940	1992	2422	3379	2905	2477	2136
HOSN08B	1790	1654	1323	1159	1364	1485	1925	2564	1314	1604	783
HOSN08B	1800	1707	1382	1568	1307	1410	1235	1189	1200	1268	1539
HOSN08B	1810	1302	1129	1002	1012	-9999					
HOSN09A	1759	1410									
HOSN09A	1760	3125	2635	1655	3758	4314	4091	3112	2582	4487	2929
HOSN09A	1770	3048	3005	2913	2696	1381	1434	1449	1528	1094	1067
HOSN09A	1780	1322	2124	2116	2328	2654	2308	2801	2526	2585	2497
HOSN09A	1790	2149	2254	2458	3040	3054	3512	3235	1678	2230	1721
HOSN09A	1800	2376	2253	2537	2119	1883	1918	1896	2405	2074	2012
HOSN09A	1810	2587	2356	1981	-9999						
HOSN09B	1767	2055	4060	2808							

HOSN09B	1770	3306	3154	2288	2596	1232	1116	1045	1287	1257	1096
HOSN09B	1780	1655	2250	1759	1638	2125	2112	2527	1988	2236	2401
HOSN09B	1790	1983	2184	2194	3108	2640	3324	3061	1473	2029	1571
HOSN09B	1800	2035	2143	2408	2449	2766	2047	1878	2186	-9999	
HOSN11A	1743	1101	1604	2028	1411	1356	1185	2086			
HOSN11A	1750	1315	1872	2568	2683	2345	1155	2281	2389	1636	1710
HOSN11A	1760	1526	1831	1340	1407	1586	1552	1699	1494	2005	1759
HOSN11A	1770	1969	2118	1489	1558	933	998	1420	1189	1203	899
HOSN11A	1780	1107	987	1167	1409	1287	1180	1223	1625	1651	1776
HOSN11A	1790	1372	1222	1308	1590	1534	1717	2003	1313	1725	1103
HOSN11A	1800	1728	1171	1250	1095	1327	1067	914	1112	1135	1212
HOSN11A	1810	1248	1075	1057	-9999						
HOSN12B	1736	476	1685	1959	371						
HOSN12B	1740	377	672	1436	995	1372	2070	1661	1717	1222	1634
HOSN12B	1750	1808	1699	1135	1516	2102	913	1542	1592	1407	1457
HOSN12B	1760	1810	1629	1479	1797	1535	1986	1817	1404	1955	1342
HOSN12B	1770	1539	1951	1381	1096	765	675	700	629	741	689
HOSN12B	1780	831	782	899	832	831	1140	1294	1162	1198	1295
HOSN12B	1790	1023	1004	879	1154	951	1334	1326	953	1050	703
HOSN12B	1800	931	830	775	808	1200	1016	941	954	1046	975
HOSN12B	1810	955	798	643	664	-9999					
HOSE04B	1723	1797	1582	1545	1315	1756	1589	1708			
HOSE04B	1730	978	1587	1550	1554	2534	1575	1616	2112	2016	3060
HOSE04B	1740	1530	998	1603	1215	1102	1280	1432	1336	1311	1618
HOSE04B	1750	1442	1492	1589	1382	1287	700	1216	1250	1237	1284
HOSE04B	1760	1756	1281	1074	992	1122	1123	1218	988	1717	1235
HOSE04B	1770	1201	1285	1150	1048	651	787	1317	1153	978	990
HOSE04B	1780	1148	1021	853	1289	1236	1161	1361	1465	1447	1322
HOSE04B	1790	1577	1404	1084	1577	1009	1331	1358	1138	1188	979
HOSE04B	1800	771	894	975	775	950	991	832	651	877	787
HOSE04B	1810	732	543	-9999							
HOSE05A	1732	1261	746	2120	2313	2172	1537	1131	1881		
HOSE05A	1740	1617	886	1015	754	1045	1369	1144	1298	819	1341
HOSE05A	1750	1427	1400	1533	1175	1669	986	1198	1504	1462	1602
HOSE05A	1760	1666	2127	1851	2122	1976	2113	1638	1427	2095	1994
HOSE05A	1770	2091	1482	1233	908	845	795	1095	1077	893	781
HOSE05A	1780	1271	957	1112	1268	1382	1615	1994	1853	1985	1947
HOSE05A	1790	1778	1628	1688	1961	1740	2124	3449	1927	1936	1357
HOSE05A	1800	1866	1822	1795	1565	1743	1458	1274	1198	1669	1535
HOSE05A	1810	1777	1729	1887	-9999						
HOSE07A	1772	2510	2163	938	880	892	743	556	730		
HOSE07A	1780	1254	1603	1440	1448	1353	1309	1935	1959	1603	1617
HOSE07A	1790	1391	1893	1527	2207	2047	2620	2108	920	1353	1090
HOSE07A	1800	2151	1925	2319	2117	1981	1465	2006	2210	-9999	
HOSE08A	1739	1156									
HOSE08A	1740	1139	718	829	1340	1966	2487	1685	2763	1570	1319
HOSE08A	1750	1923	2066	1722	2035	2001	885	1030	1413	953	1080
HOSE08A	1760	1346	1373	891	920	921	1219	1042	860	1297	1092
HOSE08A	1770	1182	1294	1220	1150	694	683	983	929	749	1206
HOSE08A	1780	1349	1426	1310	1470	1463	1075	1121	1031	1170	898
HOSE08A	1790	835	1061	987	1312	844	1057	875	902	967	822
HOSE08A	1800	993	926	1116	941	1048	1106	-9999			
HOSE08B	1751	1686	1702	1923	2021	708	1336	1626	1081	1056	
HOSE08B	1760	1674	1446	1062	881	1588	1517	1333	1320	2082	2010
HOSE08B	1770	1694	1821	2002	1958	1096	1001	1496	1386	1080	1252
HOSE08B	1780	1705	2449	2423	1774	1957	1702	1664	1384	1167	1373
HOSE08B	1790	1189	1107	833	980	874	1356	1117	1021	1088	795

HOSE08B	1800	1056	905	1333	1182	1560	1456	1064	1060	1477	1347
HOSE08B	1810	1290	1217	1059	-9999						
HOSE09A	1755	943	1242	1516	998	2073					
HOSE09A	1760	2315	1538	1462	1496	1852	2051	1784	1444	1963	1929
HOSE09A	1770	2447	2749	1891	1697	799	879	1024	1128	1189	1672
HOSE09A	1780	2374	3132	2583	2255	1924	1697	2341	1819	2217	2475
HOSE09A	1790	1889	2135	1693	2230	2112	2256	2018	1198	1598	1209
HOSE09A	1800	1477	1374	1329	1113	1119	1011	1029	1370	1440	1236
HOSE09A	1810	1393	1298	1212	-9999						
HOSE10B	1761	3050	2933	689	850	1603	2318	2225	3103	2241	
HOSE10B	1770	2061	881	1685	1313	474	2324	2473	1911	2575	1377
HOSE10B	1780	2409	3302	2210	2123	1955	2070	2498	3181	3117	3172
HOSE10B	1790	2607	2368	1941	2610	2364	2344	2185	1425	-9999	
HOSS03A	1761	1534	1870	3057	2192	1799	2701	2330	3466	3357	
HOSS03A	1770	3380	2630	2079	2407	1108	853	1047	1287	1390	1205
HOSS03A	1780	1918	1756	1899	2058	2280	1999	2571	2357	1846	2077
HOSS03A	1790	1783	1977	1651	2103	2252	2315	2252	1271	1596	1116
HOSS03A	1800	2057	1689	2031	1744	1772	1379	1311	1466	1553	1347
HOSS03A	1810	1505	1396	1278	1458	-9999					
HOSS05A	1733	877	1036	1573	910	1033	1587	524			
HOSS05A	1740	750	1130	1100	1026	1915	2468	1947	2007	1680	2988
HOSS05A	1750	2872	2475	2202	2535	2483	1754	2539	2426	1895	1656
HOSS05A	1760	1657	1888	1206	1513	1581	1835	1794	1271	1503	1494
HOSS05A	1770	1402	1186	1209	1100	764	700	887	789	677	630
HOSS05A	1780	621	648	791	651	770	578	657	645	742	813
HOSS05A	1790	774	908	857	1211	939	867	1510	730	870	577
HOSS05A	1800	843	611	679	552	778	703	651	645	853	705
HOSS05A	1810	757	752	806	714	-9999					
HOSS05B	1733	1754	757	665	933	1722	1648	1113			
HOSS05B	1740	1958	1418	1098	931	1485	2311	2023	2403	1575	2059
HOSS05B	1750	1869	1739	1599	1927	2123	1722	2256	2402	1860	1725
HOSS05B	1760	1527	1851	1481	1934	2211	2582	2601	1648	1648	1505
HOSS05B	1770	1739	1441	1129	1036	647	609	768	699	782	710
HOSS05B	1780	839	855	799	758	764	639	702	610	784	859
HOSS05B	1790	823	1055	938	1317	1094	947	-9999			
HOSS06A	1742	1456	1150	1190	1613	1497	2041	1306	1730		
HOSS06A	1750	1291	1698	1346	1835	1752	792	1017	1642	1199	1177
HOSS06A	1760	1475	1868	1552	1606	1645	1962	1715	1263	2006	1588
HOSS06A	1770	2135	2478	1679	1575	808	1040	1158	1456	1240	1426
HOSS06A	1780	1509	3540	3066	2905	2169	1931	1732	1398	1974	2075
HOSS06A	1790	1817	1719	1874	2563	2441	2785	2507	1660	2558	1734
HOSS06A	1800	2866	1991	2501	2301	2583	1640	1759	2430	2258	2279
HOSS06A	1810	2106	2071	1868	-9999						
HOSS06B	1752	1420	1999	1994	1036	1330	1700	1197	1350		
HOSS06B	1760	1900	2026	1614	2118	1910	1990	1879	1355	2019	1441
HOSS06B	1770	1971	2285	1569	1556	701	848	1048	1252	1031	1079
HOSS06B	1780	1718	897	813	1041	1398	1162	1442	1756	1935	2381
HOSS06B	1790	1930	2356	2251	2762	2798	3034	2422	1595	2248	1443
HOSS06B	1800	2385	1933	2290	-9999						
HOSS07A	1745	1092	1169	1192	1007	1000					
HOSS07A	1750	1158	1144	1204	1429	1562	1303	1161	1179	1161	932
HOSS07A	1760	893	1129	995	733	707	835	765	803	1185	1134
HOSS07A	1770	1470	1446	1337	1175	972	1028	1195	1214	1064	1258
HOSS07A	1780	1311	1217	1149	1111	1449	1839	1886	2447	2309	3298
HOSS07A	1790	2766	3028	2873	3761	3615	4216	4265	2815	3077	2401
HOSS07A	1800	2978	2715	2596	2629	2915	2765	1832	2054	2304	2103
HOSS07A	1810	2159	1902	1924	-9999						

HOSS07B	1752	1038	911	1153	1279	1268	1134	850	1047		
HOSS07B	1760	996	1204	983	683	757	831	885	810	1093	1171
HOSS07B	1770	1301	1468	1392	1384	894	963	1309	1351	1052	1143
HOSS07B	1780	1382	2750	1990	1510	1678	2193	5003	2282	2097	2867
HOSS07B	1790	2514	2929	2903	3424	3284	3653	3575	2382	2572	2093
HOSS07B	1800	2652	2400	2426	2502	2850	2661	1786	2176	2300	2040
HOSS07B	1810	1998	1852	1761	-9999						
HOSS08A	1760	3716	2124	2325	2144	2878	4170	3851	3160	3563	3016
HOSS08A	1770	2856	2429	2860	2223	921	1056	1800	1607	1466	849
HOSS08A	1780	1676	1861	1896	1668	1518	1452	1451	1391	1315	1308
HOSS08A	1790	1181	1247	1347	1556	1678	1564	2184	801	1441	998
HOSS08A	1800	1000	1145	1284	897	1005	972	917	1193	1245	1173
HOSS08A	1810	1382	1050	1128	-9999						
HOSS09A	1749	2556									
HOSS09A	1750	1691	2221	1927	2555	2013	916	991	1722	887	1251
HOSS09A	1760	2141	2144	1755	1787	1652	2094	1999	1709	2435	1937
HOSS09A	1770	1745	2005	1537	1559	773	1321	1631	1709	1627	1854
HOSS09A	1780	1458	2010	2199	1744	2124	2144	2196	2202	2102	2480
HOSS09A	1790	1882	2134	2039	2085	2015	1784	2037	1254	1244	1167
HOSS09A	1800	1367	1578	1558	1607	1634	1090	946	-9999		
HOSS09B	1744	1483	2219	1606	2048	1359	2229				
HOSS09B	1750	1382	2468	2096	2592	2157	863	937	1513	767	1084
HOSS09B	1760	1723	1797	1553	1863	1814	2052	2044	1968	2944	2521
HOSS09B	1770	2313	2533	1977	2263	851	1333	1926	2184	1918	1797
HOSS09B	1780	1579	2090	2180	1989	2208	2361	2525	2696	2495	3054
HOSS09B	1790	2147	2297	1977	2108	1937	1815	1914	1265	1173	1105
HOSS09B	1800	1417	1101	1423	1560	1465	1412	1161	1675	1640	1760
HOSS09B	1810	1919	1938	-9999							
HOSW06A	1760	2712	2501	2384	2186	1950	2816	2440	2072	3162	2955
HOSW06A	1770	2661	3578	2527	2606	1185	754	996	1192	1359	1056
HOSW06A	1780	1420	2292	2212	2364	2345	2656	3186	2629	2977	3377
HOSW06A	1790	2141	2448	2042	3128	3098	3214	2955	1189	1655	980
HOSW06A	1800	1796	1750	2291	1790	2307	1783	1864	2063	1869	2558
HOSW06A	1810	1970	1653	1645	-9999						
HOSW06B	1727	2595	3216	2590							
HOSW06B	1730	2509	1522	421	552	621	475	443	415	537	849
HOSW06B	1740	1066	635	937	906	499	800	785	738	831	1027
HOSW06B	1750	1106	1336	1000	1195	1244	446	973	1000	1241	1136
HOSW06B	1760	1304	1310	1317	1519	1173	1066	1315	1394	1062	1227
HOSW06B	1770	939	1141	1108	1059	772	904	888	1029	1338	830
HOSW06B	1780	737	871	986	1024	597	792	695	1021	675	829
HOSW06B	1790	684	511	562	766	797	771	938	753	634	832
HOSW06B	1800	915	945	947	661	1001	938	730	740	903	823
HOSW06B	1810	769	843	951	1108	1243	1105	1218	890	1261	1843
HOSW06B	1820	1686	1305	1420	1236	1109	1922	1423	1508	1687	1612
HOSW06B	1830	1415	1439	-9999							
HOSW06C	1760	2244	2120	2138	2762	2807	2384	2166	1876	3008	3089
HOSW06C	1770	2560	2852	2106	2018	1010	773	954	1078	1243	1013
HOSW06C	1780	1025	1799	1828	1909	1943	2367	3142	2607	2924	2965
HOSW06C	1790	2001	2284	1987	2867	2849	3014	2646	1224	1489	1066
HOSW06C	1800	1688	1380	1898	1577	1904	1526	1598	1757	1670	1860
HOSW06C	1810	1690	1520	1378	-9999						
HOSW07C	1747	2085	1618	1641							
HOSW07C	1750	1681	1612	1523	1675	1801	863	1293	1637	1308	1304
HOSW07C	1760	1240	1618	1202	1137	1231	1648	1379	1444	1733	1627
HOSW07C	1770	1984	1839	1371	1764	1103	1055	1279	1076	994	1213
HOSW07C	1780	1756	1392	1319	1085	1238	1572	1746	1564	1793	1658

HOSW07C	1790	1472	1551	1780	2391	1843	1986	1865	1306	1703	1298
HOSW07C	1800	1736	1349	1575	1503	1850	1615	1482	1614	1847	1622
HOSW07C	1810	1514	1548	1554	1476	-9999					
HOSW09A	1750	3497	2503	4513	4205	2161	2410	2612	1779	1699	2005
HOSW09A	1760	2496	2722	1856	2194	2091	1615	1931	1374	1930	1709
HOSW09A	1770	1759	2041	1286	1338	869	861	733	671	659	771
HOSW09A	1780	945	1242	1157	1273	1397	1553	1709	1360	1621	1659
HOSW09A	1790	1207	1608	1655	1960	1424	1314	1483	1116	1296	861
HOSW09A	1800	1131	1058	1202	1223	1324	1083	939	1095	1005	986
HOSW09A	1810	1130	995	990	1089	-9999					
HOSW10A	1763	1927	2194	2407	1978	1422	2667	2625			
HOSW10A	1770	2917	2668	1871	1323	915	704	1535	1631	1488	1293
HOSW10A	1780	1768	1835	1881	1658	1665	1387	1556	1766	1729	1792
HOSW10A	1790	1285	1293	1249	2003	1797	1726	1664	1078	1332	906
HOSW10A	1800	1174	1083	1649	1670	1897	1785	1774	2151	1972	1873
HOSW10A	1810	2242	2019	1947	-9999						
HOSW11A	1745	2549	1956	2094	1319	1630					
HOSW11A	1750	2105	1417	1618	1983	661	758	901	878	695	681
HOSW11A	1760	583	626	479	441	595	641	422	363	670	659
HOSW11A	1770	315	265	319	370	420	393	461	696	534	697
HOSW11A	1780	740	842	1104	1265	1490	1260	1001	1318	1194	1463
HOSW11A	1790	1410	1601	1371	1362	1084	1046	1415	1274	1677	826
HOSW11A	1800	1388	1585	1211	1111	1085	1105	1180	977	1024	1040
HOSW11A	1810	951	867	-9999							
HOSW12A	1728	2139	1633								
HOSW12A	1730	331	733	1436	660	970	1005	1035	1292	1718	2869
HOSW12A	1740	1798	1156	1843	1706	1722	1528	1452	1836	1281	1810
HOSW12A	1750	1523	1714	1458	1344	1676	609	983	1112	1122	1620
HOSW12A	1760	1786	2034	1653	1469	1635	1584	1638	1408	2181	1502
HOSW12A	1770	1437	819	747	875	510	737	1291	1200	925	801
HOSW12A	1780	865	575	533	547	599	854	844	1131	1299	1458
HOSW12A	1790	1103	1120	943	1195	827	1110	1255	897	1210	840
HOSW12A	1800	1013	1079	1051	976	988	1115	1023	959	1161	930
HOSW12A	1810	873	808	785	-9999						
HOSW14A	1742	733	865	1062	1820	1843	1701	955	903		
HOSW14A	1750	1120	1440	1854	1927	1691	1321	2046	2316	1629	1674
HOSW14A	1760	1632	1320	1067	1366	1427	1185	1116	968	1415	1153
HOSW14A	1770	1290	1288	1195	1260	560	1083	1621	1504	1980	2647
HOSW14A	1780	2050	1883	1316	1512	1345	1270	1177	1314	1177	1121
HOSW14A	1790	1136	1112	746	1161	1342	1209	1766	1148	1379	1097
HOSW14A	1800	835	-9999								

Appendix 2.

Complete COFECHA output for the 37 series sampled
from Hoskins House, Greensboro, North Carolina.

QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

File of DATED series: hoskins.rwl

CONTENTS:

- Part 1: Title page, options selected, summary, absent rings by series
- Part 2: Histogram of time spans
- Part 3: Master series with sample depth and absent rings by year
- Part 4: Bar plot of Master Dating Series
- Part 5: Correlation by segment of each series with Master
- Part 6: Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers
- Part 7: Descriptive statistics

RUN CONTROL OPTIONS SELECTED

VALUE

- 1 Cubic smoothing spline 50% wavelength cutoff for filtering
32 years
- 2 Segments examined are 40 years lagged successively by 20 years
- 3 Autoregressive model applied A Residuals are used in master dating series and testing
- 4 Series transformed to logarithms Y Each series log-transformed for master dating series and testing
- 5 CORRELATION is Pearson (parametric, quantitative)
Critical correlation, 99% confidence level .3665
- 6 Master dating series saved N
- 7 Ring measurements listed N
- 8 Parts printed 1234567
- 9 Absent rings are omitted from master series and segment correlations (Y)

Time span of Master dating series is 1723 to 1831 109 years
Continuous time span is 1723 to 1831 109 years
Portion with two or more series is 1727 to 1813 87 years

C Number of dated series 37 *C*
O Master series 1723 1831 109 yrs *O*
F Total rings in all series 2263 *F*
E Total dated rings checked 2241 *E*
C Series intercorrelation .647 *C*
H Average mean sensitivity .207 *H*
A Segments, possible problems 8 *A*
*** Mean length of series 61.2 ***

ABSENT RINGS listed by SERIES: (See Master Dating Series for absent rings listed by year)

No ring measurements of zero value

1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	Ident	Seq	Beg year	End year	Yrs
.	<====>	.	.	. HOSN03A	1	1755	1800	46
.	<=====>	.	.	. HOSN03B	2	1754	1813	60
.<====>	.	.	. HOSN04A	3	1763	1803	41
.<=====>	.	.	. HOSN06B	4	1761	1810	50
.	<====>.	.	.	. HOSN07A	5	1735	1785	51
.	<====>.	.	.	. HOSN08A	6	1750	1796	47
.	<=====>	.	.	. HOSN08B	7	1749	1813	65
.	<=====>	.	.	. HOSN09A	8	1759	1812	54
.<====>	.	.	. HOSN09B	9	1767	1807	41
.	<=====>	.	.	. HOSN11A	10	1743	1812	70
.	<=====>	.	.	. HOSN12B	11	1736	1813	78
.	<=====>	.	.	. HOSE04B	12	1723	1811	89
.	<=====>	.	.	. HOSE05A	13	1732	1812	81
.<====>	.	.	. HOSE07A	14	1772	1807	36
.	<=====>	.	.	. HOSE08A	15	1739	1805	67
.	<=====>	.	.	. HOSE08B	16	1751	1812	62
.	<=====>	.	.	. HOSE09A	17	1755	1812	58
.<====>.	.	.	. HOSE10B	18	1761	1797	37
.<=====>	.	.	. HOSS03A	19	1761	1813	53
.	<=====>	.	.	. HOSS05A	20	1733	1813	81
.	<=====>.	.	.	. HOSS05B	21	1733	1795	63
.	<=====>	.	.	. HOSS06A	22	1742	1812	71
.	<=====>	.	.	. HOSS06B	23	1752	1802	51
.	<=====>	.	.	. HOSS07A	24	1745	1812	68
.	<=====>	.	.	. HOSS07B	25	1752	1812	61
.<=====>	.	.	. HOSS08A	26	1760	1812	53
.	<=====>	.	.	. HOSS09A	27	1749	1806	58
.	<=====>	.	.	. HOSS09B	28	1744	1811	68
.<=====>	.	.	. HOSW06A	29	1760	1812	53
.	<=====>	.	.	. HOSW06B	30	1727	1831	105
.<=====>	.	.	. HOSW06C	31	1760	1812	53
.	<=====>	.	.	. HOSW07C	32	1747	1813	67
.	<=====>	.	.	. HOSW09A	33	1750	1813	64
.<=====>	.	.	. HOSW10A	34	1763	1812	50
.	<=====>	.	.	. HOSW11A	35	1745	1811	67
.	<=====>	.	.	. HOSW12A	36	1728	1812	85
.	<=====>	.	.	. HOSW14A	37	1742	1800	59

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
			1750	.370	20	1800	.009	33									
			1751	.712	21	1801	-.663	31									
			1752	.456	23	1802	.356	31									
			1753	1.118	23	1803	-.427	30									
			1754	.903	24	1804	.791	29									
			1755	-2.638	26	1805	-.247	29									
			1756	-.360	26	1806	-1.176	28									
			1757	.294	26	1807	.062	27									
			1758	-1.157	26	1808	.910	25									
			1759	-.437	27	1809	.343	25									
			1760	.435	30	1810	.825	25									
			1761	.467	33	1811	-.240	24									
			1762	-.619	33	1812	-.595	21									
			1763	-.180	35	1813	-.243	8									
			1764	.057	35	1814	1.110	1									
			1765	.495	35	1815	-.111	1									
			1766	.453	35	1816	.406	1									
			1767	-.619	36	1817	-2.579	1									
			1768	1.552	36	1818	.180	1									
			1769	.770	36	1819	2.753	1									
			1770	1.127	36	1820	1.948	1									
			1771	1.189	36	1821	-.172	1									
			1772	.300	37	1822	.335	1									
1723	1.846	1	1773	.207	37	1823	-1.014	1									
1724	.101	1	1774	-2.757	37	1824	-2.286	1									
1725	-.218	1	1775	-1.891	37	1825	2.366	1									
1726	-1.886	1	1776	-.686	37	1826	-.274	1									
1727	.639	2	1777	-.599	37	1827	.133	1									
1728	.932	3	1778	-.989	37	1828	1.099	1									
1729	.741	3	1779	-1.435	37	1829	.564	1									
			1780	-.183	37	1830	-1.105	1									
1730	-1.353	3	1781	.518	37	1831	-1.125	1									
1731	-.354	3	1782	.061	37												
1732	-.621	4	1783	.071	37												
1733	-.520	6	1784	.154	37												
1734	.211	6	1785	.012	37												
1735	.330	7	1786	.856	36												
1736	-.303	8	1787	.540	36												
1737	.314	8	1788	.616	36												
1738	.246	8	1789	.871	36												
1739	.366	9															
			1790	-.292	36												
1740	.017	9	1791	.088	36												
1741	-1.087	9	1792	-.482	36												
1742	-.350	11	1793	1.246	36												
1743	-1.082	12	1794	.384	36												
1744	-.453	13	1795	1.200	36												
1745	.691	15	1796	1.441	35												
1746	.122	15	1797	-1.739	34												
1747	.885	16	1798	-.028	33												
1748	-1.022	16	1799	-2.469	33												
1749	.469	18															

Year Rel value	Year Rel value	Year Rel value	Year Rel value	Year Rel value	Year Rel value	Year Rel value	Year Rel value
			1750-----A		1800-----@		
			1751-----C		1801--c		
			1752-----B		1802-----A		
			1753-----D		1803---b		
			1754-----D		1804-----C		
			1755k		1805---a		
			1756---a		1806-e		
			1757-----A		1807-----@		
			1758-e		1808-----D		
			1759---b		1809-----A		
			1760-----B		1810-----C		
			1761-----B		1811---a		
			1762--b		1812--b		
			1763---a		1813---a		
			1764-----@		1814-----D		
			1765-----B		1815-----@		
			1766-----B		1816-----B		
			1767--b		1817j		
			1768-----F		1818-----A		
			1769-----C		1819-----K		
			1770-----E		1820-----H		
			1771-----E		1821---a		
			1772-----A		1822-----A		
		1723-----G	1773-----A		1823-d		
		1724-----@	1774k		1824i		
		1725---a	1775h		1825-----I		
		1726h	1776--c		1826---a		
		1727-----C	1777--b		1827-----A		
		1728-----D	1778-d		1828-----D		
		1729-----C	1779-f		1829-----B		
		1730-e	1780---a		1830-d		
		1731---a	1781-----B		1831-d		
		1732--b	1782-----@				
		1733--b	1783-----@				
		1734-----A	1784-----A				
		1735-----A	1785-----@				
		1736---a	1786-----C				
		1737-----A	1787-----B				
		1738-----A	1788-----B				
		1739-----A	1789-----C				
		1740----@	1790---a				
		1741-d	1791-----@				
		1742---a	1792--b				
		1743-d	1793-----E				
		1744--b	1794-----B				
		1745-----C	1795-----E				
		1746-----@	1796-----F				
		1747-----D	1797g				
		1748-d	1798-----@				
		1749-----B	1799j				

Correlations of 40-year dated segments, lagged 20 years

Flags: A = correlation under .3665 but highest as dated; B = correlation higher at other than dated position

Seq	Series	Time_span	1720 1759	1740 1779	1760 1799	1780 1819
1	HOSN03A	1755 1800		.82	.86	.86
2	HOSN03B	1754 1813		.88	.79	.71
3	HOSN04A	1763 1803			.75	.74
4	HOSN06B	1761 1810			.70	.61
5	HOSN07A	1735 1785	.62	.67	.73	
6	HOSN08A	1750 1796		.68	.75	
7	HOSN08B	1749 1813		.73	.85	.82
8	HOSN09A	1759 1812		.80	.83	.78
9	HOSN09B	1767 1807			.86	.86
10	HOSN11A	1743 1812		.79	.75	.73
11	HOSN12B	1736 1813	.73	.75	.73	.67
12	HOSE04B	1723 1811	.67	.83	.60	.45
13	HOSE05A	1732 1812	.73	.72	.69	.63
14	HOSE07A	1772 1807			.70	
15	HOSE08A	1739 1805	.84	.80	.56	.55
16	HOSE08B	1751 1812		.80	.58	.59
17	HOSE09A	1755 1812		.72	.83	.81
18	HOSE10B	1761 1797			.66	
19	HOSS03A	1761 1813			.82	.84
20	HOSS05A	1733 1813	.33B	.62	.64	.65
21	HOSS05B	1733 1795	.43B	.68	.66	
22	HOSS06A	1742 1812		.84	.75	.66
23	HOSS06B	1752 1802		.79	.78	.78
24	HOSS07A	1745 1812		.31B	.63	.48
25	HOSS07B	1752 1812		.23B	.62	.58
26	HOSS08A	1760 1812			.78	.79
27	HOSS09A	1749 1806		.76	.73	.71
28	HOSS09B	1744 1811		.83	.75	.72
29	HOSW06A	1760 1812			.87	.82
30	HOSW06B	1727 1831	.47	.54	.09B	.19B
31	HOSW06C	1760 1812			.82	.82
32	HOSW07C	1747 1813		.74	.70	.64
33	HOSW09A	1750 1813		.42	.74	.68
34	HOSW10A	1763 1812			.83	.78
35	HOSW11A	1745 1811		.30B	.38	.31B
36	HOSW12A	1728 1812	.72	.71	.62	.56
37	HOSW14A	1742 1800		.53	.51	.48
Av segment correlation			.62	.68	.70	.67

For each series with potential problems the following diagnostics may appear:

[A] Correlations with master dating series of flagged 40-year segments of series filtered with 32-year spline, at every point from ten years earlier (-10) to ten years later (+10) than dated

[B] Effect of those data values which most lower or raise correlation with master series

[C] Year-to-year changes very different from the mean change in other series

[D] Absent rings (zero values)

[E] Values which are statistical outliers from mean for the year

=====

HOSN03A 1755 to 1800 46 years Series 1

[B] Entire series, effect on correlation (.835) is:

Lower 1755 -.016 1794 -.011 1763 -.009 1796 -.008 Higher 1774 .037 1797 .012 1799 .011 1786 .003

=====

HOSN03B 1754 to 1813 60 years Series 2

[B] Entire series, effect on correlation (.751) is:

Lower 1796 -.052 1806 -.023 1813 -.017 1794 -.017 Higher 1774 .058 1755 .047 1797 .036 1799 .017

=====

HOSN04A 1763 to 1803 41 years Series 3

[B] Entire series, effect on correlation (.741) is:

Lower 1767 -.030 1782 -.023 1779 -.021 1790 -.012 Higher 1797 .080 1774 .023 1799 .018 1793 .007

=====

HOSN06B 1761 to 1810 50 years Series 4

[B] Entire series, effect on correlation (.609) is:

Lower 1809 -.069 1806 -.021 1771 -.016 1764 -.014 Higher 1797 .076 1799 .030 1768 .026 1793 .017

=====

HOSN07A 1735 to 1785 51 years Series 5

[B] Entire series, effect on correlation (.585) is:

Lower 1745 -.051 1738 -.048 1748 -.026 1775 -.018 Higher 1774 .083 1755 .082 1768 .021 1758 .013

=====

HOSN08A 1750 to 1796 47 years Series 6

```

[B] Entire series, effect on correlation ( .656) is:
  Lower 1755 -.065 1754 -.031 1775 -.026 1793 -.019 Higher 1774 .171 1768 .017 1779 .010 1753 .007
=====
HOSN08B 1749 to 1813 65 years Series 7
[B] Entire series, effect on correlation ( .750) is:
  Lower 1755 -.027 1754 -.027 1809 -.019 1793 -.013 Higher 1774 .056 1799 .031 1797 .012 1768 .007
[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year
  1809 +3.0 SD
=====
HOSN09A 1759 to 1812 54 years Series 8
[B] Entire series, effect on correlation ( .748) is:
  Lower 1804 -.027 1759 -.022 1808 -.017 1763 -.009 Higher 1797 .070 1768 .012 1799 .007 1793 .006
=====
HOSN09B 1767 to 1807 41 years Series 9
[B] Entire series, effect on correlation ( .863) is:
  Lower 1774 -.016 1776 -.010 1803 -.009 1787 -.007 Higher 1797 .013 1793 .006 1768 .006 1795 .003
=====
HOSN11A 1743 to 1812 70 years Series 10
[B] Entire series, effect on correlation ( .745) is:
  Lower 1797 -.024 1781 -.021 1750 -.016 1747 -.011 Higher 1774 .049 1755 .032 1799 .013 1768 .006
=====
HOSN12B 1736 to 1813 78 years Series 11
[B] Entire series, effect on correlation ( .692) is:
  Lower 1797 -.028 1752 -.023 1774 -.018 1739 -.015 Higher 1755 .087 1799 .019 1768 .008 1795 .005
=====
HOSE04B 1723 to 1811 89 years Series 12
[*] Early part of series cannot be checked from 1723 to 1726 -- not matched by another series
[B] Entire series, effect on correlation ( .568) is:
  Lower 1797 -.044 1800 -.028 1739 -.018 1799 -.016 Higher 1755 .129 1774 .049 1768 .016 1793 .009
[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year
  1739 +3.6 SD
=====
HOSE05A 1732 to 1812 81 years Series 13

```

[B] Entire series, effect on correlation (.667) is:
Lower 1753 -.030 1774 -.026 1807 -.022 1781 -.018 Higher 1755 .090 1799 .026 1797 .011 1768 .008

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year
1796 +3.6 SD

=====

HOSE07A 1772 to 1807 36 years Series 14

[B] Entire series, effect on correlation (.704) is:
Lower 1774 -.054 1806 -.033 1805 -.020 1788 -.009 Higher 1797 .097 1799 .021 1793 .012 1795 .011

=====

HOSE08A 1739 to 1805 67 years Series 15

[B] Entire series, effect on correlation (.644) is:
Lower 1794 -.048 1797 -.039 1796 -.029 1789 -.023 Higher 1755 .073 1774 .046 1799 .026 1793 .010

=====

HOSE08B 1751 to 1812 62 years Series 16

[B] Entire series, effect on correlation (.708) is:
Lower 1797 -.046 1793 -.016 1763 -.013 1805 -.010 Higher 1755 .097 1799 .020 1768 .009 1758 .006

=====

HOSE09A 1755 to 1812 58 years Series 17

[B] Entire series, effect on correlation (.759) is:
Lower 1761 -.020 1759 -.018 1755 -.014 1804 -.014 Higher 1797 .041 1774 .025 1799 .013 1793 .006

=====

HOSE10B 1761 to 1797 37 years Series 18

[B] Entire series, effect on correlation (.655) is:
Lower 1771 -.055 1775 -.046 1778 -.023 1762 -.022 Higher 1797 .167 1774 .072 1768 .013 1779 .013

[E] Outliers 2 3.0 SD above or -4.5 SD below mean for year
1775 +3.1 SD; 1797 -4.5 SD

=====

HOSS03A 1761 to 1813 53 years Series 19

[B] Entire series, effect on correlation (.787) is:
Lower 1813 -.028 1761 -.026 1788 -.010 1765 -.010 Higher 1797 .058 1799 .040 1768 .006 1775 .004

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year
1813 +3.0 SD

=====

```

HOSS05A  1733 to 1813      81 years                                     Series  20
[A] Segment  High  -10  -9  -8  -7  -6  -5  -4  -3  -2  -1  +0  +1  +2  +3  +4  +5  +6  +7  +8  +9  +10
-----
1733 1772  -7  -.08  .01  -.14  .47*-.01  .01  .23  .00  -.16  -.11  .33|-.04  .03  .01  .01  -.04  -.41  .12  -.21  -.14  -.22

[B] Entire series, effect on correlation ( .491) is:
    Lower 1739  -.080  1762  -.022  1812  -.017  1785  -.010  Higher  1774  .052  1799  .021  1793  .013  1797  .013
1733 to 1772 segment:
    Lower 1739  -.138  1760  -.009  1740  -.008  1735  -.007  Higher  1768  .016  1743  .016  1755  .015  1767  .015

[E] Outliers      1  3.0 SD above or -4.5 SD below mean for year
    1812 +3.4 SD
=====

HOSS05B  1733 to 1795      63 years                                     Series  21
[A] Segment  High  -10  -9  -8  -7  -6  -5  -4  -3  -2  -1  +0  +1  +2  +3  +4  +5  +6  +7  +8  +9  +10
-----
1733 1772   7   .00  .01  -.16  .01  -.19  .17  .13  .05  -.01  -.20  .43|-.25  .06  .05  .00  .08  -.10  .50*-.32  -.21  -.31

[B] Entire series, effect on correlation ( .540) is:
    Lower 1787  -.033  1734  -.028  1755  -.027  1733  -.025  Higher  1774  .126  1793  .019  1748  .019  1775  .012
1733 to 1772 segment:
    Lower 1734  -.051  1733  -.039  1760  -.029  1740  -.016  Higher  1748  .045  1758  .020  1743  .020  1767  .015

=====

HOSS06A  1742 to 1812      71 years                                     Series  22
[B] Entire series, effect on correlation ( .752) is:
    Lower 1805  -.025  1756  -.013  1787  -.011  1786  -.010  Higher  1755  .070  1774  .010  1806  .005  1795  .004

=====

HOSS06B  1752 to 1802      51 years                                     Series  23
[B] Entire series, effect on correlation ( .826) is:
    Lower 1781  -.057  1782  -.011  1785  -.006  1763  -.006  Higher  1755  .038  1774  .034  1799  .024  1797  .007

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HOSS07A  1745 to 1812      68 years                                     Series  24
[A] Segment  High  -10  -9  -8  -7  -6  -5  -4  -3  -2  -1  +0  +1  +2  +3  +4  +5  +6  +7  +8  +9  +10
-----
1745 1784  -8  -.22  .13  .36* .24  -.13  .16  .33  -.05  .02  .16  .31|-.15  -.30  -.09  -.28  -.37  -.23  .24  -.15  -.19  .26

[B] Entire series, effect on correlation ( .433) is:
    Lower 1806  -.068  1755  -.051  1745  -.017  1758  -.011  Higher  1797  .042  1799  .023  1748  .017  1768  .014
1745 to 1784 segment:
    Lower 1755  -.060  1745  -.040  1758  -.021  1781  -.021  Higher  1748  .048  1768  .044  1774  .035  1753  .027

[E] Outliers      1  3.0 SD above or -4.5 SD below mean for year

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1755 +4.9 SD

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=====
HOSS07B  1752 to 1812      61 years                                     Series 25
[A] Segment  High  -10  -9  -8  -7  -6  -5  -4  -3  -2  -1  +0  +1  +2  +3  +4  +5  +6  +7  +8  +9  +10
-----
1752 1791  -5   .11  .07  .24 -.17 -.19  .31* .08  .18  .02 -.01  .23|-.18 -.01 -.15 -.18 -.04 -.35  .16 -.16  .14  .22

[B] Entire series, effect on correlation ( .405) is:
    Lower 1755 -.137 1753 -.021 1806 -.020 1787 -.019 Higher 1799 .048 1774 .021 1786 .012 1795 .012
1752 to 1791 segment:
    Lower 1755 -.227 1753 -.038 1787 -.033 1763 -.016 Higher 1774 .100 1786 .036 1771 .019 1758 .018

[E] Outliers 2 3.0 SD above or -4.5 SD below mean for year
    1755 +5.4 SD; 1786 +3.5 SD
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=====
HOSS08A  1760 to 1812      53 years                                     Series 26
[B] Entire series, effect on correlation ( .752) is:
    Lower 1799 -.027 1779 -.019 1761 -.018 1767 -.009 Higher 1797 .070 1774 .066 1775 .005 1796 .005
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HOSS09A  1749 to 1806      58 years                                     Series 27
[B] Entire series, effect on correlation ( .724) is:
    Lower 1780 -.022 1779 -.013 1798 -.011 1799 -.011 Higher 1774 .056 1797 .022 1755 .014 1768 .010
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=====
HOSS09B  1744 to 1811      68 years                                     Series 28
[B] Entire series, effect on correlation ( .758) is:
    Lower 1798 -.021 1799 -.015 1780 -.011 1811 -.008 Higher 1774 .036 1755 .025 1797 .012 1768 .009
=====

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HOSW06A  1760 to 1812      53 years                                     Series 29
[B] Entire series, effect on correlation ( .805) is:
    Lower 1809 -.031 1806 -.017 1810 -.012 1774 -.011 Higher 1797 .051 1799 .029 1768 .006 1793 .005

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year
    1809 +3.1 SD
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HOSW06B  1727 to 1831      105 years                                    Series 30
[*] Later part of series cannot be checked from 1814 to 1831 -- not matched by another series

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[A] Segment  High  -10  -9  -8  -7  -6  -5  -4  -3  -2  -1  +0  +1  +2  +3  +4  +5  +6  +7  +8  +9  +10
-----

```

1760 1799 -10 .32*-.03 -.21 .06 .04 -.09 -.39 -.14 -.10 .31 .09|-.04 -.02 -.13 .08 .01 .24 -.05 .17 .13 -.14
 1774 1813 6 .20 .06 -.08 .01 .15 -.05 -.17 -.34 -.13 .15 .19|-.12 -.05 -.05 -.12 -.04 .30* .02 .18 -.04 -.20

[B] Entire series, effect on correlation (.293) is:

Lower 1730 -.041 1799 -.036 1778 -.019 1768 -.019 Higher 1755 .223 1774 .049 1796 .010 1806 .009
 1760 to 1799 segment:
 Lower 1799 -.056 1770 -.038 1768 -.038 1778 -.036 Higher 1774 .193 1796 .028 1779 .023 1793 .013
 1774 to 1813 segment:
 Lower 1799 -.074 1778 -.040 1784 -.034 1791 -.032 Higher 1774 .151 1796 .031 1804 .027 1806 .021

[E] Outliers 4 3.0 SD above or -4.5 SD below mean for year
 1730 +4.3 SD; 1755 -4.6 SD; 1778 +4.3 SD; 1799 +3.7 SD

HOSW06C 1760 to 1812 53 years Series 31

[B] Entire series, effect on correlation (.777) is:

Lower 1806 -.020 1760 -.017 1809 -.017 1763 -.010 Higher 1797 .059 1768 .010 1774 .009 1799 .008

HOSW07C 1747 to 1813 67 years Series 32

[B] Entire series, effect on correlation (.723) is:

Lower 1774 -.027 1813 -.024 1783 -.014 1810 -.011 Higher 1755 .083 1799 .011 1793 .008 1797 .006

HOSW09A 1750 to 1813 64 years Series 33

[B] Entire series, effect on correlation (.548) is:

Lower 1755 -.074 1754 -.030 1813 -.022 1757 -.021 Higher 1799 .074 1797 .015 1793 .014 1806 .011

[E] Outliers 1 3.0 SD above or -4.5 SD below mean for year
 1813 +3.6 SD

HOSW10A 1763 to 1812 50 years Series 34

[B] Entire series, effect on correlation (.793) is:

Lower 1806 -.016 1773 -.012 1774 -.007 1782 -.005 Higher 1799 .042 1797 .030 1793 .008 1768 .008

HOSW11A 1745 to 1811 67 years Series 35

[A] Segment High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 +0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

 1745 1784 4 -.38 -.32 -.02 -.10 -.05 -.11 .00 -.06 -.13 .02 .30|.43 -.01 .10 .43*-.22 -.23 .24 -.03 -.10 -.26

 1772 1811 -2 -.14 -.15 -.07 -.06 -.11 .10 -.15 -.19 .33*-.09 .31|-.13 .30 -.05 .31 -.10 .19 .08 -.35 -.15 .03

[B] Entire series, effect on correlation (.310) is:

Lower 1754 -.055 1797 -.027 1806 -.020 1795 -.020 Higher 1799 .130 1768 .022 1748 .017 1755 .014

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1745 to 1784 segment:
  Lower 1754 -.129 1771 -.039 1770 -.033 1774 -.014 Higher 1768 .045 1755 .043 1748 .034 1753 .027
1772 to 1811 segment:
  Lower 1797 -.046 1795 -.035 1806 -.030 1801 -.027 Higher 1799 .236 1789 .012 1796 .012 1775 .011

[E] Outliers      2  3.0 SD above or -4.5 SD below mean for year
    1754 -4.8 SD;  1801 +3.7 SD
=====

HOSW12A  1728 to 1812      85 years                                     Series 36

[B] Entire series, effect on correlation ( .613) is:
  Lower 1771 -.021 1739 -.020 1781 -.015 1805 -.012 Higher 1755 .115 1799 .025 1768 .013 1774 .010

[E] Outliers      2  3.0 SD above or -4.5 SD below mean for year
    1739 +3.3 SD;  1755 -4.8 SD
=====

HOSW14A  1742 to 1800      59 years                                     Series 37

[B] Entire series, effect on correlation ( .470) is:
  Lower 1779 -.048 1800 -.023 1755 -.022 1792 -.019 Higher 1774 .155 1797 .021 1748 .015 1796 .013

[E] Outliers      2  3.0 SD above or -4.5 SD below mean for year
    1778 +3.1 SD;  1779 +5.3 SD
=====

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Seq	Series	Interval	No. Years	No. Segmt	No. Flags	Corr with Master	//----- Mean msmt	Unfiltered Max msmt	-----\\ Std dev	Auto corr	Mean sens	//----- Filtered value	-----\\ Std dev	Auto corr	AR ()
1	HOSN03A	1755 1800	46	3	0	.835	1.85	3.18	.559	.510	.253	2.53	.482	-.011	1
2	HOSN03B	1754 1813	60	3	0	.751	1.80	3.46	.555	.467	.250	2.50	.508	-.072	1
3	HOSN04A	1763 1803	41	2	0	.741	2.23	4.01	.820	.832	.172	2.44	.565	-.043	2
4	HOSN06B	1761 1810	50	2	0	.609	1.96	4.66	.950	.665	.275	3.14	.638	-.151	1
5	HOSN07A	1735 1785	51	3	0	.585	1.24	2.46	.384	.556	.210	2.75	.699	-.081	1
6	HOSN08A	1750 1796	47	2	0	.656	1.91	3.34	.559	.494	.222	2.62	.400	-.050	1
7	HOSN08B	1749 1813	65	3	0	.750	1.72	3.38	.570	.609	.228	2.66	.471	-.085	1
8	HOSN09A	1759 1812	54	3	0	.748	2.42	4.49	.761	.585	.190	2.51	.420	-.053	1
9	HOSN09B	1767 1807	41	2	0	.863	2.18	4.06	.674	.552	.208	2.47	.447	-.052	1
10	HOSN11A	1743 1812	70	3	0	.745	1.49	2.68	.408	.507	.197	2.56	.551	-.055	1
11	HOSN12B	1736 1813	78	4	0	.692	1.19	2.10	.432	.566	.225	2.38	.328	-.068	1
12	HOSE04B	1723 1811	89	4	0	.568	1.28	3.06	.393	.545	.194	2.57	.359	.013	1
13	HOSE05A	1732 1812	81	4	0	.667	1.54	3.45	.463	.595	.202	2.94	.424	-.061	1
14	HOSE07A	1772 1807	36	1	0	.704	1.62	2.62	.545	.601	.232	2.44	.453	.009	1
15	HOSE08A	1739 1805	67	4	0	.644	1.21	2.76	.413	.607	.203	2.65	.583	-.027	1
16	HOSE08B	1751 1812	62	3	0	.708	1.40	2.45	.397	.559	.205	2.46	.398	-.033	1
17	HOSE09A	1755 1812	58	3	0	.759	1.68	3.13	.527	.677	.195	2.55	.448	-.074	1
18	HOSE10B	1761 1797	37	1	0	.655	2.16	3.30	.718	.395	.325	2.42	.473	.012	1
19	HOSS03A	1761 1813	53	2	0	.787	1.90	3.47	.596	.665	.196	2.55	.510	-.048	1
20	HOSS05A	1733 1813	81	4	1	.491	1.22	2.99	.630	.834	.202	2.87	.500	-.005	1
21	HOSS05B	1733 1795	63	3	1	.540	1.39	2.60	.578	.789	.199	2.78	.522	.003	1
22	HOSS06A	1742 1812	71	3	0	.752	1.83	3.54	.548	.539	.224	2.60	.441	.023	1
23	HOSS06B	1752 1802	51	3	0	.826	1.72	3.03	.550	.625	.243	2.50	.597	-.072	1
24	HOSS07A	1745 1812	68	3	1	.433	1.78	4.27	.900	.924	.124	2.34	.338	-.038	1
25	HOSS07B	1752 1812	61	3	1	.405	1.85	5.00	.897	.750	.177	2.77	.407	-.074	2
26	HOSS08A	1760 1812	53	2	0	.752	1.75	4.17	.845	.808	.199	2.62	.478	-.070	1
27	HOSS09A	1749 1806	58	3	0	.724	1.76	2.56	.431	.480	.197	2.41	.374	.020	1
28	HOSS09B	1744 1811	68	3	0	.758	1.85	3.05	.507	.549	.212	2.43	.351	.059	2
29	HOSW06A	1760 1812	53	2	0	.805	2.20	3.58	.684	.618	.222	2.69	.446	-.020	1
30	HOSW06B	1727 1831	105	4	2	.293	1.06	3.22	.464	.791	.207	2.48	.326	-.014	1
31	HOSW06C	1760 1812	53	2	0	.777	1.99	3.14	.651	.738	.184	2.48	.428	-.011	1
32	HOSW07C	1747 1813	67	3	0	.723	1.53	2.39	.282	.385	.163	2.52	.364	-.037	1
33	HOSW09A	1750 1813	64	3	0	.548	1.58	4.51	.752	.778	.176	2.52	.419	-.037	1
34	HOSW10A	1763 1812	50	2	0	.793	1.72	2.92	.466	.671	.174	2.63	.552	.075	1
35	HOSW11A	1745 1811	67	3	2	.310	1.04	2.55	.500	.793	.203	2.55	.429	-.070	1
36	HOSW12A	1728 1812	85	4	0	.613	1.22	2.87	.447	.592	.239	2.56	.340	-.017	1
37	HOSW14A	1742 1800	59	3	0	.470	1.37	2.65	.401	.595	.207	2.65	.423	-.036	1
Total or mean:			2263	105	8	.647	1.61	5.00	.560	.633	.207	3.14	.447	-.033	

- = [COFECHA TEST COF] = -