A Dendrochronological Study of Select Timbers and Planks from the Phelps House, South Egremont, Massachusetts

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Introduction

On March 13th, 2009, a selection of oak, hemlock, and pitch pine timbers and planks were sampled from the Phelps house located at the junction of Townhouse Hill road and Creamery road in South Egremont, Massachusetts for the purposes of conducting a dendrochronological study. A follow up visit was made on April 10th, 2009 to obtain additional samples from framing members, especially related to a south side extension uncovered since the initial visit. The samples were obtained and analyzed by William Flynt, Architectural Conservator at Historic Deerfield located in Deerfield, Massachusetts.

Background

Dendrochronology, or the study of tree ring growth patterns to date the age of archeological timbers, was initially developed in the 1920's by Andrew E. Douglass using long-lived Ponderosa pines in the Southwest United States. An astronomer by training, Douglass was interested in historical sun spot activity and its relationship to earth's climate. He surmised that by looking at yearly growth ring sequences in long-lived trees growing in an arid environment where moisture is key, he might be able to ascertain yearly variations in climate attributable to sunspot activity. (Baillie,1982). To push the tree ring database back past the age of living trees, samples were taken from roof poles in Pueblo ruins which turned out to eventually overlap the living tree data. Besides fulfilling his research needs, this work revealed the feasibility of dating archeological structures.

In the 1980's the advent of computer programs to collate the data and compile master chronologies enabled unknown samples to be compared to known masters with a high degree of accuracy. Recent work in Eastern Massachusetts focusing on Oak (Krusic and Cook 2001, Miles, Worthington and Grady 2002, 2003, 2005) and in the Connecticut River valley initially concentrating on Pitch pine (Flynt 2004) and expanding into oak, chestnut, and hemlock, and white pine has revealed the suitability of using dendrochronology as a mainstream research tool for analyzing and establishing construction timber felling dates in New England, a region heretofore considered too variable climatically to provide reliable results.

To aid with this study, a variety of dated master chronologies are available. For hemlock a living-tree chronology based on a stand in Charlemont, Massachusetts, a historic timber-based chronology from Deerfield, Massachusetts, and a fledgling historic timber chronology for southern Berkshire County, were all used. Testing of oak was undertaken using a Connecticut River Valley of Massachusetts historic timber oak chronology and a southern Berkshire County historic timber oak chronology. Pitch pine samples were compared to a Connecticut River Valley historic timber pitch pine chronology and a southern Berkshire county historic timber pitch pine chronology. For chestnut, both a Deerfield area provisional chestnut historic timber chronology was used as was one from southern Berkshire County.

Procedures

In procuring samples suitable for dendrochronology research, the analyst must be on the lookout for timbers, framing, and boards that exhibit several parameters. First, a bark, or waney, edge must be present if one wishes to establish with certainty the last year of growth. Second, there needs to be a sufficient number of rings in a sample to span several distinctive climactic variations that register as patterns of wide and narrow rings. Ideally, having 100 years of growth is best, but more often than not, samples will range from 60 to 100+ years. While it is feasible to get dates on young samples, spurious results are possible and thus must be reviewed carefully both with longer-lived samples from the same structure as well as with what documentary and stylistic research uncovers. This is especially relevant for this study as many of the samples turned out to be 60 years or less in age. Third, enough samples need to be obtained (10-12 per building episode is usually reasonable) to allow for comparison and the fact that often some will not date for one reason or another. It is also critical that an assessment be made of the building frame to ascertain that the members from which samples are extracted were not reused or inserted at a later date. Fourth, all samples must be labeled and entered into a log book that notes the position of each sampled timber within the structure, its species, whether or not it has wane, and any other information pertinent to the sample. In labeling samples, the first letter(s) denotes the town where the house was located (South Egremont, with the letter (s) that follow derived from the first owner of the house, in this case assumed to be Phelps). Sequential sample numbers follow the letters.

Samples were taken using a custom coring bit, chucked into a Bosch battery-powered drill that creates a 9/16" hole out of which is obtained a 3/8" core. Core samples were glued into custom wood mounts and sanded using successively finer grit paper (60-600 grit) both on a bench top belt sander and by hand sanding to create a mirror-smooth finish. All samples were then viewed under a Unitron ZST 7.5-45X binocular microscope fitted with cross hairs in one eyepiece to ascertain and mark the number of rings per sample. This was followed by a visual review of all samples from the structure to determine if site-specific growth patterns could be picked out. Each sample was then placed under the microscope on a Velmex Acu-Rite Encoder sliding stage calibrated to read to the nearest micron (.001mm). Measuring begins at the outer or last year of growth ring (LYOG), established as 1000, and proceeds to the center of the sample or first year of growth sampled (FYOG). At the junction of each growth ring, the analyst registers the interface by pushing a button sending the measurement to the computer via a Quick-Chek Digital Readout. In all of the work in this study, the measuring program Measure J2X was used to compile each structure's raw data files. The program transforms the ring widths into a series of indices that relate each ring's growth to its neighbors, thus standardizing the climate-related influences on a year to year basis (Krusic 2001). Thus trees from a similar location but growing at different rates should exhibit similar indices. With the raw data in hand, using the program COFECHA, samples from each site can be compared with each other to determine if all were cut more or less at the same time or within the span of several years or more. The samples are also compared against a dated regional master chronology of the same species to determine the exact year or years when the samples in question were felled. As strong samples are uncovered, these are added to

a fledgling site master and the raw data is again run against the site master to see if additional samples align.

With COFECHA samples are broken down into ring groups of 50 years which are compared to various dated masters. The 50-year groupings in an individual sample are lagged a certain number of years (20 years is used primarily throughout this study) to provide an overlap of data within the groupings. In the case of the chestnut samples, a 40 year grouping with a 5-year lag was used due to the very short ring counts in the samples. The results are displayed in a series of columns with the "best fit" being in column #1, the next "best fit" in column #2 and so on out 10 columns. The "add" number is the number to be added to the last year of growth (1000) to provide the year date of felling, while the "corr" number relates to how well the "add" meshes with the master. .3281 is considered the threshold of significance. High correlation values (preferably over .40) accompanying consistent "add" numbers in the first column usually reveal reliable results. In the example below, consistent "add" numbers with strong correlations appearing in the first column for samples DLBH-07 and 08 reveal each samples true date of felling (1784 and 1782 respectively). Sample DLBH-09 does not show strong correlation with any particular date.

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7	CORR ADD # 8	CORR ADD # 9	CORR ADD #10
DLBH-07	937- 986	784 .51	712 .47	729 .37	713 .37	847 .33	846 .31	728 .30	813 .29	800 .29	763 .28
DLBH-07	947- 996	784 .54	712 .45	760 .33	816 .31	729 .31	800 .29	713 .29	671 .29	847 .26	808 .25
DLBH-07	951-1000	784 .41	760 .35	712 .35	661 .31	787 .30	800 .29	774 .29	729 .27	808 .26	832 .25
DLBH-08	929- 978	782 .44	746 .42	793 .33	760 .32	705 .32	840 .31	858 .30	689 .30	824 .28	685 .26
DLBH-08	939- 988	782 .61	746 .37	689 .34	840 .30	725 .29	708 .27	723 .27	806 .27	684 .25	724 .25
DLBH-08	949- 998	782 .69	669 .47	840 .41	722 .32	806 .28	708 .27	700 .26	683 .25	723 .25	720 .24
DLBH-08	951-1000	782 .69	669 .38	840 .38	722 .34	757 .29	700 .28	730 .25	659 .24	838 .23	723 .23
DLBH-09	932- 981	713 .52	785 .35	848 .35	744 .35	729 .32	863 .31	846 .28	849 .26	693 .26	714 .25
DLBH-09	942- 991	846 .38	713 .36	785 .33	848 .33	729 .29	727 .29	790 .29	693 .28	761 .28	705 .27
DLBH-09	951-1000	799 .43	783 .39	731 .30	689 .30	808 .29	767 .27	756 .26	790 .25	814 .24	846 .24

Results (See Figure 1 for sample set summary)

Hemlock

Seven samples of hemlock were obtained from sidewall planks on the original house, framing in the leanto, and one stud in the addition. In comparing the samples to the longest growing sample within the group (SEP-07) it is clear that they inter-correlate well and reveal that they were cut over a period of two growing seasons (Charts 1A & 1B). The lone sample from the addition (SEP-21) was likely fabricated from one of the planks removed from the west wall of the main house at the time the house was expanded. Running the samples against both a dated hemlock master from the Connecticut River Valley of Massachusetts and a small hemlock master from Southern Berkshire County (Charts 2 and 3) reveal corroborating results dating these samples to the years 1808 and 1809. The samples were then assigned true dates and added to the Southern Berkshire County hemlock master. The undated samples were then compared against this larger master (Chart 4). Chart 5, which depicts Part 2 of the program COFECHA output, shows how well the new Phelps house samples align with the other samples comprising the Southern Berkshire county Hemlock master. The correlation coefficients ranging from .56 to .76 reveal that the match is quite strong.

Pitch Pine

Of the four samples of pitch pine that were obtained, three came from the addition and one from the original structure. When the samples were compared to the longest growing of the four, SEP-20, the results revealed that the other two from the addition were cut 5 years previously (they are very likely from the same tree), and the lone sample from the original house was felled 28 years earlier (Chart 6). While it would be better to have additional samples from the earlier portion for verification, this one sample does give a sense of the time difference between the two building phases. The sample data was then compared to the Deerfield Pitch pine master chronology as it is the only master that has data into the 19th century (Chart 7). While the results are nowhere near as conclusive as the hemlock, with the knowledge gleaned from Chart 6 and the hemlock results, one can begin to get a sense of what this data is suggesting. As highlighted on the chart, the years 1837, 1832, and 1809 do align with what Chart 6 reveals. While SEP-11 shows some inclination for 1809, 1833 also is within realm. This is a good example where one must view the options with caution when comparing samples to more distant dated masters. When one reviews the correlation between samples as shown on Chart 6, the 1809 date makes more sense. Additionally, this date fits well with what the hemlock samples revealed. In an attempt to verify this information, the samples were all given true dates and added to the small Southern Berkshire County pitch pine master to see if their correlations would hold up where they aligned with the eighteenth century samples comprising the master. Chart 8 reveals that the cross over, while not extensive, does seem to hold together, suggesting that the dates assigned to the samples are correct. Chart 9 depicts the comparison of the Phelps house samples with the new Southern Berkshire county pitch pine master that incorporates the dated Phelps house samples. It would certainly be better to have more extensive overlap, but at the moment that is not possible.

Oak

Of the fifteen oak samples taken from the structure, eight came from the original house and seven were from the west addition. Using SEP-14, the longest living oak sample from the addition (under the assumption that it would sufficiently cross over the growing period of the original portion of the house to reveal the age difference between the two sections) an undated site chronology was successfully developed (Charts 10A & 10B) that correlated well with what was determined when analyzing the pitch pine samples (Chart 6). The oak samples were then compared to the Connecticut River Valley of Massachusetts Oak master chronology (Chart 11) where SEP-04 reveals good correlations with the date 1809 while SEP-14 and 17 show affinity for 1837. The age differential between the two aligns with what is depicted in Chart 10B. Working with Charts 10B and 11, true dates were assigned to SEP-04,05,06,14,17,18,, and 19 to create a Phelps house oak site master. These dated samples were then added to the small Southern Berkshire County Oak master and the samples were run against this expanded master to both see if other Phelps house samples would come into alignment with a specific date and to confirm that the dated Phelps house samples would continue to correlate well as they crossed over other samples in the Southern Berkshire County Oak master (Chart 12). While no additional samples fell into alignment, the samples added to the site master appear to correlate well where they overlap some of the other samples.

While it was initially expected that SEP-01 and SEP-28, the longest living oak samples, would align well with this master, they unfortunately did so only in a portion of their sequence. The cause is likely due to the fact that the tree experienced an extended period of very slow growth during the middle portion of its life which made accurate measuring very difficult due to the nature of narrow ring variability within the species. That said, the strong alignment with 1809 in their latter years of growth agrees with the data from the other oak samples from this portion of the house. It should be pointed out that these two samples came from the same timber with one core being taken in the basement of the main house while the second came from the portion in the leanto. While it was not possible to visually confirm that the timber was, in fact, a single stick, a visual comparison of the two samples did allow for a positive confirmation. It should be pointed out that the oak from this house exhibited very little similarity of growth patterns between the various samples making one wonder if they were gathered from a variety of sources some distance apart and/or from areas with variable microclimates.

Chestnut

In an attempt to date the floor framing in what appears to be a southern addition off the back of the original house leanto, seven samples were obtained, all of which turned out to be chestnut. With the exception of sample SEP-32, the south side sill, all others turned out to have less than 50 years of growth. While this normally precludes definitive results, as no other suitable timbers could be located in this section, an attempt was made to see if any information could be gleaned from these samples. In order to deal with the short ring counts, 40 year ring groups were selected (rather than the standard 50) and the sample set was compared to SEP-32, the longest growing sample (Chart 13). While one must view the results with some skepticism, the results suggest that the joists were felled 35 years previous to the south side sill. Unfortunately, when the samples were compared to fledgling provisional chestnut masters for both the Deerfield area and for southern Berkshire County, no meaningful results surfaced that correlated with what Chart 13 suggested. Running the chestnut data against a variety of oak masters (occasionally chestnut will correlate with oak) also failed to provide meaningful results.

Conclusion

While the samples as a whole from the Phelps house did not align as strongly as one would have liked with various dated masters, thankfully enough information could be gleaned from them to decipher two distinct periods of felling. It would have been beneficial and made for stronger conclusions if the various dated samples from the Phelps house had greater overlaps with the dated samples in their respective southern Berkshire county masters but that was not in the cards. However, the overlaps, such as they are, do support the conclusions. It appears that the earliest the original east portion of the house could have been framed up was the spring/summer of 1810. A majority of the dated material from the east section was felled in the winter of 1809, though several of the hemlock planks were felled the previous year. The one hemlock sample from the west addition (SEP-21) is likely a portion of a reused plank from the original house, perhaps taken from the west wall that was removed when the house was enlarged. The sampling also confirmed that the leanto extending off the back of the original house was part of the initial building phase. The two samples extracted from the chimney bay (SEP-12 and 13)

that might have helped to determine if and when a center chimney had been removed did not date leaving that question still unanswered.

A majority of the framing members sampled in the west addition appear to have been felled in the summer, though several do exhibit late fall/winter felling. It is possible that the frame could have been erected as early as the last quarter of 1838 though spring of 1839 is a bit more likely.

Unfortunately none of the chestnut samples taken from the leanto south side addition floor frame could be dated. As the sills to this section do not seem to have stud mortices, it is a bit perplexing as to the nature of the structure this framing relates to.

From this study it is clear that the house is not 18th century and thus may need a new name if the property was no longer owned by the Phelps family at the turn of the 19th century.

With this information in hand local tax records, if they exist, should be consulted for the periods 1807-1811 and 1836-1840 to see if the property owner's taxes make significant jumps during these periods.

Acknowledgments

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Figure 1

PHELPS HOUSE, SOUTH EGREMONT, MA

SAMPLE	AGE	FYOG	LYOG	WANE	SPECIES	LOCATION
Original section						
SEP-01	146	1663	1809	Y	QUAL	EAST SILL
SEP-02		TOO SHORT		Y	QURU	SOUTH SILL
SEP-03		TOO SHORT		Y	?	1ST JOIST WEST OF EAST SILL
SEP-04	65	1745	1809	Y	QUAL	WEST SILL
SEP-05	44	1766	1809	Y	QUAL	NORTH SILL
SEP-06	66	1744	1809	Y	QUAL	4TH JOIST WEST OF EAST SILL
SEP-07	107	1703	1809	Y	TCSA	W.PARLOR,S.WALL PLANK,2ND W. OF CRAWLSPACE ENTRY
SEP-08	78	1731	1808	Y	TCSA	E.PARLOR S.WALL PLANK,4TH FROM SE CORNER
SEP-09	90	1719	1808	Y	TCSA	E.PARLOR S.WALL PLANK,2ND FROM SE CORNER
SEP-10	54	1755	1808	Y	TCSA	LEANTO EAST WALL PLANK,4TH FROM S CORNER
SEP-11	64	1746	1809	Y	PIRI	E.PARLOR CEILING SOUTH SIDE GIRT
SEP-12	44*	957	1000	Y	QURU	BASEMENT, 3RD JOIST S. OF N.SILL,CHIMNEY BAY
SEP-13	72#	929	1000	Y	QUAL	BASEMENT N-S GIRT ON W.SIDE OF CELLAR STAIRS
SEP-25	113	1697	1809	Y	TCSA	LEANTO S.WALL,SE CHIMNEY POST,SOUTH BRACE
SEP-26	71	1739	1809	Y	TCSA	LEANTO 1ST STUD N. OF SE CHIMNEY POST
SEP-27		TOO SHORT		Y	CADN	LEANTO SOUTH SILL,N. SECTION (REPLACEMENT?)
SEP-28	134	867	1000	Y	QUAL	LEANTO EAST SILL-SAME TIMBER AS SEP-01
ADDITION						
SEP-14	84	1754	1837	Y	QUAL	1ST JOIST EAST OF WEST SILL,S.OF SUMMER BEAM
SEP-15	57	944	1000	Y	QURU	5TH JOIST EAST OF WEST SILL,S.OF SUMMER BEAM
SEP-16	65	936	1000	Y	QUAL	5TH JOIST EAST OF WEST SILL,N.OF SUMMER BEAM
SEP-17	70	1768	1837**	Y	QUAL	BASEMENT SUMMER BEAM
SEP-18	62	1777	1838	Y	QURU	EAST SILL
SEP-19	52	1786	1837**	Y	QUAL	W.PARLOR,S.WALL CEILING GIRT
SEP-20	94	1744	1837**	Y	PIRI	SOUTH PLATE
SEP-21	93	1717	1809	Y	TCSA	S.WALL,1ST STUD EAST OF WEST CORNERPOST
SEP-22	60	1773	1832**	Y	PIRI	S.WALL,5TH STUD EAST OF WEST CORNERPOST
SEP-23	61	1772	1832**	Y	PIRI	S.WALL,7TH STUD EAST OF WEST CORNERPOST
SEP-24	78	923	1000	Y	QUAL	W.PARLOR, SE POST

Figure 1 continued

LEANTO "PORCH"

SEP-29	47	954	1000	Y	CADN	1ST JOIST FROM W.SILL
SEP-30	42	959	1000	Y	CADN	2ND JOIST FROM W.SILL
SEP-31	TOO SHORT			Y	CADN	3RD JOIST FROM W.SILL
SEP-32	92	909	1000	Y	CADN	SOUTH SIDE SILL
✂ SEP-33	TOO SHORT			Y	CADN	EAST SILL
SEP-34	43	958	1000	Y	CADN	2ND JOIST FROM E.SILL
SEP-35	TOO SHORT			Y	CADN	1ST JOIST FROM E.SILL

FYOG = FIRST YEAR OF GROWTH (AS MEASURED)
LYOG = LAST YEAR OF GROWTH
QUAL = WHITE OAK
QURU = RED OAK
TCSA = HEMLOCK
PIRI = PITCH PINE
* = 13 OUTERMOST RINGS NOT MEASURED DUE TO DECAY
# = 7 OUTERMOST RINGS NOT MEASURED DUE TO DECAY
** = OUTERMOST RING PARTIAL, NOT MEASURED. TREE FELLED IN SPRING/EARLY SUMMER OF FOLLOWING YEAR

✂ - SENT TO OWNERS - SHARON & GUY GOWIN

CHART 1A

PART B: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP HEMLOCK VS SEP-25
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	ADD	CORR # 1	ADD	CORR # 2	ADD	CORR # 3	ADD	CORR # 4	ADD	CORR # 5	ADD	CORR # 6	ADD	CORR # 7
SEP-07	894- 943	0	.61	9	.28	57	.28	56	.27	50	.26	37	.25	-1	.22
SEP-07	914- 963	0	.48	29	.28	9	.26	26	.21	11	.19	-10	.19	-15	.18
SEP-07	934- 983	0	.45	13	.32	11	.24	-35	.23	-46	.22	-21	.22	-33	.19
SEP-07	951-1000	0	.49	-1	.32	-44	.30	-15	.28	-46	.25	-17	.19	-42	.17
SEP-08	923- 972	-1	.45	-20	.30	-22	.29	-17	.26	28	.25	-2	.22	1	.21
SEP-08	943- 992	-1	.40	-52	.35	-51	.29	-22	.26	6	.24	5	.22	-8	.22
SEP-08	951-1000	-52	.39	-1	.35	-8	.31	-20	.27	-22	.27	-61	.21	-58	.17
SEP-09	911- 960	-1	.54	28	.37	10	.24	-17	.22	24	.22	25	.20	-2	.20
SEP-09	931- 980	-22	.38	10	.38	-41	.36	-1	.31	-17	.30	-19	.27	-20	.25
SEP-09	951-1000	-1	.39	-52	.34	-22	.31	-8	.26	-54	.22	-40	.20	-20	.19
SEP-10	947- 996	-1	.40	-33	.29	-51	.28	-3	.25	-35	.24	-54	.24	-22	.20
SEP-10	951-1000	-1	.38	-51	.27	-33	.26	-8	.26	-35	.25	-62	.22	-3	.22
SEP-21	908- 957	0	.46	29	.28	43	.27	42	.25	-1	.22	-16	.18	-14	.18
SEP-21	928- 977	0	.47	-21	.31	9	.31	11	.30	-1	.22	-37	.18	13	.17
SEP-21	948- 997	0	.54	-21	.25	-19	.19	-51	.19	-44	.19	-32	.18	-1	.15
SEP-21	951-1000	0	.51	-21	.20	-32	.18	-13	.17	-48	.16	-44	.16	-51	.16
SEP-25	888- 937	01	.00	37	.26	57	.23	9	.21	51	.21	29	.20	24	.20
SEP-25	908- 957	01	.00	43	.25	3	.20	-3	.19	32	.19	21	.17	29	.14
SEP-25	928- 977	01	.00	-27	.28	-3	.23	3	.22	2	.22	15	.19	-35	.18
SEP-25	948- 997	01	.00	-44	.28	-57	.27	-43	.26	-15	.22	-27	.20	-41	.16
SEP-25	951-1000	01	.00	-57	.26	-43	.25	-44	.25	-15	.19	-7	.19	-27	.18
SEP-26	930- 979	-29	.28	0	.27	-21	.25	-32	.25	-8	.23	11	.22	-16	.20
SEP-26	950- 999	0	.47	-32	.28	-59	.27	-13	.26	-29	.23	-15	.20	-58	.20
SEP-26	951-1000	0	.47	-32	.29	-59	.26	-13	.23	-29	.22	-58	.20	-15	.18

CHART 1B

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP HEMLOCK VS SEP 07,21,25 UNDATED
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	CORR ADD	# 1	CORR ADD	# 2	CORR ADD	# 3	CORR ADD	# 4	CORR ADD	# 5	CORR ADD	# 6	CORR ADD	# 7
SEP-07	894- 943	0	.88	56	.30	57	.28	23	.27	-1	.22	24	.22	26	.20
SEP-07	914- 963	0	.86	-24	.24	26	.22	32	.21	-25	.18	-1	.17	2	.17
SEP-07	934- 983	0	.88	-21	.23	13	.23	-46	.18	11	.18	-43	.17	-44	.15
SEP-07	951-1000	0	.89	-46	.28	-44	.25	-43	.21	-57	.21	-21	.20	-42	.18
SEP-08	923- 972	-1	.72	-2	.32	-22	.31	-25	.24	-26	.20	-20	.20	2	.18
SEP-08	943- 992	-1	.60	-52	.36	-51	.32	-8	.26	-18	.22	-22	.22	-19	.21
SEP-08	951-1000	-1	.53	-52	.35	-8	.31	-22	.27	-58	.22	-51	.20	-18	.18
SEP-09	911- 960	-1	.76	28	.32	-2	.23	-15	.21	-3	.20	24	.19	-14	.18
SEP-09	931- 980	-1	.57	-22	.37	-41	.28	12	.23	10	.22	-17	.16	-2	.14
SEP-09	951-1000	-1	.54	-22	.34	-52	.32	-8	.23	-31	.22	-27	.21	-40	.20
SEP-10	947- 996	-1	.58	-18	.27	-33	.22	-35	.22	-3	.21	-7	.20	-45	.19
SEP-10	951-1000	-1	.59	-18	.38	-61	.25	-33	.23	-35	.22	-59	.20	-14	.20
SEP-21	908- 957	0	.86	43	.37	-1	.27	25	.25	42	.23	-13	.19	13	.18
SEP-21	928- 977	0	.90	-21	.35	9	.25	13	.24	11	.20	-1	.18	-13	.16
SEP-21	948- 997	0	.90	-21	.30	-32	.25	-56	.23	-43	.22	-51	.21	-13	.20
SEP-21	951-1000	0	.89	-21	.29	-32	.26	-43	.24	-56	.22	-13	.21	-61	.20
SEP-25	888- 937	0	.89	37	.23	51	.23	10	.23	24	.22	14	.22	29	.21
SEP-25	908- 957	0	.81	21	.31	32	.20	-9	.17	43	.17	42	.16	1	.13
SEP-25	928- 977	0	.77	-9	.27	-27	.25	-37	.19	-23	.18	1	.17	3	.16
SEP-25	948- 997	0	.80	-43	.30	-57	.29	-29	.26	-56	.22	-13	.21	-42	.20
SEP-25	951-1000	0	.79	-57	.30	-43	.29	-13	.27	-56	.20	-42	.18	-50	.18
SEP-26	930- 979	0	.44	-21	.38	-29	.22	-32	.22	-8	.19	2	.19	1	.17
SEP-26	950- 999	0	.53	-13	.33	-56	.24	-32	.23	-42	.21	1	.21	-59	.21
SEP-26	951-1000	0	.53	-13	.29	-32	.25	-56	.24	-58	.21	-59	.20	-42	.20

CHART 2

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP HEMLOCK VS CRVM HEMLOCK MASTER
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	CORR ADD	# 1	CORR ADD	# 2	CORR ADD	# 3	CORR ADD	# 4	CORR ADD	# 5	CORR ADD	# 6	CORR ADD	# 7
SEP-07	894- 943	889	.40	891	.40	809	.39	866	.36	918	.36	787	.32	862	.28
SEP-07	914- 963	809	.38	867	.32	907	.30	787	.29	808	.28	784	.27	908	.26
SEP-07	934- 983	809	.56	865	.46	742	.37	779	.33	767	.31	765	.31	783	.29
SEP-07	951-1000	809	.55	865	.44	717	.38	753	.36	855	.31	783	.28	696	.28
SEP-08	923- 972	808	.43	807	.36	896	.33	900	.31	742	.30	810	.28	865	.27
SEP-08	943- 992	864	.44	847	.39	778	.39	710	.32	760	.31	810	.28	816	.27
SEP-08	951-1000	778	.40	818	.37	802	.35	864	.30	757	.27	816	.27	847	.27
SEP-09	911- 960	865	.46	807	.38	837	.38	808	.35	820	.34	861	.28	906	.27
SEP-09	931- 980	808	.32	807	.30	820	.28	758	.28	782	.27	763	.26	760	.26
SEP-09	951-1000	778	.48	864	.38	757	.34	802	.28	818	.28	709	.27	843	.27
SEP-10	947- 996	847	.45	808	.42	864	.41	862	.35	791	.34	716	.32	710	.30
SEP-10	951-1000	847	.49	864	.43	791	.41	808	.40	862	.34	716	.32	828	.25
SEP-21	908- 957	809	.52	808	.40	866	.34	751	.34	867	.30	830	.29	821	.29
SEP-21	928- 977	809	.63	796	.36	808	.32	742	.31	867	.27	865	.27	774	.27
SEP-21	948- 997	865	.52	809	.51	779	.49	792	.32	855	.32	796	.27	711	.27
SEP-21	951-1000	809	.51	865	.50	779	.45	848	.33	855	.29	792	.29	796	.26
SEP-25	888- 937	909	.32	796	.28	862	.27	777	.26	838	.26	767	.24	911	.23
SEP-25	908- 957	830	.33	761	.30	855	.28	838	.26	777	.26	809	.26	811	.25
SEP-25	928- 977	809	.41	811	.39	855	.33	761	.32	777	.29	868	.27	800	.26
SEP-25	948- 997	865	.40	809	.40	811	.37	779	.35	711	.30	838	.30	717	.25
SEP-25	951-1000	809	.39	811	.37	865	.35	779	.35	711	.31	856	.27	835	.27
SEP-26	930- 979	889	.40	809	.39	886	.33	732	.31	868	.30	734	.29	722	.23
SEP-26	950- 999	811	.42	863	.33	711	.33	779	.30	809	.29	696	.27	859	.24
SEP-26	951-1000	811	.42	711	.33	863	.31	809	.29	803	.27	779	.27	696	.25

CHART 3

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP HEMLOCK VS S.BERKSHIRE COUNTY HEMLOCK MASTER
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	ADD	CORR # 1	ADD	CORR # 2	ADD	CORR # 3	ADD	CORR # 4	ADD	CORR # 5	ADD	CORR # 6	ADD	CORR # 7
SEP-07	894- 943	809	.68	891	.43	862	.40	785	.36	832	.35	889	.33	916	.31
SEP-07	914- 963	809	.58	785	.38	886	.38	891	.37	888	.28	834	.25	818	.24
SEP-07	934- 983	809	.69	871	.38	855	.37	753	.27	882	.26	881	.25	752	.25
SEP-07	951-1000	809	.60	871	.33	709	.31	792	.30	767	.29	762	.28	728	.27
SEP-08	923- 972	808	.68	865	.38	881	.26	787	.25	819	.24	863	.24	890	.24
SEP-08	943- 992	864	.45	863	.39	808	.37	734	.36	847	.32	881	.31	744	.28
SEP-08	951-1000	808	.38	864	.35	863	.35	734	.34	847	.33	828	.29	769	.29
SEP-09	911- 960	808	.64	910	.39	865	.39	861	.34	794	.34	782	.32	890	.29
SEP-09	931- 980	808	.50	782	.35	865	.33	787	.32	861	.32	863	.31	752	.29
SEP-09	951-1000	808	.39	734	.38	863	.36	828	.34	787	.33	769	.30	782	.29
SEP-10	947- 996	864	.48	808	.45	734	.37	721	.36	708	.36	774	.32	847	.27
SEP-10	951-1000	864	.44	808	.40	734	.37	774	.35	708	.34	791	.31	710	.31
SEP-21	908- 957	809	.73	834	.34	866	.32	891	.32	785	.29	796	.29	795	.28
SEP-21	928- 977	809	.74	820	.37	753	.35	867	.31	796	.26	840	.26	788	.25
SEP-21	948- 997	809	.62	753	.37	788	.32	779	.31	711	.30	865	.30	792	.27
SEP-21	951-1000	809	.61	753	.34	711	.33	735	.32	788	.31	709	.29	748	.27
SEP-25	888- 937	809	.48	915	.34	796	.33	786	.32	767	.32	833	.31	823	.30
SEP-25	908- 957	809	.50	830	.42	785	.31	772	.30	901	.29	915	.28	757	.27
SEP-25	928- 977	809	.57	853	.35	855	.28	886	.26	744	.24	830	.24	880	.23
SEP-25	948- 997	809	.48	777	.32	711	.31	796	.31	728	.30	858	.30	729	.28
SEP-25	951-1000	809	.46	858	.34	796	.33	835	.32	754	.31	728	.28	727	.26
SEP-26	930- 979	809	.43	847	.34	883	.29	811	.27	893	.26	886	.25	788	.24
SEP-26	950- 999	711	.37	809	.35	811	.35	728	.32	796	.30	698	.29	754	.28
SEP-26	951-1000	711	.36	809	.35	811	.34	728	.30	754	.30	725	.29	796	.28

CHART 4

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP-HEMLOCK VS SOUTHERN BERKSHIRE COUNTY HEMLOCK MASTER WITH SEP SAMPLES INCLUDED
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7
SEP-07	894- 943	809 .82	891 .42	832 .36	785 .33	916 .31	889 .29	862 .27
SEP-07	914- 963	809 .74	886 .39	891 .37	785 .36	888 .28	865 .23	811 .22
SEP-07	934- 983	809 .80	871 .38	855 .26	882 .26	835 .26	753 .26	881 .25
SEP-07	951-1000	809 .77	871 .33	709 .32	767 .30	762 .27	752 .26	700 .24
SEP-08	923- 972	808 .80	787 .32	863 .27	865 .27	881 .26	807 .26	840 .25
SEP-08	943- 992	808 .72	864 .45	863 .40	847 .36	881 .31	734 .28	744 .24
SEP-08	951-1000	808 .70	864 .35	863 .35	847 .34	828 .32	818 .26	734 .25
SEP-09	911- 960	808 .79	910 .39	863 .33	782 .32	890 .29	865 .28	794 .28
SEP-09	931- 980	808 .67	787 .37	863 .37	782 .33	865 .28	752 .27	861 .27
SEP-09	951-1000	808 .70	863 .36	787 .34	828 .32	734 .31	843 .29	769 .28
SEP-10	947- 996	808 .70	864 .48	721 .35	708 .34	847 .32	734 .29	774 .28
SEP-10	951-1000	808 .65	864 .44	791 .35	710 .33	708 .33	734 .30	721 .30
SEP-21	908- 957	809 .84	866 .35	834 .34	785 .30	891 .30	852 .29	913 .27
SEP-21	928- 977	809 .87	753 .34	788 .32	867 .28	840 .27	865 .26	820 .25
SEP-21	948- 997	809 .85	788 .32	753 .32	711 .30	865 .30	709 .25	779 .25
SEP-21	951-1000	809 .84	711 .33	788 .32	709 .29	753 .28	696 .27	700 .26
SEP-25	888- 937	809 .65	796 .34	915 .34	767 .33	823 .30	786 .30	762 .29
SEP-25	908- 957	809 .63	830 .43	772 .32	785 .30	901 .29	915 .28	757 .27
SEP-25	928- 977	809 .65	853 .37	886 .26	830 .24	753 .24	744 .23	880 .22
SEP-25	948- 997	809 .67	858 .31	729 .30	711 .27	796 .27	766 .27	728 .26
SEP-25	951-1000	809 .66	858 .34	796 .32	835 .31	754 .29	752 .28	729 .28
SEP-26	930- 979	809 .51	788 .32	883 .29	847 .27	811 .27	893 .26	886 .25
SEP-26	950- 999	809 .57	711 .35	796 .31	698 .29	728 .28	823 .27	865 .25
SEP-26	951-1000	809 .57	711 .35	698 .28	823 .27	796 .26	728 .26	865 .25

CHART 5

SOUTHERN BERKSHIRE COUNTY HEMLOCK MASTER
PART 2: CORRELATIONS WITH MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED

32-YEAR CUBIC SPLINE FILTER; CORRELATIONS OF 50-YEAR SEGMENTS LAGGED 20 YEARS

FLAGS: __A=CORRELATION UNDER 0.3281; __B=CORRELATION HIGHER AT OTHER POSITION

0SEQ	SERIES	INTERVAL	1640 1689	1660 1709	1680 1729	1700 1749	1720 1769	1740 1789	1760 1809	1780 1829	1800 1849	FLAGS/ TOTAL
1	SEP-07	1710-1809	=	=	=	.70	.72	.74	.72	=	=	0/ 4
2	SEP-08	1731-1808	=	=	=	=	.75	.65	.61	=	=	0/ 3
3	SEP-09	1719-1808	=	=	=	.74	.74	.59	.61	=	=	0/ 4
4	SEP-10	1755-1808	=	=	=	=	=	.65	.59	=	=	0/ 2
5	SEP-21	1717-1809	=	=	=	.81	.82	.83	.80	=	=	0/ 4
6	SEP-25	1697-1809	=	=	.53	.58	.55	.54	.59	=	=	0/ 5
7	SEP-26	1739-1809	=	=	=	=	.44	.42	.50	=	=	0/ 3
8	SCC-12	1664-1792	=	.47	.52	.47	.56	.49	=	=	=	0/ 5
9	SCC-13	1690-1790	=	=	.71	.77	.85	.80	=	=	=	0/ 4
10	SCC-14	1697-1790	=	=	.77	.78	.75	.79	=	=	=	0/ 4
11	SCC-15	1664-1792	=	.69	.72	.74	.73	.71	=	=	=	0/ 5
12	IB-02	1701-1825	=	=	=	.69	.67	.70	.63	.72	=	0/ 5
13	IB-03	1664-1825	=	.31 B	.43	.62	.71	.75	.57	.59	=	1/ 7
14	IB-05	1730-1826	=	=	=	=	.36	.40	.35	.43	=	0/ 4
15	IB-07	1688-1825	=	=	.47	.61	.73	.65	.60	.55	=	0/ 6
16	IB-09	1742-1826	=	=	=	=	=	.51	.43	.53	=	0/ 3
17	IB-11	1805-1826	=	=	=	=	=	=	=	=	.43	0/ 1

CHART 6

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP-PITCH PINE VS SEP-20
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	ADD	CORR # 1	ADD	CORR # 2	ADD	CORR # 3	ADD	CORR # 4	ADD	CORR # 5	ADD	CORR # 6	ADD	CORR # 7
SEP-11	937- 986	-28	.43	-9	.39	3	.24	-27	.22	-7	.21	-16	.21	-29	.19
SEP-11	951-1000	-28	.54	-9	.30	-38	.27	-16	.23	-7	.19	0	.18	-41	.11
SEP-20	907- 956	01	.00	44	.21	23	.16	30	.14	28	.13	10	.13	36	.13
SEP-20	927- 976	01	.00	23	.30	2	.20	10	.20	12	.19	-10	.09	-19	.08
SEP-20	947- 996	01	.00	-23	.31	-10	.22	-36	.19	-38	.13	-26	.11	-12	.09
SEP-20	951-1000	01	.00	-23	.22	-44	.21	-36	.16	-21	.15	-9	.14	-30	.11
SEP-22	941- 990	-5	.42	-23	.28	5	.27	-25	.24	-24	.22	6	.19	-7	.17
SEP-22	951-1000	-5	.40	-24	.27	-41	.26	-23	.26	-8	.17	-35	.15	-42	.12
SEP-23	940- 989	-5	.48	-33	.25	-23	.21	-22	.20	6	.17	-31	.16	5	.14
SEP-23	951-1000	-5	.45	-35	.24	-31	.22	-24	.19	-23	.19	-22	.18	-12	.16

CHART 7

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP PITCH PINE VS DEERFIELD PITCH PINE MASTER
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	CORR ADD	# 1	CORR ADD	# 2	CORR ADD	# 3	CORR ADD	# 4	CORR ADD	# 5	CORR ADD	# 6	CORR ADD	# 7
SEP-11	937- 986	844	.39	833	.39	809	.39	761	.33	846	.32	822	.32	595	.31
SEP-11	951-1000	595	.44	751	.38	809	.33	833	.32	615	.32	659	.30	597	.29
SEP-20	907- 956	624	.47	688	.40	863	.36	744	.34	623	.32	627	.32	643	.31
SEP-20	927- 976	625	.41	688	.40	624	.37	863	.37	742	.35	767	.34	623	.32
SEP-20	947- 996	837	.49	658	.39	708	.39	585	.34	623	.33	696	.32	678	.32
SEP-20	951-1000	837	.51	691	.37	708	.35	696	.31	816	.30	678	.29	661	.29
SEP-22	941- 990	599	.51	601	.37	703	.36	832	.35	683	.32	665	.30	663	.30
SEP-22	951-1000	832	.49	755	.39	623	.39	808	.37	601	.33	599	.31	703	.31
SEP-23	940- 989	707	.40	832	.39	653	.38	737	.36	599	.34	733	.32	618	.30
SEP-23	951-1000	832	.48	808	.42	755	.41	707	.36	623	.32	733	.29	666	.28

CHART 8

SOUTHERN BERKSHIRE COUNTY PITCH PINE MASTER
PART 2: CORRELATIONS WITH MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED

32-YEAR CUBIC SPLINE FILTER; CORRELATIONS OF 50-YEAR SEGMENTS LAGGED 20 YEARS

FLAGS: __A = CORRELATION UNDER 0.3281;

	SERIES	INTERVAL	1580 1629	1600 1649	1620 1669	1640 1689	1660 1709	1680 1729	1700 1749	1720 1769	1740 1789	1760 1809	1780 1829	FLAGS/ TOTAL
1	SEP-11	1746-1809	=	=	=	=	=	=	=	=	.60	.60	=	0/ 2
2	SEP-20	1744-1832	=	=	=	=	=	=	=	=	.40	.48	.55	0/ 3
3	SEP-22	1773-1832	=	=	=	=	=	=	=	=	=	.71	.74	0/ 2
4	SEP-23	1772-1832	=	=	=	=	=	=	=	=	=	.65	.69	0/ 2
5	SCC-16	1693-1793	=	=	=	=	=	.53	.57	.44	.54	=	=	0/ 4
6	SCC-18	1685-1793	=	=	=	=	=	.40	.50	.52	.44	=	=	0/ 4
7	SCC-23	1740-1793	=	=	=	=	=	=	=	=	.52	=	=	0/ 1
8	AFGA-01	1670-1770	=	=	=	=	.67	.67	.49	.28	=	=	=	1/ 4
9	AFGA-02	1671-1770	=	=	=	=	.57	.63	.71	.64 ___A	=	=	=	0/ 4
10	AFGA-03	1670-1770	=	=	=	=	.40	.44	.47	.43	=	=	=	0/ 4
11	AFGA-08	1666-1761	=	=	=	=	.53	.58	.65	.73	=	=	=	0/ 4
12	AFCA-02	1683-1734	=	=	=	=	=	.77	.74	=	=	=	=	0/ 2
13	AFCA-03	1682-1734	=	=	=	=	=	.58	.62	=	=	=	=	0/ 2
14	AFCA-04	1682-1734	=	=	=	=	=	.62	.60	=	=	=	=	0/ 2
15	AFCA-05	1678-1734	=	=	=	=	.46	.45	=	=	=	=	=	0/ 2
16	AFCA-06	1657-1734	=	=	=	.59	.64	.61	=	=	=	=	=	0/ 3
17	AFCA-07	1677-1732	=	=	=	=	.40	.39	=	=	=	=	=	0/ 2
18	AFCA-08	1651-1734	=	=	=	.47	.49	.45	=	=	=	=	=	0/ 3
19	AFCA-09	1686-1735	=	=	=	=	=	.40	=	=	=	=	=	0/ 1
20	AFCA-10	1680-1734	=	=	=	=	=	.54	=	=	=	=	=	0/ 1
21	AFCA-11	1680-1734	=	=	=	=	=	.66	=	=	=	=	=	0/ 1
22	AFCA-12	1669-1734	=	=	=	=	.47	.52	=	=	=	=	=	0/ 2
23	AFCA-13	1685-1734	=	=	=	=	=	.50	=	=	=	=	=	0/ 1
24	AFCA-16	1617-1737	=	.54	.51	.46	.55	.52	=	=	=	=	=	0/ 5
25	AFCA-17	1617-1739	=	.50	.50	.42	.39	.42	=	=	=	=	=	0/ 5
26	AFCA-18	1670-1734	=	=	=	=	.69	.61	=	=	=	=	=	0/ 2

CHART 9

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP PITCH PINE VS SOUTHERN BERKSHIRE COUNTY PITCH PINE MASTER WITH SEP PP ADDED
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	ADD	CORR # 1	ADD	CORR # 2	ADD	CORR # 3	ADD	CORR # 4	ADD	CORR # 5	ADD	CORR # 6	ADD	CORR # 7
SEP-11	937- 986	809	.72	761	.50	828	.41	762	.37	714	.35	748	.31	726	.28
SEP-11	951-1000	809	.75	828	.45	726	.34	647	.34	751	.29	761	.28	729	.28
SEP-20	907- 956	837	.58	742	.39	716	.36	688	.30	744	.28	800	.28	771	.28
SEP-20	927- 976	837	.68	800	.34	771	.33	708	.31	748	.31	663	.28	710	.28
SEP-20	947- 996	837	.73	779	.39	708	.39	653	.33	687	.29	693	.27	698	.27
SEP-20	951-1000	837	.76	708	.35	779	.33	653	.30	687	.27	791	.26	760	.25
SEP-22	941- 990	832	.84	719	.31	703	.30	813	.30	665	.29	795	.28	658	.27
SEP-22	951-1000	832	.87	813	.39	713	.37	703	.33	748	.29	792	.29	802	.28
SEP-23	940- 989	832	.83	795	.34	736	.33	766	.32	703	.32	658	.31	737	.28
SEP-23	951-1000	832	.87	769	.37	639	.34	703	.32	733	.27	748	.27	658	.26

CHART 10 A

SEP OAK UNDATED SITE MASTER

PART 2: CORRELATIONS WITH MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED

32-YEAR CUBIC SPLINE FILTER; CORRELATIONS OF 50-YEAR SEGMENTS LAGGED 20 YEARS

FLAGS: __A = CORRELATION UNDER 0.3281;

0SEQ	SERIES	INTERVAL	900 949	920 969	940 989	960 1009	980 1029	FLAGS/ TOTAL
1	SEP-04	908- 972	.38	.37	=	=	=	
+								0/ 2
2	SEP-06	908- 972	.44	.70	=	=	=	
+								0/ 2
3	SEP-14	917-1000	.60	.56	.60	.55	=	
+								0/ 4
4	SEP-15	945-1001	=	=	.68	.66	=	
+								0/ 2
5	SEP-18	940-1001	=	=	.70	.54	=	
+								0/ 2
6	SEP-17	931-1000	=	.78	.78	.72	=	
+								0/ 3
7	SEP-19	949-1000	=	=	.63	.63	=	
+								0/ 2

CHART 10B

PART B: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP OAK VS SEP UNDATED OAK SITE MASTER
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	ADD	CORR # 1	ADD	CORR # 2	ADD	CORR # 3	ADD	CORR # 4	ADD	CORR # 5	ADD	CORR # 6	ADD	CORR # 7
SEP-01	867- 916	64	.36	45	.36	81	.24	66	.19	40	.18	41	.17	84	.17
SEP-01	887- 936	64	.31	26	.25	40	.22	51	.19	28	.18	27	.16	20	.15
SEP-01	907- 956	19	.40	16	.20	4	.20	40	.20	27	.19	7	.17	39	.17
SEP-01	927- 976	19	.29	5	.22	-6	.15	-3	.14	-16	.14	16	.11	-20	.11
SEP-01	947- 996	-28	.68	5	.26	-26	.18	-4	.17	4	.13	-25	.10	-12	.10
SEP-01	951-1000	-28	.66	-26	.29	-13	.16	-7	.15	-3	.14	-4	.13	-1	.11
SEP-04	936- 985	-28	.67	13	.24	-8	.23	12	.18	-26	.18	-7	.16	-19	.14
SEP-04	951-1000	-28	.60	-4	.33	-8	.29	-26	.22	-37	.20	-44	.20	-19	.19
SEP-05	957-1000	-28	.39	-47	.37	-13	.27	-4	.20	-21	.18	-2	.17	-40	.16
SEP-06	935- 984	-28	.79	12	.38	14	.29	5	.22	-26	.17	6	.15	7	.14
SEP-06	951-1000	-28	.80	-30	.19	-16	.18	-13	.13	-3	.12	-37	.08	-26	.08
SEP-12	957-1000	-3	.36	-34	.25	-43	.23	-1	.21	-8	.18	-21	.17	-29	.14
SEP-13	929- 978	6	.33	15	.30	-8	.30	-21	.24	-19	.22	-16	.20	19	.19
SEP-13	949- 998	-41	.26	-21	.25	-8	.25	1	.24	-39	.22	-16	.22	-19	.20
SEP-13	951-1000	-21	.29	-41	.24	-40	.24	1	.23	-14	.21	-8	.20	-19	.19
SEP-14	917- 966	0	.79	23	.28	13	.22	20	.22	32	.18	14	.16	7	.13
SEP-14	937- 986	0	.74	13	.31	7	.24	15	.23	-29	.20	-18	.18	-23	.15
SEP-14	951-1000	0	.70	-18	.29	-31	.29	-9	.25	-40	.21	-24	.18	-16	.17
SEP-15	944- 993	1	.76	3	.27	-32	.27	-17	.22	-37	.22	-6	.15	-20	.13
SEP-15	951-1000	1	.75	-32	.33	-17	.25	-39	.24	-37	.20	-6	.16	-38	.15
SEP-16	936- 985	5	.28	-16	.27	-4	.27	-6	.23	-15	.17	14	.15	-25	.15
SEP-16	951-1000	-39	.37	-15	.26	-6	.26	0	.26	-7	.22	-25	.21	-4	.17
SEP-17	931- 980	0	.87	-23	.27	18	.22	-2	.21	-13	.18	-20	.18	-22	.17
SEP-17	951-1000	0	.82	-2	.27	-33	.25	-13	.24	-21	.24	-42	.22	-40	.19
SEP-18	939- 988	1	.79	-22	.25	-18	.21	-14	.20	-1	.19	-5	.14	4	.12
SEP-18	951-1000	1	.67	-14	.36	-38	.24	-1	.24	-35	.22	-41	.21	-37	.20
SEP-19	949- 998	0	.78	-40	.33	-33	.23	-13	.21	-21	.21	-1	.19	-18	.17
SEP-19	951-1000	0	.78	-40	.31	-33	.25	-13	.23	-1	.20	-21	.19	-20	.17
SEP-24	923- 972	1	.27	7	.27	6	.25	14	.23	16	.23	28	.17	-5	.16
SEP-24	943- 992	-26	.38	6	.37	-24	.24	-35	.21	-27	.19	7	.15	-6	.15
SEP-24	951-1000	1	.36	-24	.35	-26	.27	-4	.25	-17	.18	-44	.18	-35	.15
SEP-28	867- 916	46	.40	69	.29	82	.28	64	.17	84	.17	67	.16	55	.15
SEP-28	887- 936	55	.27	46	.25	26	.24	62	.19	20	.17	29	.16	60	.16
SEP-28	907- 956	8	.33	19	.33	6	.33	26	.25	29	.19	17	.13	39	.13
SEP-28	927- 976	19	.34	8	.34	6	.32	-1	.24	1	.18	-12	.17	-14	.17
SEP-28	947- 996	-28	.49	-37	.26	4	.21	-39	.18	-20	.17	3	.17	1	.17
SEP-28	951-1000	-28	.48	-37	.23	-1	.21	1	.21	-39	.19	-20	.17	-25	.14

CHART 11

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP OAK VS CT. RIVER VALLEY-MA OAK MASTER OAK MASTER
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7
SEP-01	867- 916	808 .51	882 .32	757 .32	826 .31	771 .31	926 .31	752 .30
SEP-01	887- 936	856 .35	903 .34	834 .32	823 .31	774 .29	745 .27	821 .26
SEP-01	907- 956	856 .42	834 .41	709 .34	796 .27	855 .26	710 .25	844 .25
SEP-01	927- 976	690 .34	746 .32	707 .30	764 .28	709 .28	847 .27	849 .27
SEP-01	947- 996	777 .39	718 .35	802 .33	849 .31	833 .30	817 .30	754 .29
SEP-01	951-1000	718 .39	732 .34	777 .33	836 .32	802 .31	730 .29	696 .28
SEP-04	936- 985	809 .52	856 .42	858 .36	684 .34	701 .33	704 .32	741 .32
SEP-04	951-1000	809 .53	741 .40	684 .37	777 .37	824 .35	739 .34	663 .33
SEP-05	957-1000	722 .46	809 .38	817 .33	669 .30	684 .28	756 .26	790 .26
SEP-06	935- 984	856 .36	851 .33	788 .32	790 .31	858 .29	740 .29	717 .29
SEP-06	951-1000	809 .45	777 .31	699 .29	677 .29	752 .28	748 .27	824 .26
SEP-12	957-1000	663 .48	810 .42	678 .42	843 .40	784 .36	747 .35	776 .30
SEP-13	929- 978	713 .36	829 .35	727 .33	791 .28	863 .28	746 .28	852 .27
SEP-13	949- 998	843 .34	671 .32	789 .31	691 .27	688 .27	708 .27	845 .26
SEP-13	951-1000	843 .38	671 .29	688 .29	789 .28	825 .27	764 .26	691 .25
SEP-14	917- 966	837 .39	805 .29	843 .29	850 .28	866 .24	709 .24	694 .23
SEP-14	937- 986	843 .38	828 .37	673 .36	837 .36	758 .34	821 .31	805 .30
SEP-14	951-1000	837 .48	821 .42	813 .41	805 .34	844 .33	846 .32	828 .32
SEP-15	944- 993	746 .36	672 .34	706 .33	804 .32	727 .30	744 .29	686 .28
SEP-15	951-1000	814 .31	689 .31	838 .30	674 .25	751 .24	807 .24	672 .23
SEP-16	936- 985	779 .42	753 .38	837 .37	851 .30	681 .29	752 .27	765 .26
SEP-16	951-1000	837 .37	813 .37	696 .31	698 .30	729 .30	681 .29	720 .28
SEP-17	931- 980	837 .44	745 .41	805 .37	744 .34	816 .33	803 .28	780 .26
SEP-17	951-1000	837 .46	671 .33	745 .32	722 .32	681 .30	743 .28	815 .28
SEP-18	939- 988	746 .34	674 .33	838 .33	730 .32	726 .31	691 .30	706 .28
SEP-18	951-1000	689 .38	744 .35	746 .34	814 .31	728 .26	706 .24	657 .24
SEP-19	949- 998	754 .37	803 .34	745 .32	837 .32	671 .29	681 .29	670 .29
SEP-19	951-1000	754 .37	837 .33	803 .33	745 .32	671 .31	702 .29	681 .29
SEP-24	923- 972	775 .37	718 .35	739 .33	697 .33	838 .31	822 .28	835 .27
SEP-24	943- 992	677 .41	739 .36	754 .31	697 .27	718 .26	838 .25	751 .24
SEP-24	951-1000	840 .42	759 .37	838 .34	816 .32	677 .31	761 .31	699 .29
SEP-28	867- 916	809 .47	787 .39	772 .36	758 .36	883 .33	789 .32	813 .32
SEP-28	887- 936	736 .39	789 .37	892 .34	813 .32	809 .32	822 .31	883 .31
SEP-28	907- 956	809 .46	711 .35	822 .34	836 .33	870 .32	788 .32	731 .30
SEP-28	927- 976	809 .50	865 .33	707 .29	731 .28	845 .27	690 .26	709 .24
SEP-28	947- 996	809 .52	777 .38	817 .34	707 .33	704 .30	825 .28	793 .28
SEP-28	951-1000	809 .43	777 .32	817 .29	707 .28	704 .27	682 .26	730 .25

CHART 12A

SOUTHERN BERKSHIRE COUNTY OAK MASTER WITH SEP ADDED

PART 2: CORRELATIONS WITH MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED

32-YEAR CUBIC SPLINE FILTER; CORRELATIONS OF 50-YEAR SEGMENTS LAGGED 25 YEARS

FLAGS: __A=CORRELATION UNDER 0.3281; __B=CORRELATION HIGHER AT OTHER POSITION

ØSEQ	SERIES	INTERVAL	1600 1649	1625 1674	1650 1699	1675 1724	1700 1749	1725 1774	1750 1799	1775 1824	1800 1849	FLAGS/ TOTAL
1	SEP-04	1750-1809	=	=	=	=	=	=	.47	.42 ___B	=	1/ 2
2	SEP-05	1766-1809	=	=	=	=	=	=	.42	=	=	0/ 1
3	SEP-06	1750-1809	=	=	=	=	=	=	.52	.55	=	0/ 2
4	SEP-14	1754-1837	=	=	=	=	=	=	.39	.50	.55	0/ 3
5	SEP-15	1782-1838	=	=	=	=	=	=	=	.68	.68	0/ 2
6	SEP-17	1768-1837	=	=	=	=	=	=	.69	.70	.71	0/ 3
7	SEP-18	1777-1838	=	=	=	=	=	=	=	.61	.56	0/ 2
8	SEP-19	1786-1837	=	=	=	=	=	=	=	.63	.63	0/ 2
9	SM-03	1628-1742	=	.39	.53	.41	.41 ___B	=	=	=	=	1/ 4
10	SM-08	1668-1729	=	=	.48	.44	.41	=	=	=	=	0/ 3
11	SM-15	1624-1741	.47	.49	.73	.68	.46	=	=	=	=	0/ 5
12	SM-16	1655-1740	=	=	.55	.56	.48	=	=	=	=	0/ 3
13	SM-18	1624-1738	.42	.42	.63	.53	.38	=	=	=	=	0/ 5
14	SCC-01	1689-1781	=	=	=	.48	.63	.52	.63	=	=	0/ 4
15	SCC-02	1711-1781	=	=	=	=	.34	.39	.59	=	=	0/ 3
16	SCC-03	1734-1781	=	=	=	=	=	.51	=	=	=	0/ 1
17	SCC-04	1703-1781	=	=	=	=	.48	.54	.47	=	=	0/ 3
18	SCC-05	1718-1781	=	=	=	=	.32 ___A	.38	.50	=	=	1/ 3
19	SCC-06	1711-1781	=	=	=	=	.36	.42	.43	=	=	0/ 3
20	SCC-07	1723-1781	=	=	=	=	.39	.32 ___A	.41	=	=	1/ 3
21	SCC-08	1689-1781	=	=	=	.58	.60	.64	.57	=	=	0/ 4
22	SCC-09	1718-1781	=	=	=	=	.67	.68	.68	=	=	0/ 3
23	SCC-10	1709-1781	=	=	=	=	.65	.59	.62	=	=	0/ 3
24	SCC-20	1705-1788	=	=	=	=	.43	.60	.45	=	=	0/ 3

CHART 12B

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP OAK VS SOUTHERN BERKSHIRE COUNTY OAK MASTER WITH SEP ADDED
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	CORR ADD	# 1	CORR ADD	# 2	CORR ADD	# 3	CORR ADD	# 4	CORR ADD	# 5	CORR ADD	# 6	CORR ADD	# 7
SEP-01	867- 916	830	.45	901	.42	793	.33	808	.32	832	.31	810	.30	776	.29
SEP-01	892- 941	856	.43	810	.35	823	.34	853	.31	745	.31	877	.30	832	.27
SEP-01	917- 966	823	.36	709	.35	856	.33	693	.32	812	.31	788	.29	745	.29
SEP-01	942- 991	809	.45	717	.32	720	.27	734	.27	757	.25	706	.24	777	.23
SEP-01	951-1000	809	.49	718	.37	757	.37	756	.29	684	.26	717	.24	779	.24
SEP-04	936- 985	809	.57	740	.46	785	.37	776	.35	818	.31	741	.29	720	.27
SEP-04	951-1000	809	.55	800	.43	741	.34	740	.34	757	.33	833	.32	723	.28
SEP-05	957-1000	809	.53	684	.40	782	.34	738	.34	721	.29	720	.28	669	.28
SEP-06	935- 984	738	.42	809	.37	757	.37	849	.35	800	.34	755	.33	777	.32
SEP-06	951-1000	809	.63	715	.31	782	.29	738	.28	668	.27	697	.24	779	.24
SEP-12	957-1000	714	.39	834	.38	738	.37	776	.33	678	.32	663	.31	658	.31
SEP-13	929- 978	713	.34	829	.28	744	.28	852	.28	727	.27	843	.26	805	.25
SEP-13	951-1000	658	.41	710	.35	693	.33	745	.29	708	.29	669	.27	799	.27
SEP-14	917- 966	837	.50	805	.36	850	.32	689	.30	748	.26	779	.25	716	.24
SEP-14	942- 991	837	.65	795	.35	819	.32	787	.31	813	.30	703	.30	687	.30
SEP-14	951-1000	837	.69	687	.36	746	.31	665	.30	819	.27	806	.25	797	.25
SEP-15	944- 993	838	.77	727	.35	708	.30	746	.28	747	.26	686	.26	767	.24
SEP-15	951-1000	838	.76	657	.36	711	.30	727	.28	767	.28	737	.28	749	.27
SEP-16	936- 985	813	.39	753	.33	779	.30	768	.28	842	.28	701	.26	710	.26
SEP-16	951-1000	681	.39	659	.32	720	.31	811	.30	822	.30	813	.30	837	.28
SEP-17	931- 980	837	.78	805	.33	746	.30	743	.30	745	.28	804	.27	710	.26
SEP-17	951-1000	837	.81	804	.35	696	.32	743	.32	653	.29	683	.29	746	.28
SEP-18	939- 988	838	.71	730	.46	767	.42	667	.40	726	.35	746	.34	680	.33
SEP-18	951-1000	838	.67	814	.39	654	.38	747	.35	767	.34	711	.34	765	.31
SEP-19	949- 998	837	.77	746	.38	784	.32	806	.29	745	.29	707	.29	779	.29
SEP-19	951-1000	837	.77	746	.36	653	.34	784	.34	779	.28	745	.28	806	.27
SEP-24	923- 972	843	.39	799	.35	738	.31	811	.30	773	.28	853	.27	800	.26
SEP-24	948- 997	742	.37	659	.36	738	.33	722	.32	759	.32	660	.30	770	.29
SEP-24	951-1000	838	.38	793	.37	780	.36	759	.33	770	.31	833	.26	742	.26
SEP-28	867- 916	743	.48	772	.41	809	.35	787	.32	831	.32	811	.32	813	.29
SEP-28	892- 941	772	.31	736	.31	787	.29	892	.29	811	.28	845	.27	866	.26
SEP-28	917- 966	845	.41	812	.37	711	.36	798	.33	809	.31	731	.31	709	.31
SEP-28	942- 991	809	.55	682	.40	729	.35	704	.33	785	.32	707	.30	765	.30
SEP-28	951-1000	809	.55	682	.43	765	.38	654	.34	706	.32	679	.30	704	.29

CHART 13

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

SEP CHESTNUT VS SEP-32
40-YEAR SEGMENTS LAGGED 5 YEARS

SERIES	COUNTED SEGMENT	CORR ADD	# 1	CORR ADD	# 2	CORR ADD	# 3	CORR ADD	# 4	CORR ADD	# 5	CORR ADD	# 6	CORR ADD	# 7
SEP-27	955- 994	-16	.50	-35	.45	-19	.33	2	.32	-4	.26	0	.22	-7	.21
SEP-27	960- 999	-35	.48	-16	.43	-19	.30	-50	.24	-49	.22	-4	.22	-37	.21
SEP-27	961-1000	-35	.49	-16	.38	-51	.33	-19	.28	-50	.24	-4	.23	-49	.21
SEP-29	954- 993	-35	.54	-7	.45	-10	.32	-19	.27	-17	.25	-16	.22	-33	.17
SEP-29	959- 998	-35	.53	-7	.41	-17	.36	-45	.34	-10	.29	2	.25	-14	.25
SEP-29	961-1000	-35	.54	-7	.37	-17	.32	-10	.32	-45	.27	-14	.25	-16	.22
SEP-30	960- 999	-49	.29	-11	.26	-43	.26	-17	.22	-38	.22	-39	.20	-28	.16
SEP-30	961-1000	-49	.27	-11	.27	-43	.24	-38	.24	-17	.23	-39	.19	-30	.17
SEP-30A	961-1000	-38	.36	-10	.28	-6	.27	-13	.26	-37	.21	-16	.21	-25	.21
SEP-32	910- 949	01	.00	37	.29	44	.26	46	.25	25	.25	1	.24	14	.24
SEP-32	915- 954	01	.00	46	.29	-1	.26	37	.24	14	.24	44	.23	1	.23
SEP-32	920- 959	01	.00	35	.34	25	.27	28	.25	34	.23	16	.21	2	.20
SEP-32	925- 964	01	.00	35	.32	2	.31	-2	.27	25	.25	-14	.25	16	.22
SEP-32	930- 969	01	.00	2	.32	21	.31	-2	.27	16	.25	-14	.25	19	.23
SEP-32	935- 974	01	.00	25	.36	19	.34	21	.29	3	.28	-25	.25	9	.21
SEP-32	940- 979	01	.00	19	.30	9	.27	12	.24	-3	.21	-16	.19	3	.19
SEP-32	945- 984	01	.00	-9	.32	-25	.27	-16	.26	-3	.25	9	.25	3	.24
SEP-32	950- 989	01	.00	-9	.29	-21	.28	-19	.28	-37	.26	-25	.25	9	.25
SEP-32	955- 994	01	.00	-35	.34	-19	.31	-21	.29	-9	.26	-44	.25	-12	.24
SEP-32	960- 999	01	.00	-25	.36	-35	.32	-19	.28	-9	.26	-46	.26	-12	.25
SEP-32	961-1000	01	.00	-25	.46	-19	.32	-35	.30	-28	.29	-46	.29	-9	.26
SEP-34	958- 997	-35	.46	-19	.26	-37	.23	-12	.21	-10	.20	-28	.18	-7	.18
SEP-34	961-1000	-35	.50	-19	.34	-37	.26	-33	.23	-45	.21	-49	.21	-7	.20