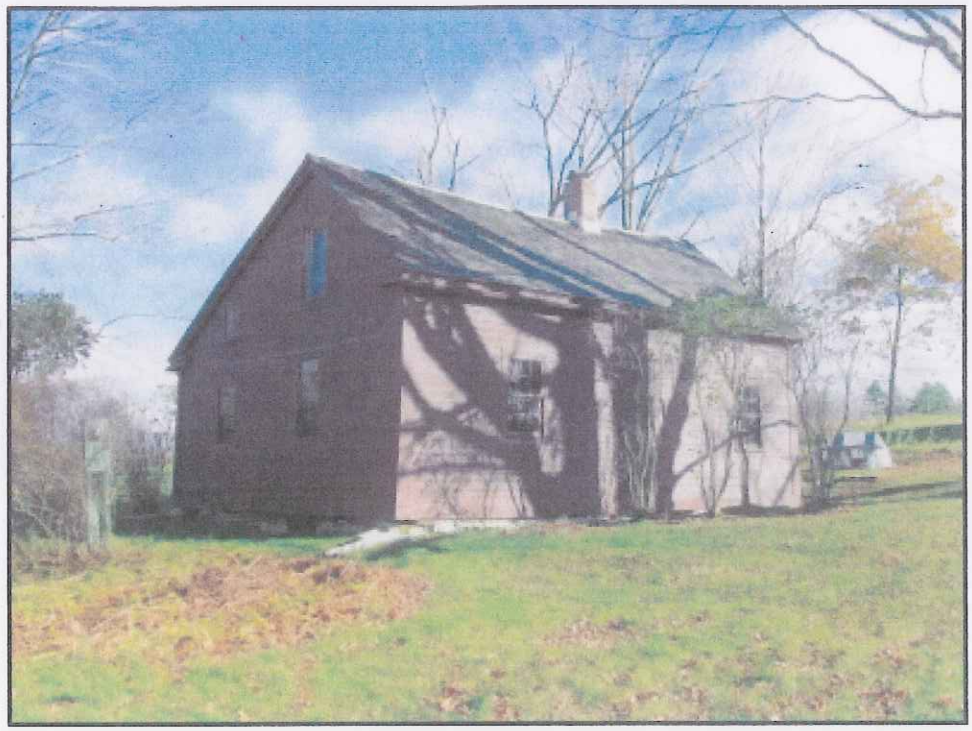
A Dendrochronology Study of Select Timbers from Shaker Farm, Richmond, MA



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A Dendrochronology Study of Select Framing Members from Shaker Farm, Richmond, MA

Introduction

On July 7, 2011, a selection of timbers in Ted Andrew's Shaker Farm were sampled for the purposes of conducting a dendrochronology study. The samples were then prepped and analyzed at Historic Deerfield by William Flynt, Architectural Conservator.

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. 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, 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 the Northeast, a region heretofore considered too variable climatically to provide reliable results.

To aid with this specific study, several dated master chronologies are available including ones for oak, chestnut, hemlock, and pine from southern Berkshire County, eastern New York and the Connecticut River Valley region of Massachusetts. It should be remembered that trees were usually felled in the winter months with frame preparation occurring shortly thereafter, so the earliest a frame could be raised would be in the year following the felling date delineated in a dendrochronology study such as this.

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. Third, enough samples need to be obtained (10-15 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, or, if so, are duly noted. 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 the samples, the following code was employed; RSF (Richmond, Shaker Farm) with the numbers that follow simply referring to the sequence in which the samples were taken.

Samples were taken using a custom coring bit, chucked into a ½" 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 structures 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 (measure) ring (LYOM), established as 1000, and proceeds to the center of the sample or first year of measure (FYOM). At the junction of each growth ring, the analyst registers the interface electronically which sends the measurement to the computer via a Quick-Chek Digital Readout. In all of the work in this study, the measuring program PJK10v10e 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 one or more dated regional master chronologies 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 (for most of this study a lag of 25 years was utilized) to provide an overlap of data within the groupings. The results are displayed in a series of ways with Part 8 "Date Adjustment for Best Fit Matches for Counted Unknown Series" composed 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. A correlation coefficient of .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 consistently strong correlation with any particular date.

SERIES	COUNTED SEGMENT	ADD	CORR # 1	ADD	CORR # 2	ADD	CORR # 3	ADD	CORR # 4	ADD	CORR # 5	ADD	CORR # 6	ADD	CORR # 7	ADD	CORR # 8	ADD	CORR # 9	ADD	CORR #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	795	.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

Once samples from a site are firmly dated and grouped into a site species master, Part 2 "Correlations with Master Series of all Segments as Dated and Measured" and Part 3 "Segments Correlating Low, or Higher, at other than Dated Position" of COFECHA can be viewed to see how well each sample correlates with the others in the group and where weak areas within the ring counts are located.

Results (See Figure 1)

Black Ash

Initially it was thought that the majority of timbers in this structure were chestnut but on examination under the microscope it was determined that they were Black Ash. An examination of the area through Google maps revealed what appears to be a large wetland nearby to the west of the house, a likely source for the black ash. When the samples from the house were compared against one of the longest lived samples, RSF-10, all except one sample (RSF-06) aligned amazingly well (Chart 1) with having been felled the same year as RSF-10. The high correlation coefficients seen in the first column of the chart strongly suggest that the timbers were fabricated from just a few trees growing quite near to each other. Chart 2 reveals, in Part 2 of the chart, the high correlations between samples throughout their long periods of growth, further reinforcing the notion of their having all come from the same source. In Part 8 it is noted that sample RSF-12, from the added eastern section of the house, appears to be 14 years older than material from the original house. To see if this is correct, RSF-12 data was aligned 14 years earlier and added to the Shaker Farm black ash site master (Chart 3). The chart reveals that RSF-12 fits marginally well at 14 years younger (Part 2 of Chart 3) though certainly not as strongly as do the samples from the earlier section. In addition, in Part 8 of Chart 3 sample RSF-06 appears to favor dating 7 years later than the other black ash samples from this section of the house. When RSF-06 is aligned 7 years later and added to the site master (Chart 4), Part 2 reveals a possible fit with the other samples. As well, its inclusion strengthens sample RSF-12 with the group. Sample RSF-14 remains a bit ambiguous with only a suggestion that there is some affinity to want to date 25 years later than the majority of the timbers in the west portion of the house. To test RSF-14 aligning

at 25 years later, this sample was aligned with this information and added to the site master (Chart 5). While the latter roughly 80 years seem to align somewhat decently, the earliest years do not. As such this age difference must be regarded with some suspicion. With this information in hand the raw black ash data was compared to a very small (4 sample, 1612-1792) provisional black ash site master from a house in Monterey, MA (Chart 6). While none of the samples depicted on Chart 6 show conclusive alignments with a specific date, certain samples do reveal some possibilities. RSF-06 and RSF-08 favor 780 (1780) while RSF-14A(a re-measure of RSF-14) shows some promise for 798 (1798). That said, from the earlier charts it appears that RSF-06 wants to date seven years later than the other samples from the west portion that includes RSF-08, so both samples should not be the same age. Throughout the samples from the west section the date 1780 does show up weakly within portions of RSF-01 and RSF-04, as does the date 1773 though again, very weakly and certainly not with enough regularity to be able to assign a date with confidence.

White pine

The lone sample of white pine, RSF-11, was rather short-lived but still with enough rings to offer the possibility of dating. The sample was run against three different white pine masters from the Connecticut River Valley of Massachusetts, two New York Dutch barns, and an eastern New York state white pine master (Chart 7). Here again, none of the runs produced strong absolute dates, just possibilities. Weak dates of 1773 and 1784 are suggested when run against the Connecticut River Valley data while the run against the New York barn data suggests the dates 1784 and 1787. The run against the eastern New York state white pine did not reveal any realistic dates. The fact that both of the first two comparisons had the date 1784 as a possibility may be a clue as to the correct date. At this point in time no definitive conclusions can be made.

Hemlock

One sample turned out to be hemlock, RSF-15 which was compared to a large regional master composed of samples from eastern New York, western Massachusetts, and southern Vermont; and a smaller southern Berkshire county master (Chart 8). While neither run revealed perfect alignment with a specific date, it is clear from the results that the timber was felled in 1773.

Larch

Two samples turned out to be larch, a species for which there are no masters in the region. As such a definitive date cannot be determined. It was hoped that by comparing one against the other the difference in age could be determined, as the timbers from which they were extracted were located in both the original and added sections. As well, sample RSF-07 was measured twice with the second run (RSF-07A) starting 5 rings in from the bark edge and stopping at a break in the core near the center of the tree. Chart 8 reveals that there does not seem to be any strong correlations between RSF-07 and RSF-13.

Conclusion

While it is unfortunate that the samples from the two periods of the house did not correlate well with each other nor provide conclusive dates when compared against dated masters, some information was gleaned from the data. The lone sample that did date, the reused hemlock plate on the north wall indicates that the leanto addition went on at some point after that date and most likely, quite a bit after that date, as the building it came from must have stood for a period of time prior to being dismantled so the plate could be reused. As for the black ash, the vast majority of the timbers from the original house correlated extremely well with each other but only hinted at possible relationships with the black ash from the added section. While merely suggestive, in looking at the relationships suggested by Chart 5 coupled with the clues on Chart 6, it is possible that the bulk original house samples could date provisionally to 1773 with RSF-06 dated to 1780, RSF-12 dating to 1759 and RSF-14 to 1798. RSF-06 dating to 1780 would imply that the house would have been framed up no earlier than spring 1781. With so many timbers felled in 1773 it seems a bit out of the ordinary to wait so long to frame up the house. Then again, seeing 1780 crop up within several of the samples on Chart 6 makes one wonder if this date might hold some validity, with sample RSF-06 being an anomaly. At this point in time there just is not enough data for black ash to conclusively elicit the date of these samples. As for the other species present, larch has no regional masters as stated earlier, and the samples did not reveal their age differences as hoped. The white pine was short-lived and did not conclusively align with any specific date, though it did offer up some possible dates. The lone hemlock sample did provide a date but unfortunately it is reused so can only be used to confirm that the leanto dates after its felling by a number of years.

With the suggestions supplied by this work it may be possible to review tax records, land records, and the like, focusing in on some of the dates to see if there might be corroborating evidence for one or more of the time periods. As more structures with similar species are analyzed in the region, the data from Shaker Farm will be continued to be tested against any dated material. Should meaningful correlations come to light, the new information will be forwarded to Ted Andrews.

Acknowledgments

The author would like to thank Ted Andrews for his interest in having this study undertaken and Jack Sobon for his review of the structure and the Figure 2 framing plan. As well Bruce Hoadley, retired professor of wood technology, UMASS/ Amherst should be acknowledged for his expertise in confirming samples RSF-07 and RSF-13 to be larch.

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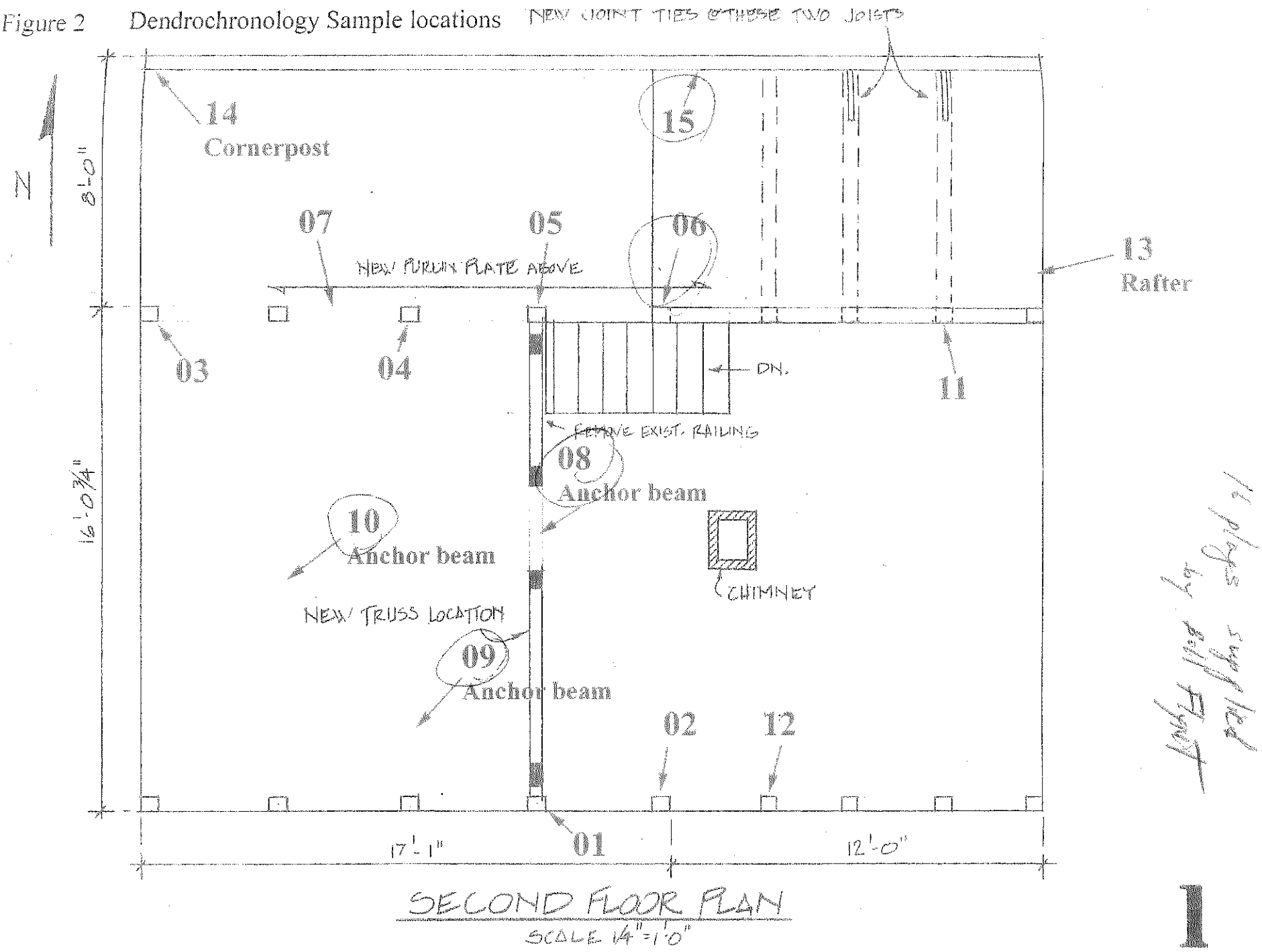
Figure 1

SHAKER FARM, RICHMOND, MA

SAMPLE	AGE	FYOM	LYOM	DATE	WANE	SPECIES	LOCATION
RSF-01	109	892	1000	ND	Y	FRNI	S.WALL, 4TH POST FROM W.END
RSF-02	113	888	1000	ND	Y	FRNI	S.WALL, E.POST OF ORIGINAL HOUSE
RSF-03	109	892	1000	ND	Y	FRNI	N.WALL, W.POST OF ORIGINAL HOUSE
RSF-04	122	879	1000	ND	Y	FRNI	N.WALL, 2ND POST FROM WEST END
RSF-05	118	883	1000	ND	Y	FRNI	N.WALL, 3RD POST FROM WEST END
RSF-06	83	918	1000	ND	Y	FRNI	N.WALL, 4TH POST FROM WEST END
RSF-07	147	854	1000	ND	Y	LASP	NORTH WALL PLATE, ORIGINAL HOUSE
RSF-08	119	882	1000	ND	Y	FRNI	3RD ANCHOR BEAM FROM WEST END
RSF-09	140	861	1000	ND	Y	FRNI	2ND ANCHOR BEAM FROM WEST END
RSF-10	164	837	1000	ND	Y	FRNI	1ST ANCHOR BEAM FROM WEST END
RSF-11	64	937	1000	ND	Y	PIST	1ST POST FROM E.END AT LEANTO DOOR
RSF-12	89	912	1000	ND	Y	FRNI	S.WALL, 4TH POST FROM EAST END
RSF-13	59	942	1000	ND	Y	LASP	EAST END LEANTO RAFTER
RSF-14	123	878	1000	ND	Y	FRNI	LEANTO NW CORNER POST
RSF-15	114	887	1000	1773	Y	TCSA	LEANTO N.PLATE, REUSED

FYOM = FIRST YEAR OF MEASURE
LYOM = LAST YEAR OF MEASURE
ND = NO DATE
FRNI = BLACK ASH
LASP = LARCH
PIST = WHITE PINE
TCSA = HEMLOCK

Figure 2 Dendrochronology Sample locations



SECOND FLOOR PLAN

SCALE 1/4" = 1'-0"

CHART 1

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES Tucson-Mendoza-Hamburg-Lamont ProgLib

RSF-BLACK ASH VS RSF-10
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	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
RSF-01	892- 941	0 .55	3 .25	50 .25	-48 .24	32 .23	27 .23	39 .21	-35 .21	-2 .21	-32 .21	-18 .20
RSF-01	917- 966	0 .66	-18 .40	5 .34	-55 .32	23 .31	-64 .26	-48 .24	21 .22	32 .22	-57 .21	25 .20
RSF-01	942- 991	0 .58	-80 .36	-20 .35	5 .28	-36 .27	-40 .24	-62 .24	-84 .23	-96 .23	-75 .21	-16 .20
RSF-01	951-1000	0 .56	-36 .44	-20 .43	-59 .30	-40 .29	-95 .28	-15 .28	-56 .28	-96 .26	-100 .26	-103 .26
RSF-02	888- 937	0 .61	-32 .33	14 .30	41 .30	55 .29	7 .29	-25 .28	30 .27	-44 .27	-18 .24	57 .24
RSF-02	913- 962	0 .44	-11 .41	30 .35	36 .25	25 .25	-6 .24	-64 .24	16 .23	-48 .22	-32 .22	-50 .21
RSF-02	938- 987	0 .57	-80 .35	-41 .32	-20 .32	-101 .30	-43 .26	-26 .25	-84 .25	-87 .24	-75 .22	-81 .21
RSF-02	951-1000	0 .62	-100 .33	-40 .32	-20 .30	-60 .28	-81 .26	-95 .25	-103 .24	-87 .23	-19 .21	-36 .20
RSF-03	892- 941	0 .40	30 .34	39 .33	-16 .30	7 .29	-9 .28	-32 .27	-25 .26	48 .24	5 .23	27 .22
RSF-03	917- 966	0 .45	-57 .39	25 .38	-32 .32	5 .30	-74 .30	-16 .26	-50 .24	30 .24	-11 .24	-64 .23
RSF-03	942- 991	0 .57	-41 .32	-80 .27	-85 .23	-71 .23	-87 .22	-101 .21	-21 .20	-20 .20	-81 .18	-74 .17
RSF-03	951-1000	0 .62	-100 .33	-20 .33	-56 .30	-41 .28	-36 .28	-40 .27	-59 .25	-95 .24	-102 .24	-81 .23
RSF-04	879- 928	0 .60	41 .38	62 .34	30 .31	46 .27	-25 .27	-23 .26	7 .25	-2 .25	57 .24	64 .24
RSF-04	904- 953	41 .43	0 .42	30 .38	5 .35	25 .29	-25 .28	7 .27	-1 .24	-39 .22	-54 .21	-57 .21
RSF-04	929- 978	0 .57	5 .37	-41 .34	20 .31	-75 .26	-67 .25	-55 .25	-32 .24	-16 .23	-27 .22	-57 .21
RSF-04	951-1000	0 .59	-60 .44	-19 .32	-45 .28	-63 .25	-81 .25	-104 .24	-40 .23	-1 .23	-100 .23	-95 .19
RSF-05	883- 932	0 .70	-46 .36	41 .35	62 .35	-39 .33	7 .31	-32 .23	-20 .22	57 .21	-7 .20	55 .20
RSF-05	908- 957	0 .67	25 .39	41 .38	-57 .35	-55 .33	-11 .32	-41 .31	5 .30	30 .27	-16 .24	-32 .24
RSF-05	933- 982	0 .71	-41 .55	5 .31	-32 .31	-57 .30	-16 .29	-76 .28	-96 .27	-62 .27	-75 .24	-80 .23
RSF-05	951-1000	0 .74	-41 .43	-60 .35	-96 .31	-1 .29	-20 .25	-16 .25	-100 .24	-36 .22	-59 .21	-21 .20
RSF-06	918- 967	-68 .45	12 .44	33 .34	7 .26	-47 .26	28 .23	-26 .23	-8 .21	-11 .21	-17 .19	-50 .19
RSF-06	943- 992	-68 .36	7 .33	-72 .31	-52 .31	-35 .25	-11 .24	-13 .22	-56 .22	-8 .21	-94 .19	-87 .19
RSF-06	951-1000	-72 .32	-56 .28	-114 .26	-111 .26	-50 .24	-93 .23	-68 .23	-70 .21	-20 .20	-43 .20	-11 .20
RSF-08	882- 931	0 .47	41 .38	37 .36	-39 .29	-18 .29	64 .26	62 .24	46 .22	55 .22	-7 .20	43 .18
RSF-08	907- 956	0 .49	41 .40	-25 .36	-67 .32	-69 .28	-53 .28	7 .28	-9 .28	25 .28	-60 .27	30 .27
RSF-08	932- 981	0 .61	-20 .35	-95 .33	-80 .32	-36 .29	-67 .28	-41 .27	-26 .24	-75 .23	5 .20	-5 .20
RSF-08	951-1000	0 .65	-20 .58	-41 .44	-100 .41	-36 .31	-59 .30	-52 .28	-96 .27	-87 .26	-80 .26	-56 .23
RSF-09	861- 910	0 .73	64 .34	82 .29	59 .28	84 .25	44 .23	80 .22	7 .21	-21 .21	46 .20	22 .18
RSF-09	886- 935	0 .81	-42 .37	59 .27	-44 .25	41 .23	-32 .23	36 .22	57 .19	-23 .19	7 .19	25 .18
RSF-09	911- 960	0 .61	-67 .36	-21 .28	-41 .27	36 .26	-26 .24	-25 .23	20 .22	16 .21	-39 .20	-58 .20
RSF-09	936- 985	0 .65	-41 .54	-21 .37	-67 .30	-5 .26	-85 .25	-23 .25	-80 .23	-87 .22	5 .21	-76 .20
RSF-09	951-1000	0 .69	-41 .45	-60 .34	-67 .32	-5 .30	-21 .30	-100 .29	-36 .24	-85 .24	-95 .23	-20 .21
RSF-10	837- 886	01.00	80 .33	101 .31	46 .27	103 .25	42 .25	14 .24	69 .24	28 .21	13 .20	60 .19
RSF-10	862- 911	01.00	80 .45	55 .31	62 .29	7 .27	44 .26	14 .24	-7 .23	85 .22	67 .22	-14 .21
RSF-10	887- 936	01.00	41 .38	-44 .31	-32 .25	36 .24	59 .22	62 .21	-46 .21	55 .20	21 .18	44 .18
RSF-10	912- 961	01.00	36 .37	-67 .37	21 .33	-18 .29	-55 .28	18 .28	5 .28	-5 .27	23 .26	16 .22
RSF-10	937- 986	01.00	-41 .51	-80 .44	-36 .42	-62 .38	-5 .33	-21 .33	5 .31	-18 .31	-23 .30	-20 .28
RSF-10	951-1000	01.00	-41 .44	-80 .40	-59 .37	-36 .34	-20 .34	-18 .32	-101 .30	-103 .29	-87 .24	-5 .22
RSF-12	912- 961	-16 .32	-65 .28	39 .26	-46 .25	36 .22	-11 .20	-71 .20	-21 .20	-28 .20	-25 .18	-55 .18
RSF-12	937- 986	-9 .40	-14 .40	-89 .35	-71 .31	2 .27	-36 .23	-65 .22	7 .19	-73 .19	-34 .19	-30 .18
RSF-12	951-1000	-14 .37	-76 .27	-34 .26	-9 .25	-30 .23	-55 .22	-89 .22	-71 .22	-65 .21	-93 .20	-94 .18
RSF-14	879- 928	3 .32	59 .28	70 .28	39 .27	43 .25	-36 .24	8 .24	64 .23	12 .22	38 .22	36 .21
RSF-14	904- 953	-6 .28	18 .28	30 .26	-23 .26	-25 .24	39 .24	-49 .23	-46 .22	-62 .20	-11 .19	21 .19
RSF-14	929- 978	-32 .36	9 .33	-50 .31	-78 .30	-76 .29	-9 .28	-14 .26	-34 .25	-18 .24	-41 .23	18 .22
RSF-14	951-1000	-32 .53	-38 .32	-105 .30	-14 .28	-73 .27	-11 .27	-78 .27	-50 .26	-37 .26	-99 .25	-96 .25

CHART 2

PART 2: CORRELATIONS WITH MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED Tucson-Mendoza-Hamburg-Lamont ProgLib

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	825 874	850 899	875 924	900 949	925 974	950 999	975 1024	1000 1049	1025 1074	1050 1099	1075 1124	1100 1149	1125 1174	1150 1199	1175 1224	1200 1249	1225 1274	1250 1299	1275 1324	1300 1349	FLAGS/ TOTAL
1	RSF-01	892-1000	=	=	.60	.61	.52	.63	.65														
+																							0/ 5
2	RSF-02	888-1000	=	=	.77	.67	.55	.82	.83														
+																							0/ 5
3	RSF-03	892-1000	=	=	.60	.63	.63	.82	.83														
+																							0/ 5
4	RSF-04	879-1000	=	=	.70	.61	.78	.75	.76														
+																							0/ 5
5	RSF-05	883-1000	=	=	.82	.84	.79	.83	.83														
+																							0/ 5
6	RSF-08	882-1000	=	=	.66	.70	.67	.67	.69														
+																							0/ 5
7	RSF-09	861-1000	=	.63	.68	.58	.64	.69	.71														
+																							0/ 6
8	RSF-10	861-1000	=	.67	.75	.62	.67	.75	.76														
+																							0/ 6

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES Tucson-Mendoza-Hamburg-Lamont ProgLib

RSF-BS VS RSF-BA ALIGNED
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	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
RSF-01	892- 941	0 .71	-7 .34	32 .28	-35 .28	7 .26	-46 .25	39 .24	50 .24	-18 .23	23 .22	-48 .21
RSF-01	917- 966	0 .78	-64 .39	-55 .33	-18 .33	20 .30	-57 .28	-48 .27	-41 .26	5 .26	-7 .25	-32 .24
RSF-01	942- 991	0 .73	-20 .43	-84 .31	-80 .27	1 .25	-16 .24	-36 .24	-96 .22	-27 .22	-104 .21	-103 .20
RSF-01	951-1000	0 .76	-20 .44	-36 .35	-59 .30	-16 .29	-103 .28	-40 .27	-100 .27	-96 .26	-95 .23	-77 .23
RSF-02	888- 937	0 .83	30 .36	25 .35	14 .32	7 .29	-23 .28	32 .27	-32 .27	37 .23	-25 .22	-37 .22
RSF-02	913- 962	0 .72	-64 .32	20 .31	36 .31	30 .30	-7 .30	-25 .28	-48 .26	-11 .26	-57 .25	-50 .25
RSF-02	938- 987	0 .76	-20 .45	-43 .36	-84 .29	-80 .28	-87 .22	-41 .20	-25 .20	-27 .19	-57 .18	-81 .18
RSF-02	951-1000	0 .89	-20 .44	-100 .30	-40 .29	-19 .29	-70 .22	-103 .22	-95 .20	-1 .19	-45 .19	-87 .17
RSF-03	892- 941	0 .70	-16 .35	-25 .33	7 .31	27 .26	16 .26	39 .25	-23 .25	-30 .23	-2 .23	-37 .22
RSF-03	917- 966	0 .78	-57 .43	-16 .30	20 .30	25 .27	-37 .25	-64 .24	-74 .24	-32 .24	-50 .24	-23 .22
RSF-03	942- 991	0 .80	-20 .30	-100 .25	-80 .24	-87 .21	-6 .21	-78 .20	-74 .18	-99 .18	-47 .18	-57 .17
RSF-03	951-1000	0 .88	-100 .38	-20 .36	-40 .24	-70 .23	-59 .23	-45 .22	-102 .22	-19 .21	-77 .18	-107 .16
RSF-04	879- 928	0 .78	-23 .39	41 .38	30 .34	25 .33	23 .30	16 .27	37 .27	-2 .25	7 .24	57 .23
RSF-04	904- 953	0 .74	41 .35	30 .35	-7 .31	25 .28	-30 .26	5 .25	-25 .24	-39 .23	18 .22	-57 .22
RSF-04	929- 978	0 .81	-57 .32	20 .31	-5 .26	5 .26	-41 .23	-37 .22	-75 .21	-55 .20	-30 .20	-16 .16
RSF-04	951-1000	0 .83	-19 .43	-20 .22	-100 .21	-104 .21	-74 .21	-4 .21	-60 .19	-1 .19	-63 .18	-99 .18
RSF-05	883- 932	0 .87	-39 .38	7 .37	-46 .37	37 .33	41 .30	-20 .27	-2 .25	-23 .25	18 .24	57 .23
RSF-05	908- 957	0 .90	-57 .41	-37 .33	-16 .31	-41 .30	25 .26	-55 .26	16 .26	36 .25	5 .23	-30 .23
RSF-05	933- 982	0 .85	-41 .36	-57 .35	-96 .31	5 .28	-20 .25	-37 .25	-32 .25	-76 .25	-62 .24	-39 .23
RSF-05	951-1000	0 .87	-1 .39	-20 .35	-96 .31	-19 .29	-16 .25	-60 .22	-100 .22	-41 .20	-103 .20	-76 .19
RSF-06	918- 967	-68 .37	7 .37	-47 .34	28 .32	12 .32	-42 .28	-50 .24	-15 .23	-29 .22	-70 .22	-11 .21
RSF-06	943- 992	-72 .34	7 .33	-68 .28	-52 .28	-13 .22	-87 .21	-96 .19	-20 .19	-94 .19	-70 .18	-93 .18
RSF-06	951-1000	-93 .31	-114 .30	-68 .26	-72 .24	-87 .23	-56 .22	-36 .22	-90 .21	-70 .20	-50 .20	-43 .20
RSF-08	882- 931	0 .77	37 .40	-39 .35	-18 .32	41 .28	30 .26	23 .25	-23 .23	2 .22	-21 .21	-27 .18
RSF-08	907- 956	0 .81	-57 .31	-69 .31	-53 .30	-7 .30	7 .29	-25 .28	-39 .25	-18 .25	-9 .25	30 .23
RSF-08	932- 981	0 .83	-20 .34	-95 .32	-25 .27	-26 .24	19 .23	-75 .23	1 .22	-36 .21	-80 .20	-84 .19
RSF-08	951-1000	0 .75	-20 .63	-96 .33	-100 .31	-87 .29	-59 .25	-41 .23	-50 .23	-36 .21	-25 .20	-80 .19
RSF-09	861- 910	0 .83	57 .30	64 .29	84 .28	-21 .25	41 .24	59 .23	18 .22	-20 .19	32 .18	80 .18
RSF-09	886- 935	0 .80	-42 .29	25 .27	32 .26	18 .25	7 .25	-23 .24	41 .24	57 .22	-44 .22	-32 .21
RSF-09	911- 960	0 .79	-67 .41	20 .32	-30 .27	-41 .26	-37 .24	-58 .24	11 .23	-26 .22	-5 .22	16 .22
RSF-09	936- 985	0 .75	-30 .41	-67 .34	-87 .32	-5 .31	-21 .31	-41 .30	-37 .29	-85 .24	-76 .24	-1 .20
RSF-09	951-1000	0 .76	-67 .37	-100 .33	-60 .31	-41 .27	-20 .26	-5 .25	-85 .23	-25 .23	-21 .23	-95 .20
RSF-10	837- 886	0 .94	39 .33	46 .32	69 .30	101 .29	20 .29	60 .25	96 .24	42 .22	13 .21	76 .20
RSF-10	862- 911	0 .86	80 .41	55 .35	57 .27	75 .25	32 .24	7 .23	25 .22	41 .22	67 .22	37 .20
RSF-10	887- 936	0 .82	41 .42	-44 .30	-46 .29	32 .24	25 .22	-7 .21	36 .21	-32 .19	7 .18	-23 .16
RSF-10	912- 961	0 .79	-67 .38	-5 .36	36 .33	-41 .31	16 .27	20 .27	-64 .25	-46 .24	21 .24	-55 .21
RSF-10	937- 986	0 .83	-41 .43	-80 .37	-62 .35	-5 .33	-25 .33	-30 .28	-82 .27	-55 .26	-57 .26	-20 .25
RSF-10	951-1000	0 .81	-20 .40	-59 .35	-41 .32	-57 .29	-80 .29	-87 .29	-103 .28	-25 .28	-50 .25	-100 .25
RSF-12	912- 961	-28 .35	-14 .34	-65 .31	16 .28	-23 .28	-21 .26	2 .25	-62 .25	9 .23	35 .22	25 .20
RSF-12	937- 986	-14 .42	-71 .33	2 .31	-9 .31	-65 .26	-39 .26	7 .25	-89 .21	-73 .19	-48 .18	-76 .18
RSF-12	951-1000	-14 .47	-65 .35	-34 .33	-76 .25	-71 .24	-104 .23	-94 .22	-35 .21	-93 .21	-113 .20	-9 .19
RSF-14	879- 928	3 .33	59 .33	11 .28	8 .25	38 .24	-36 .23	-39 .22	70 .21	5 .20	-20 .20	39 .18
RSF-14	904- 953	25 .33	-23 .32	-46 .25	-6 .25	5 .25	-25 .25	-65 .25	-43 .24	18 .23	-49 .20	32 .20
RSF-14	929- 978	-78 .35	-18 .34	-75 .31	9 .31	-50 .26	-23 .24	-62 .22	-32 .22	-48 .20	-76 .20	-34 .20
RSF-14	951-1000	-32 .47	-78 .35	-96 .30	-38 .29	-37 .29	-50 .28	-99 .28	-18 .27	-73 .26	-105 .25	-55 .23

CHART 3

PART 2: CORRELATIONS WITH MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED Tucson-Mendoza-Hamburg-Lamont ProgLib

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	825 874	850 899	875 924	900 949	925 974	950 999	975 1024	1000 1049	1025 1074	1050 1099	1075 1124	1100 1149	1125 1174	1150 1199	1175 1224	1200 1249	1225 1274	1250 1299	1275 1324	1300 1349	FLAGS/ TOTAL
1	RSF-01	892-1000	=	=	.59	.58	.55	.63	.65														Ø/ 5
+																							
2	RSF-02	888-1000	=	=	.78	.68	.53	.81	.82														Ø/ 5
+																							
3	RSF-03	892-1000	=	=	.59	.65	.59	.79	.80														Ø/ 5
+																							
4	RSF-04	879-1000	=	=	.71	.64	.75	.73	.74														Ø/ 5
+																							
5	RSF-05	883-1000	=	=	.82	.84	.79	.85	.85														Ø/ 5
+																							
6	RSF-08	882-1000	=	=	.65	.67	.64	.67	.68														Ø/ 5
+																							
7	RSF-09	861-1000	=	.61	.65	.50	.56	.66	.68														Ø/ 6
+																							
8	RSF-10	861-1000	=	.67	.73	.58	.66	.75	.76														Ø/ 6
+																							
9	RSF-12	898- 986	=	=	.34	.35	.37	.47	=														Ø/ 4
+																							

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES Tucson-Mendoza-Hamburg-Lamont ProgLib

RSF-BA VS RSF-01,02,03,04,05,08,09,10,12 ALIGNED
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	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
RSF-01	892- 941	Ø .69	-7 .33	7 .31	-35 .28	32 .27	-46 .25	-2 .24	-18 .22	-48 .21	23 .20	50 .19
RSF-01	917- 966	Ø .75	-64 .38	-55 .34	-18 .31	-48 .29	-57 .27	5 .27	20 .26	-32 .25	-41 .25	-50 .24
RSF-01	942- 991	Ø .71	-20 .43	-16 .32	-84 .30	-36 .26	-80 .25	-96 .22	-27 .22	1 .22	-104 .21	5 .21
RSF-01	951-1000	Ø .75	-20 .43	-36 .39	-16 .34	-59 .29	-103 .28	-96 .27	-40 .26	-15 .26	-100 .25	-95 .23
RSF-02	888- 937	Ø .83	14 .38	25 .35	30 .33	7 .31	-23 .29	32 .26	-32 .26	-25 .22	-37 .22	-46 .21
RSF-02	913- 962	Ø .72	-64 .32	20 .32	36 .31	-7 .27	-50 .27	-48 .25	-25 .25	30 .25	16 .24	-57 .23
RSF-02	938- 987	Ø .75	-20 .45	-43 .36	-84 .29	-80 .26	-41 .24	-87 .22	-16 .19	-81 .18	-25 .17	-27 .17
RSF-02	951-1000	Ø .87	-20 .39	-19 .30	-100 .30	-40 .28	-45 .25	-95 .23	-103 .22	-70 .21	-16 .21	-1 .19
RSF-03	892- 941	Ø .68	-16 .33	-25 .33	7 .32	-2 .30	-23 .27	16 .26	-30 .25	27 .25	-37 .23	-9 .21
RSF-03	917- 966	Ø .75	-57 .42	20 .32	-16 .31	-23 .29	-32 .25	-50 .24	-74 .24	25 .24	-64 .24	-48 .23
RSF-03	942- 991	Ø .77	-20 .30	-100 .25	-80 .23	-6 .21	-87 .19	-74 .19	-78 .18	-99 .18	-21 .17	-71 .15
RSF-03	951-1000	Ø .86	-100 .37	-20 .34	-45 .29	-19 .24	-70 .24	-40 .24	-59 .22	-102 .22	-36 .20	-107 .16
RSF-04	879- 928	Ø .78	-23 .39	25 .36	41 .36	30 .32	23 .30	14 .28	57 .27	16 .25	-2 .25	7 .24
RSF-04	904- 953	Ø .73	25 .34	41 .32	-7 .31	-30 .30	30 .28	-25 .26	5 .24	-39 .24	18 .23	14 .23
RSF-04	929- 978	Ø .78	20 .35	-57 .28	-30 .26	-5 .25	5 .22	-41 .22	-55 .21	-75 .20	-16 .19	-76 .18
RSF-04	951-1000	Ø .81	-19 .43	-45 .23	-1 .22	-74 .22	-100 .21	-104 .21	-95 .20	-16 .19	-20 .19	-4 .18
RSF-05	883- 932	Ø .86	7 .39	-39 .38	-46 .37	37 .29	41 .28	-23 .26	-2 .26	-20 .25	57 .25	25 .23
RSF-05	908- 957	Ø .89	-57 .40	-16 .33	-37 .31	25 .28	-41 .27	20 .26	-55 .26	16 .25	-30 .24	-9 .23
RSF-05	933- 982	Ø .87	-57 .32	-41 .32	-96 .31	-76 .28	-16 .26	-37 .25	-55 .24	5 .24	-39 .23	-30 .23
RSF-05	951-1000	Ø .88	-1 .40	-20 .33	-96 .30	-16 .30	-19 .30	-100 .22	-76 .21	-60 .20	-103 .20	-44 .18
RSF-06	918- 967	7 .49	-68 .37	-47 .34	28 .31	12 .31	-42 .28	-15 .26	-50 .23	-70 .22	32 .20	-11 .20
RSF-06	943- 992	7 .39	-72 .32	-68 .28	-52 .28	-70 .22	-13 .21	-15 .20	-87 .20	-36 .20	-96 .19	-47 .19
RSF-06	951-1000	-93 .30	-114 .30	-36 .29	-68 .27	-70 .26	-72 .25	-87 .23	-15 .22	-43 .20	-90 .20	-96 .19
RSF-08	882- 931	Ø .76	-39 .35	37 .35	-18 .32	41 .27	30 .26	2 .24	-23 .24	23 .24	-21 .21	57 .19
RSF-08	907- 956	Ø .78	-7 .34	7 .31	-69 .31	-53 .31	-57 .30	-9 .29	-25 .27	-39 .27	-18 .26	-16 .25
RSF-08	932- 981	Ø .80	-20 .34	-95 .32	-25 .27	-26 .25	-36 .24	19 .23	-75 .22	-5 .21	1 .21	-84 .19
RSF-08	951-1000	Ø .74	-20 .58	-96 .34	-100 .31	-36 .30	-87 .27	-50 .25	-59 .23	-41 .23	-25 .21	-80 .18
RSF-09	861- 910	Ø .81	57 .32	64 .28	59 .26	-21 .25	84 .24	41 .23	18 .21	-20 .19	80 .18	2 .17
RSF-09	886- 935	Ø .77	-42 .29	25 .27	32 .24	18 .24	7 .24	41 .24	-23 .24	57 .22	16 .22	-32 .22
RSF-09	911- 960	Ø .74	-67 .41	20 .36	-30 .26	-58 .25	16 .25	-41 .22	-53 .22	21 .22	-37 .22	-5 .22
RSF-09	936- 985	Ø .70	-30 .40	-5 .33	-87 .32	-21 .32	-67 .31	-37 .27	-76 .27	-41 .26	-85 .24	-1 .23
RSF-09	951-1000	Ø .73	-67 .34	-100 .33	-60 .30	-41 .27	-5 .27	-21 .26	-25 .25	-1 .25	-85 .24	-16 .22
RSF-10	837- 886	Ø .94	46 .34	101 .31	39 .31	20 .29	60 .27	69 .26	96 .23	42 .22	90 .21	80 .21
RSF-10	862- 911	Ø .84	80 .39	57 .31	55 .30	75 .27	32 .26	7 .24	41 .23	25 .23	14 .21	67 .20
RSF-10	887- 936	Ø .81	41 .40	-44 .30	-46 .29	7 .24	32 .24	-7 .21	-32 .21	25 .21	-3 .17	36 .17
RSF-10	912- 961	Ø .79	-5 .40	-67 .38	20 .30	36 .29	16 .29	-41 .27	-64 .25	21 .23	-55 .23	-46 .21
RSF-10	937- 986	Ø .80	-41 .37	-5 .36	-80 .35	-62 .33	-25 .32	-55 .28	-82 .27	-30 .25	-21 .25	-39 .24
RSF-10	951-1000	Ø .81	-20 .36	-59 .31	-25 .31	-80 .29	-50 .28	-103 .28	-41 .27	-87 .26	-57 .25	-100 .24

CHART 3 CONTINUED

RSF-12	912- 961	-14 .56	-28 .32	-65 .31	16 .28	-23 .27	-21 .25	-62 .24	2 .24	19 .21	35 .20	39 .19
RSF-12	937- 986	-14 .64	-71 .33	2 .26	-9 .25	-65 .25	-39 .25	7 .23	6 .22	-89 .21	-48 .20	-41 .19
RSF-12	951-1000	-14 .66	-34 .36	-65 .33	-71 .25	-104 .23	-93 .22	-76 .22	-94 .21	-35 .20	-113 .20	-73 .17
RSF-14	879- 928	3 .35	59 .34	11 .28	8 .27	38 .27	-36 .23	5 .22	-39 .22	43 .21	-20 .20	70 .19
RSF-14	904- 953	25 .37	-23 .33	5 .29	-25 .27	-46 .26	-65 .25	-6 .23	34 .22	-43 .22	-49 .21	14 .20
RSF-14	929- 978	-18 .38	-78 .35	9 .30	-75 .30	-62 .24	-50 .23	-9 .22	-48 .20	-76 .20	-69 .20	-34 .20
RSF-14	951-1000	-32 .43	-78 .34	-37 .33	-96 .32	-18 .29	-99 .28	-38 .27	-105 .25	-55 .24	-73 .23	-50 .22

CHART 4

PART 2: CORRELATIONS WITH MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED — Tucson-Mendoza-Hamburg-Lamont ProgLib

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	825 874	850 899	875 924	900 949	925 974	950 999	975 1024	1000 1049	1025 1074	1050 1099	1075 1124	1100 1149	1125 1174	1150 1199	1175 1224	1200 1249	1225 1274	1250 1299	1275 1324	1300 1349	FLAGS/ TOTAL
1	RSF-01	892-1000	=	=	.58	.55	.51	.62	.63														
+																							0/ 5
2	RSF-02	888-1000	=	=	.74	.60	.44	.75	.76														
+																							0/ 5
3	RSF-03	892-1000	=	=	.61	.66	.60	.76	.77														
+																							0/ 5
4	RSF-04	879-1000	=	=	.71	.64	.74	.73	.74														
+																							0/ 5
5	RSF-05	883-1000	=	=	.80	.78	.74	.84	.84														
+																							0/ 5
6	RSF-06	925-1000	=	=	=	=	.49	.39	.35														
+																							0/ 3
7	RSF-08	882-1000	=	=	.64	.61	.58	.65	.66														
+																							0/ 5
8	RSF-09	861-1000	=	.61	.65	.47	.53	.67	.69														
+																							0/ 6
9	RSF-10	861-1000	=	.67	.73	.53	.60	.75	.75														
+																							0/ 6
10	RSF-12	898- 986	=	=	.42	.43	.52	.56	=														
+																							0/ 4

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES — Tucson-Mendoza-Hamburg-Lamont ProgLib

50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	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 CORR	ADD #11 CORR
RSF-01	892- 941	0 .68	-7 .32	7 .29	-35 .28	-2 .27	32 .25	-46 .25	-18 .22	50 .21	-48 .21	-37 .17
RSF-01	917- 966	0 .71	-64 .38	-55 .34	-18 .29	-48 .29	20 .28	-57 .27	-32 .26	-50 .24	-35 .24	-41 .24
RSF-01	942- 991	0 .65	-20 .42	-16 .34	-84 .30	-80 .25	-96 .22	5 .22	-104 .21	-103 .20	-36 .19	-43 .19
RSF-01	951-1000	0 .72	-20 .40	-16 .36	-36 .34	5 .31	-103 .28	-59 .28	-96 .27	-100 .25	-40 .25	-95 .23
RSF-02	888- 937	0 .80	14 .35	7 .34	25 .33	30 .30	-23 .29	-32 .26	32 .25	70 .25	-25 .22	-37 .22
RSF-02	913- 962	0 .65	-64 .32	36 .32	20 .30	-50 .27	-48 .25	-16 .24	30 .24	-57 .23	7 .23	-43 .23
RSF-02	938- 987	0 .67	-20 .45	-43 .34	-84 .29	20 .27	-80 .26	-41 .25	-87 .22	16 .21	-16 .20	19 .19
RSF-02	951-1000	0 .82	-20 .37	-45 .30	-100 .30	-40 .26	-19 .25	-95 .23	-103 .22	-70 .21	-16 .21	-25 .20
RSF-03	892- 941	0 .69	-25 .33	-16 .32	-2 .29	7 .29	-23 .27	-30 .25	27 .25	-37 .23	16 .22	-9 .21
RSF-03	917- 966	0 .73	-57 .42	20 .33	-32 .30	-23 .29	-16 .27	-50 .24	-74 .24	-64 .24	39 .24	-48 .23
RSF-03	942- 991	0 .74	-20 .27	-100 .25	-80 .23	-21 .21	-6 .20	-87 .19	-74 .19	-78 .18	-99 .18	-71 .15
RSF-03	951-1000	0 .83	-100 .37	-45 .33	-20 .30	-70 .24	-40 .23	-19 .22	-102 .22	-36 .20	-59 .19	1 .17
RSF-04	879- 928	0 .78	25 .39	-23 .39	41 .32	57 .31	14 .29	30 .27	23 .25	-2 .24	7 .23	32 .23
RSF-04	904- 953	0 .72	25 .34	-30 .30	18 .29	-7 .28	41 .27	-39 .24	-25 .24	-54 .23	-57 .22	-9 .22
RSF-04	929- 978	0 .79	20 .35	-57 .28	-5 .25	-30 .23	-41 .21	-55 .21	25 .20	-75 .20	5 .20	-76 .18
RSF-04	951-1000	0 .80	-19 .38	-45 .29	-1 .25	-49 .23	-63 .22	-100 .21	-104 .21	-95 .20	-67 .19	-74 .19
RSF-05	883- 932	0 .85	7 .39	-39 .38	-46 .37	57 .28	-23 .26	-2 .26	18 .25	-20 .25	25 .24	37 .23
RSF-05	908- 957	0 .84	-57 .40	-37 .31	-16 .30	20 .29	-41 .27	-55 .26	-5 .24	-9 .24	-32 .24	25 .23
RSF-05	933- 982	0 .85	-96 .31	-57 .31	-41 .29	-76 .28	24 .27	25 .26	-39 .26	-44 .26	-55 .24	19 .23
RSF-05	951-1000	0 .87	-1 .40	-96 .30	-20 .30	-19 .27	-16 .23	-100 .22	-76 .21	-45 .21	-44 .20	-103 .20
RSF-06	918- 967	7 .71	-68 .37	-47 .34	12 .32	28 .29	-42 .28	-15 .28	-11 .25	-50 .23	-70 .22	-65 .20
RSF-06	943- 992	7 .55	-72 .32	-68 .28	-52 .24	-20 .23	-70 .22	-15 .22	-36 .21	6 .20	-87 .20	-96 .19
RSF-06	951-1000	7 .49	-93 .30	-114 .30	-36 .29	-68 .27	-70 .26	-72 .25	-15 .24	-87 .23	-90 .20	-96 .19
RSF-08	882- 931	0 .75	-39 .35	-18 .32	37 .29	30 .27	41 .26	-23 .24	2 .24	57 .23	-21 .21	7 .19
RSF-08	907- 956	0 .72	-7 .36	-69 .31	-53 .31	-57 .30	-18 .29	-9 .27	7 .27	-39 .27	-25 .26	25 .23
RSF-08	932- 981	0 .73	20 .38	-20 .34	-95 .32	-25 .28	25 .27	-26 .26	-5 .24	1 .24	19 .23	-36 .23
RSF-08	951-1000	0 .72	-20 .56	-96 .34	-100 .31	-87 .27	-36 .27	-41 .26	4 .25	-25 .23	-50 .22	-59 .21
RSF-09	861- 910	0 .81	57 .30	59 .28	64 .27	-21 .25	18 .22	41 .22	32 .21	79 .20	84 .19	-20 .19
RSF-09	886- 935	0 .76	-42 .29	18 .26	32 .24	59 .24	-23 .24	25 .23	7 .23	57 .22	41 .22	-32 .22
RSF-09	911- 960	0 .70	-67 .41	20 .33	-58 .25	21 .23	-41 .22	-53 .22	16 .22	-5 .22	-37 .22	-30 .21
RSF-09	936- 985	0 .68	-30 .37	-5 .33	-87 .32	-67 .31	-21 .30	-76 .27	20 .26	-41 .25	-1 .24	-85 .24
RSF-09	951-1000	0 .73	-67 .36	-100 .33	-60 .29	-41 .28	-5 .28	-21 .27	-1 .25	-85 .24	-95 .22	-25 .22
RSF-10	837- 886	0 .94	46 .34	101 .31	20 .29	39 .29	120 .28	96 .25	42 .24	60 .23	69 .22	90 .21
RSF-10	862- 911	0 .84	80 .36	57 .32	32 .32	75 .32	55 .30	95 .27	7 .24	14 .22	25 .22	41 .20
RSF-10	887- 936	0 .80	41 .35	-44 .30	-46 .29	32 .26	-7 .22	7 .21	-32 .21	36 .19	18 .17	57 .17
RSF-10	912- 961	0 .75	-5 .47	-67 .38	20 .30	41 .30	-41 .27	36 .27	-64 .25	16 .25	21 .23	-55 .23
RSF-10	937- 986	0 .75	-5 .42	-80 .35	-41 .33	-62 .33	-21 .28	-25 .28	-82 .27	-55 .26	20 .26	-39 .26
RSF-10	951-1000	0 .80	-25 .31	-20 .30	-80 .29	-103 .28	-59 .27	-87 .26	-5 .26	-41 .25	-57 .25	-100 .24
RSF-12	912- 961	-14 .60	-65 .31	-28 .30	16 .27	-23 .26	39 .26	-62 .24	-21 .24	41 .24	35 .22	2 .21
RSF-12	937- 986	-14 .70	-71 .33	-41 .25	-65 .25	-39 .24	-9 .22	6 .22	-89 .21	2 .21	7 .20	-48 .19
RSF-12	951-1000	-14 .71	2 .40	-65 .34	-34 .33	-71 .24	-104 .23	-93 .22	-76 .22	-94 .21	-113 .20	-35 .20

CHART 4 CONTINUED

RSF-14	879- 928	3 .36	59 .34	8 .28	11 .28	38 .26	44 .23	-36 .23	5 .22	-39 .22	75 .21	-20 .20
RSF-14	904- 953	25 .38	-23 .33	5 .28	-46 .26	54 .25	-65 .25	-25 .23	34 .23	-6 .23	-43 .22	-49 .21
RSF-14	929- 978	25 .44	-18 .35	-78 .35	-75 .30	9 .26	24 .24	-62 .24	-50 .22	-76 .20	-69 .20	-23 .20
RSF-14	951-1000	-32 .39	-37 .35	7 .34	-78 .34	-96 .32	-18 .28	-99 .28	-55 .25	-105 .25	-50 .24	-73 .22

CHART 5

PART 2: CORRELATIONS WITH MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED Tucson-Mendoza-Hamburg-Lamont ProgLib

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	825 874	850 899	875 924	900 949	925 974	950 999	975 1024	1000 1049	1025 1074	1050 1099	1075 1124	1100 1149	1125 1174	1150 1199	1175 1224	1200 1249	1225 1274	1250 1299	1275 1324	1300 1349	FLAGS/ TOTAL
1	RSF-01	892-1000	=	=	.54	.50	.46	.59	.60	=													0/ 5
2	RSF-02	888-1000	=	=	.73	.57	.45	.72	.73	=													0/ 5
3	RSF-03	892-1000	=	=	.57	.62	.59	.75	.76	=													0/ 5
4	RSF-04	879-1000	=	=	.69	.62	.75	.71	.72	=													0/ 5
5	RSF-05	883-1000	=	=	.78	.74	.72	.83	.84	=													0/ 5
6	RSF-06	925-1007	=	=	=	=	.49	.46	.33	=													0/ 3
7	RSF-08	882-1000	=	=	.60	.56	.57	.62	.63	=													0/ 5
8	RSF-09	861-1000	=	.61	.65	.44	.50	.64	.66	=													0/ 6
9	RSF-10	861-1000	=	.68	.74	.50	.57	.73	.74	=													0/ 6
10	RSF-12	898- 986	=	=	.44	.45	.55	.58	=	=													0/ 4
11	RSF-14	904-1007	=	=	=	.02	.25	.42	.37	=													0/ 4
						___B	___A																2/ 4

PART 3: SEGMENTS CORRELATING LOW, OR HIGHER AT OTHER THAN DATED POSITION Tucson-Mendoza-Hamburg-Lamont ProgLib

CORRELATIONS OF 50-YEAR SEGMENTS
FROM TEN YEARS EARLIER (-10) TO TEN YEARS LATER (+10) THAN DATED

SERIES	SEGMENT	HIGH	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
RSF-14	904- 953	4	-.06	-.13	-.03	.13	-.18	.00	.06	.05	-.13	-.33	.02 ___	-.04	-.03	-.03	.17 <___>	-.08	.07	-.09	.02	.07	.00
RSF-14	925- 974	0	-.02	-.01	-.23	.16	-.03	-.10	.05	-.37	-.24	-.23	.25 <___>	.21	-.14	-.26	.03	.08	.09	.06	.00	.22	.19

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES Tucson-Mendoza-Hamburg-Lamont ProgLib

RSF-BA VS RSF-01,02,03,04,05,06,08,09,10,12,14,ALIGNED
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	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
RSF-01	892- 941	0 .64	7 .31	-7 .31	-35 .28	-2 .27	-18 .25	-46 .25	50 .24	-48 .21	32 .20	-4 .19
RSF-01	917- 966	0 .68	-64 .38	-18 .35	-55 .32	-35 .29	-57 .28	20 .27	39 .26	-50 .26	50 .26	-48 .26
RSF-01	942- 991	0 .60	-20 .40	20 .39	-16 .35	-84 .30	5 .25	-80 .24	19 .24	-96 .22	-104 .21	-103 .20
RSF-01	951-1000	0 .69	-20 .38	-16 .36	-36 .35	-59 .32	5 .31	-103 .28	21 .28	-96 .27	17 .25	-100 .25
RSF-02	888- 937	0 .80	14 .39	25 .34	7 .30	-23 .28	87 .27	30 .26	-32 .25	70 .24	-25 .23	-3 .22
RSF-02	913- 962	0 .65	36 .32	-64 .32	62 .31	20 .29	-50 .27	57 .27	-25 .25	7 .24	-57 .23	-16 .23
RSF-02	938- 987	0 .67	-20 .44	37 .36	-43 .31	20 .31	36 .30	-84 .29	16 .27	-80 .24	-87 .22	-41 .20
RSF-02	951-1000	0 .80	17 .52	-45 .33	-20 .33	-100 .30	-40 .25	-19 .23	-95 .23	-1 .23	-103 .22	-16 .21
RSF-03	892- 941	0 .65	71 .39	-25 .32	-16 .30	7 .28	-2 .28	-23 .25	70 .24	-30 .23	16 .23	-37 .23
RSF-03	917- 966	0 .72	-57 .43	20 .37	-32 .30	-23 .29	56 .26	-50 .26	45 .25	39 .24	-74 .24	46 .24
RSF-03	942- 991	0 .71	-100 .25	16 .24	-80 .24	-20 .24	-6 .22	20 .20	-87 .19	-74 .19	-57 .18	-99 .18
RSF-03	951-1000	0 .81	17 .39	-100 .37	-45 .36	-20 .26	1 .24	-70 .23	-59 .22	-40 .22	-102 .22	-36 .21
RSF-04	879- 928	0 .76	25 .40	-23 .39	14 .37	41 .34	57 .29	30 .27	23 .26	-2 .23	7 .21	87 .20
RSF-04	904- 953	0 .70	25 .33	-30 .30	62 .30	18 .29	41 .27	-9 .26	-25 .23	14 .23	-54 .23	-57 .22
RSF-04	929- 978	0 .80	20 .34	45 .28	-57 .28	-5 .23	-30 .22	-55 .22	25 .21	40 .21	-41 .20	-75 .20
RSF-04	951-1000	0 .78	17 .38	-19 .37	-45 .36	-1 .30	18 .27	-74 .22	-100 .21	-49 .21	-104 .21	-63 .20
RSF-05	883- 932	0 .83	7 .41	-39 .38	-46 .37	57 .29	-20 .28	14 .26	25 .26	-2 .25	-23 .25	18 .24
RSF-05	908- 957	0 .80	62 .42	-57 .40	57 .36	20 .30	-37 .29	-16 .28	-41 .28	-55 .26	-9 .26	63 .26
RSF-05	933- 982	0 .84	36 .41	-57 .32	-96 .31	25 .30	-76 .27	-55 .26	-41 .26	24 .24	-39 .24	-62 .23
RSF-05	951-1000	0 .86	-1 .42	-96 .30	17 .27	-20 .26	-45 .25	-19 .24	-16 .22	-76 .22	-100 .22	-71 .21
RSF-06	918- 967	7 .70	-68 .37	-47 .34	28 .30	-15 .27	12 .26	-42 .26	-50 .25	52 .25	-11 .23	51 .23
RSF-06	943- 992	7 .60	-72 .31	-68 .26	-52 .26	27 .25	-70 .25	-20 .24	6 .20	-15 .20	-96 .19	8 .19
RSF-06	951-1000	7 .52	-93 .31	-114 .30	-70 .29	-36 .29	25 .26	-72 .26	-68 .25	-15 .23	-46 .22	-87 .21

CHART 5 CONTINUED

RSF-08	882- 931	0 .72	-39 .35	-18 .33	41 .28	30 .26	2 .24	78 .23	82 .23	-23 .23	37 .23	25 .21
RSF-08	907- 956	0 .69	63 .35	-7 .34	-18 .32	-69 .31	-53 .31	-57 .30	-9 .29	-39 .28	7 .28	-25 .26
RSF-08	932- 981	0 .72	37 .40	20 .39	-20 .32	-95 .32	-26 .29	25 .28	-5 .25	-25 .25	4 .25	43 .24
RSF-08	951-1000	0 .69	-20 .53	-96 .34	-100 .31	4 .28	25 .27	-87 .26	-50 .26	-36 .25	-25 .23	-59 .23
RSF-09	861- 910	0 .81	100 .33	57 .28	59 .28	102 .28	64 .27	103 .27	-21 .25	32 .21	79 .20	-20 .19
RSF-09	886- 935	0 .75	-42 .29	7 .27	25 .25	59 .23	57 .23	87 .23	-23 .22	18 .22	-32 .22	32 .22
RSF-09	911- 960	0 .66	57 .51	-67 .41	20 .36	63 .35	62 .29	56 .26	-58 .25	-41 .25	-53 .23	16 .21
RSF-09	936- 985	0 .66	-30 .32	-87 .32	-5 .31	-67 .31	20 .27	-76 .27	-21 .27	-41 .25	36 .24	-85 .24
RSF-09	951-1000	0 .70	-67 .35	-100 .33	-60 .32	-1 .26	-21 .26	21 .25	20 .25	-41 .25	-85 .23	-95 .23
RSF-10	837- 886	0 .94	46 .36	120 .32	101 .30	20 .28	42 .28	96 .27	39 .26	137 .24	90 .23	69 .22
RSF-10	862- 911	0 .86	80 .35	75 .32	100 .32	57 .31	95 .24	7 .24	32 .24	14 .24	55 .24	67 .19
RSF-10	887- 936	0 .80	41 .33	-44 .30	-46 .29	77 .27	7 .26	32 .22	-32 .21	57 .20	36 .19	-7 .18
RSF-10	912- 961	0 .71	-5 .48	63 .40	57 .39	-67 .38	41 .31	20 .30	62 .30	36 .29	-18 .28	-41 .26
RSF-10	937- 986	0 .73	-5 .45	-80 .35	-62 .33	36 .32	-39 .31	-41 .29	-55 .27	20 .27	-82 .27	-21 .24
RSF-10	951-1000	0 .78	-80 .30	-59 .30	-50 .29	17 .28	-103 .28	-25 .27	-57 .26	18 .26	-5 .25	-87 .25
RSF-12	912- 961	-14 .62	59 .47	-65 .31	-28 .28	-23 .28	16 .26	29 .25	-62 .24	-21 .24	2 .23	39 .23
RSF-12	937- 986	-14 .71	-71 .34	22 .29	-41 .25	31 .25	-48 .24	-65 .23	6 .22	-89 .21	7 .21	-68 .20
RSF-12	951-1000	-14 .72	22 .40	2 .39	-34 .32	-65 .30	-71 .27	-104 .23	-76 .22	-93 .22	11 .22	-94 .21
RSF-14	879- 928	3 .40	59 .34	8 .29	25 .26	38 .25	11 .24	44 .23	-36 .23	-39 .22	75 .21	-20 .20
RSF-14	904- 953	25 .52	-23 .29	5 .28	-46 .27	-6 .25	-65 .25	-25 .24	54 .23	-41 .23	-43 .23	34 .21
RSF-14	929- 978	25 .58	-78 .35	-18 .32	-75 .30	24 .23	-50 .23	9 .22	-62 .21	26 .21	-76 .20	-9 .19
RSF-14	951-1000	25 .78	-32 .40	-37 .36	-78 .35	7 .32	-96 .32	-99 .28	-50 .27	-55 .27	-18 .26	-105 .25

CHART 6

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES Tucson-Mendoza-Hamburg-Lamont ProgLib

RSF-BA VS MK-BA PROVISIONAL BLACK ASH SITE MASTER
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	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
RSF-01	892- 941	836 .28	832 .27	768 .25	770 .22	747 .22	720 .20	844 .20	750 .19	724 .19	800 .19	823 .18
RSF-01	917- 966	800 .45	722 .34	743 .24	739 .23	768 .23	770 .22	826 .21	784 .21	805 .21	749 .20	779 .20
RSF-01	942- 991	723 .36	795 .29	780 .28	670 .28	733 .27	778 .25	745 .25	722 .23	743 .22	688 .21	777 .21
RSF-01	951-1000	780 .34	778 .32	745 .30	723 .27	670 .26	698 .26	733 .26	764 .23	721 .22	754 .21	669 .21
RSF-02	888- 937	832 .38	726 .34	749 .29	816 .25	750 .25	810 .25	763 .24	779 .23	820 .23	798 .22	800 .22
RSF-02	913- 962	753 .40	737 .36	784 .28	800 .28	722 .28	809 .26	785 .25	738 .23	779 .23	749 .23	830 .22
RSF-02	938- 987	753 .47	777 .40	779 .29	793 .25	794 .24	705 .24	717 .24	718 .23	729 .23	702 .23	773 .22
RSF-02	951-1000	700 .38	698 .37	667 .34	790 .31	699 .27	774 .26	760 .24	754 .24	710 .24	779 .22	773 .21
RSF-03	892- 941	796 .32	844 .31	848 .31	804 .29	724 .29	770 .28	780 .28	820 .27	832 .27	786 .24	772 .23
RSF-03	917- 966	722 .40	820 .38	749 .36	800 .32	770 .29	695 .28	825 .28	743 .24	739 .23	794 .23	780 .23
RSF-03	942- 991	695 .39	773 .33	749 .27	780 .26	670 .26	789 .24	779 .24	759 .24	753 .23	739 .22	725 .21
RSF-03	951-1000	700 .33	780 .30	790 .28	698 .28	755 .26	773 .25	725 .23	699 .22	761 .22	695 .21	779 .21
RSF-04	879- 928	780 .43	795 .29	749 .28	771 .24	779 .24	752 .23	821 .23	798 .22	803 .19	769 .19	843 .17
RSF-04	904- 953	727 .36	780 .34	804 .31	738 .30	820 .29	835 .22	799 .21	773 .19	834 .19	724 .19	796 .19
RSF-04	929- 978	773 .45	799 .28	780 .27	759 .27	687 .27	697 .24	739 .24	738 .24	725 .23	785 .23	710 .23
RSF-04	951-1000	700 .37	773 .32	760 .32	754 .28	699 .27	710 .25	722 .24	678 .24	786 .21	790 .20	755 .20
RSF-05	883- 932	798 .31	757 .31	780 .27	814 .24	731 .23	779 .23	772 .22	764 .22	821 .18	827 .18	750 .18
RSF-05	908- 957	820 .35	743 .30	780 .29	738 .28	726 .27	712 .25	772 .24	804 .22	710 .21	760 .20	830 .20
RSF-05	933- 982	773 .38	759 .30	695 .25	800 .24	779 .24	725 .23	780 .22	743 .22	683 .21	739 .20	723 .20
RSF-05	951-1000	700 .38	779 .31	761 .31	753 .28	773 .27	774 .26	698 .25	678 .24	744 .22	675 .22	702 .20
RSF-06	918- 967	702 .38	694 .37	730 .37	806 .30	746 .29	712 .25	780 .24	807 .23	792 .23	755 .22	769 .22
RSF-06	943- 992	780 .54	730 .32	682 .30	708 .28	685 .27	746 .26	768 .25	729 .22	792 .20	723 .20	698 .20
RSF-06	951-1000	780 .41	730 .37	682 .34	685 .28	699 .24	670 .24	771 .21	723 .21	754 .21	707 .20	684 .20
RSF-08	882- 931	780 .44	798 .35	834 .24	731 .23	774 .23	757 .22	822 .22	803 .21	855 .21	795 .21	747 .19
RSF-08	907- 956	780 .35	726 .32	786 .30	800 .29	710 .27	774 .25	820 .25	743 .23	798 .23	810 .22	836 .22
RSF-08	932- 981	774 .43	780 .38	800 .32	773 .27	798 .24	687 .23	777 .23	718 .23	683 .22	702 .21	729 .21
RSF-08	951-1000	780 .49	777 .42	753 .40	670 .35	774 .32	700 .29	702 .26	760 .24	667 .23	723 .22	705 .21
RSF-09	861- 910	864 .29	802 .28	772 .27	861 .27	804 .24	803 .23	857 .22	757 .20	771 .20	754 .19	837 .19
RSF-09	886- 935	754 .42	726 .37	836 .29	804 .28	780 .26	779 .25	750 .24	728 .23	802 .23	738 .21	757 .21
RSF-09	911- 960	738 .32	773 .31	743 .29	739 .28	726 .28	754 .28	725 .27	820 .26	774 .25	832 .22	786 .21
RSF-09	936- 985	773 .30	794 .30	759 .30	779 .29	687 .25	696 .24	739 .24	683 .23	800 .23	744 .22	795 .22
RSF-09	951-1000	779 .34	773 .31	678 .25	744 .25	702 .23	780 .23	700 .23	738 .23	790 .21	774 .21	764 .20
RSF-10	837- 886	796 .42	906 .31	880 .30	868 .28	894 .26	893 .25	834 .24	811 .23	858 .21	874 .21	844 .20
RSF-10	862- 911	874 .38	750 .33	798 .30	840 .29	857 .29	751 .25	780 .25	860 .23	754 .23	875 .22	797 .20
RSF-10	887- 936	750 .34	820 .33	754 .30	781 .29	836 .27	780 .24	737 .24	797 .20	779 .20	821 .19	734 .19
RSF-10	912- 961	820 .31	800 .30	743 .30	739 .27	785 .26	815 .26	738 .23	773 .22	754 .21	710 .21	821 .21
RSF-10	937- 986	779 .35	795 .34	718 .32	773 .30	739 .30	800 .30	743 .26	695 .24	794 .23	745 .22	683 .20
RSF-10	951-1000	779 .35	667 .35	700 .32	773 .29	755 .28	745 .27	739 .26	774 .25	670 .24	760 .23	669 .22
RSF-12	912- 961	799 .26	703 .26	796 .26	775 .26	820 .25	809 .25	757 .25	732 .24	756 .24	779 .23	741 .21
RSF-12	937- 986	724 .34	709 .31	707 .30	802 .29	679 .29	799 .28	786 .27	759 .22	785 .22	706 .21	692 .21
RSF-12	951-1000	661 .29	764 .27	725 .26	679 .26	739 .25	751 .24	786 .22	724 .22	703 .21	669 .20	756 .20
RSF-14	878- 927	808 .32	748 .31	855 .29	802 .28	797 .26	774 .25	828 .23	752 .22	814 .22	842 .22	838 .22
RSF-14	903- 952	797 .40	730 .35	778 .34	774 .32	808 .29	777 .27	773 .27	798 .24	814 .23	802 .23	725 .22
RSF-14	928- 977	798 .42	725 .34	762 .31	786 .30	750 .29	814 .25	801 .23	702 .23	773 .22	691 .21	719 .20
RSF-14	951-1000	674 .38	762 .37	741 .31	706 .29	725 .26	722 .25	707 .25	717 .23	781 .23	693 .22	705 .22
RSF-14A	879- 928	749 .36	809 .28	843 .27	777 .26	775 .26	798 .23	832 .23	782 .23	856 .22	734 .21	825 .21
RSF-14A	904- 953	798 .41	731 .33	804 .30	708 .26	752 .25	775 .25	825 .25	774 .24	828 .24	778 .24	749 .23
RSF-14A	929- 978	798 .40	786 .39	725 .38	688 .28	726 .27	774 .27	702 .25	703 .24	804 .21	812 .20	741 .18
RSF-14A	951-1000	762 .42	741 .39	674 .33	706 .29	707 .27	722 .25	717 .23	725 .23	702 .22	693 .21	781 .21

CHART 8

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES — Tucson-Mendoza-Hamburg-Lamont ProgLib

RSF-HEMLOCK VS NY-MA-VT HEMLOCK MASTER
50-YEAR SEGMENTS LAGGED 25 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	ADD	CORR # 8	ADD	CORR # 9	ADD	CORR #10	ADD	CORR #11
RSF-15	887- 936	773	.55	1067	.42	665	.40	1006	.36	756	.33	680	.32	908	.30	1045	.30	605	.30	604	.30	959	.30
RSF-15	912- 961	773	.53	633	.48	663	.38	754	.37	908	.36	863	.34	605	.31	811	.31	945	.30	893	.30	1006	.29
RSF-15	937- 986	773	.45	836	.39	754	.38	716	.35	967	.34	622	.33	567	.32	950	.30	811	.30	588	.29	792	.29
RSF-15	951-1000	754	.38	766	.35	913	.35	562	.35	811	.35	526	.34	787	.34	773	.34	825	.32	563	.30	588	.30

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES — Tucson-Mendoza-Hamburg-Lamont ProgLib

RSF-HEMLOCK VS SOUTHERN BERKSHIRE COUNTY HEMLOCK MASTER
50-YEAR SEGMENTS LAGGED 25 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	ADD	CORR # 8	ADD	CORR # 9	ADD	CORR #10	ADD	CORR #11
RSF-15	887- 936	773	.50	928	.37	834	.31	908	.31	888	.30	852	.28	758	.27	786	.26	927	.26	912	.24	844	.24
RSF-15	912- 961	773	.40	892	.37	910	.32	811	.30	721	.30	855	.30	834	.28	767	.27	806	.26	835	.24	798	.24
RSF-15	937- 986	836	.45	882	.36	742	.33	773	.32	856	.29	754	.29	806	.27	790	.26	872	.24	716	.24	702	.22
RSF-15	951-1000	716	.35	792	.30	731	.28	798	.27	690	.27	872	.25	753	.24	823	.23	825	.22	729	.22	694	.22

CHART 9

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES Tucson-Mendoza-Hamburg-Lamont ProgLib

RSF-LARCH VS RSF-07 REMEASURE(LAST 5 RINGS NOT MEASURED)
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	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
RSF-07	854- 903	80 .33	66 .33	63 .25	47 .20	69 .20	95 .18	93 .18	71 .17	81 .15	50 .14	46 .13
RSF-07	874- 923	67 .35	66 .22	65 .21	51 .18	27 .17	52 .16	69 .15	56 .14	48 .14	25 .12	68 .12
RSF-07	894- 943	5 .97	42 .34	40 .22	24 .21	21 .21	39 .18	8 .17	20 .15	57 .13	48 .09	51 .09
RSF-07	914- 963	5 .81	-14 .36	4 .34	2 .26	6 .21	30 .19	-10 .19	-13 .17	-11 .17	20 .16	-12 .13
RSF-07	934- 983	4 .62	5 .51	-33 .29	-10 .24	6 .22	-30 .16	-25 .13	2 .12	-13 .12	14 .07	-14 .07
RSF-07	951-1000	-33 .29	-10 .25	-25 .22	-9 .20	-38 .20	-8 .18	-17 .18	-39 .17	-30 .17	-47 .16	-19 .14
RSF-13	942- 991	4 .29	3 .29	-11 .22	2 .22	-14 .18	-35 .18	-43 .18	-33 .16	-6 .16	-12 .15	-31 .15
RSF-13	951-1000	-45 .23	-46 .19	-30 .19	-12 .18	-4 .13	-43 .11	-35 .11	-23 .11	-33 .09	-7 .09	-29 .09
RSF-07	899- 948	01.00	37 .41	3 .24	19 .22	16 .22	34 .21	35 .21	46 .12	44 .10	15 .10	32 .08
RSF-07	919- 968	01.00	-16 .31	16 .22	-19 .17	-3 .17	-1 .16	3 .15	-15 .15	1 .15	-17 .15	21 .14
RSF-07	939- 988	01.00	-37 .44	12 .18	-16 .17	-34 .17	-1 .16	1 .14	9 .12	-9 .11	-14 .11	-21 .11
RSF-07	951-1000	01.00	-37 .45	-16 .27	-28 .21	-13 .21	-14 .20	-12 .18	-9 .16	-21 .16	-25 .11	-46 .10

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES Tucson-Mendoza-Hamburg-Lamont ProgLib

RSF-LARCH VS RSF-13
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	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
RSF-07	854- 903	91 .30	92 .17	94 .15	89 .14	95 .02	93-.02	97-.06	88-.06	96-.17	90-.20	97****
RSF-07	874- 923	73 .05	75 .03	71-.01	74-.05	68-.05	72-.06	76-.07	77-.08	69-.11	70-.15	77****
RSF-07	894- 943	50 .30	48 .19	49 .06	51 .00	53-.01	54-.04	52-.04	55-.09	56-.13	57-.15	57****
RSF-07	914- 963	36 .12	34 .09	35 .07	33 .01	37-.01	31-.02	30-.02	28-.02	32-.12	29-.13	37****
RSF-07	934- 983	16 .29	10 .13	11 .10	13 .07	12 .07	17 .02	8-.03	9-.12	14-.13	15-.19	17****
RSF-07	951-1000	0 .24	-2 .14	-9 .11	-1 .00	-8-.07	-5-.08	-7-.14	-4-.18	-3-.19	-6-.35	0****
RSF-13	942- 991	01.00	1 .18	7-.03	8-.05	4-.05	3-.06	2-.06	9-.10	5-.25	6-.38	9****
RSF-13	951-1000	01.00	-4 .19	-7 .02	-2 .00	-8-.05	-1-.09	-3-.10	-9-.10	-5-.28	-6-.31	0****
RSF-07	899- 948	45 .23	43 .18	44 .06	46 .02	48 .00	49 .00	47-.03	50-.07	51-.08	52-.16	52****
RSF-07	919- 968	30 .21	26 .16	29 .09	28 .05	31 .01	32-.04	23-.04	25-.12	24-.12	27-.34	32****
RSF-07	939- 988	12 .18	8 .13	6 .11	5 .04	7 .02	9 .00	11-.02	10-.04	4-.06	3-.20	12****
RSF-07	951-1000	-4 .23	-2 .16	-6 .06	-9 .03	-3 .01	0 .00	-7-.02	-5-.02	-1-.18	-8-.21	0****