[] Dendrochronology Program Library Run NAMP5 Program COF 15:17 Mon 13 Mar 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30024

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: NAMP5\_ACSA\_Corr2\_Final2

File of DATED series: NAMP5\_ACSA\_Corr2\_Final

CONTENTS:

Part 1: Title page, options selected, summary, absent rings by series

Part 2: Histogram of time spans

Part 3: Master series with sample depth and absent rings by year

Part 4: Bar plot of Master Dating Series

Part 5: Correlation by segment of each series with Master

Part 6: Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers

Part 7: Descriptive statistics

RUN CONTROL OPTIONS SELECTED VALUE

1 Cubic smoothing spline 50% wavelength cutoff for filtering

32 years

2 Segments examined are 50 years lagged successively by 25 years

3 Autoregressive model applied A Residuals are used in master dating series and testing

4 Series transformed to logarithms Y Each series log-transformed for master dating series and testing

5 CORRELATION is Pearson (parametric, quantitative)

Critical correlation, 99% confidence level .3281

6 Master dating series saved N

7 Ring measurements listed Y

8 Parts printed 1234567

9 Absent rings are omitted from master series and segment correlations (Y)

Time span of Master dating series is 1887 to 2015 129 years

Continuous time span is 1887 to 2015 129 years

Portion with two or more series is 1893 to 2015 123 years

>> 1342A 1992 absent in 2 of 39 series, but is not usually narrow: master index is -.315

>> 1342A 2008 absent in 1 of 39 series, but is not usually narrow: master index is .506

>> 1342B 1992 absent in 2 of 39 series, but is not usually narrow: master index is -.315

>> 1343A 2012 absent in 1 of 39 series, but is not usually narrow: master index is .857

>> 1343A 2014 absent in 1 of 39 series, but is not usually narrow: master index is .377

>> 1343A 2015 absent in 1 of 39 series, but is not usually narrow: master index is -.030

>> 1473B 1933 absent in 1 of 34 series, but is not usually narrow: master index is -.193

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*C\* Number of dated series 39 \*C\*

\*O\* Master series 1887 2015 129 yrs \*O\*

\*F\* Total rings in all series 3919 \*F\*

\*E\* Total dated rings checked 3913 \*E\*

\*C\* Series intercorrelation .635 \*C\*

\*H\* Average mean sensitivity .312 \*H\*

\*A\* Segments, possible problems 1 \*A\*

\*\*\* Mean length of series 100.5 \*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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

1342A 2 absent rings: 1992 2008

1342B 2 absent rings: 1992 2007

1343A 4 absent rings: 2012 2013 2014 2015

1344A 1 absent rings: 1965

1344B 1 absent rings: 2007

1345A 1 absent rings: 1966

1473B 1 absent rings: 1933

1474A 1 absent rings: 2007

1474B 1 absent rings: 2007

14 absent rings .357%

PART 2: TIME PLOT OF TREE-RING SERIES: NAMP5\_ACSA\_Corr2\_Final2 15:17 Mon 13 Mar 2017 Page 2

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1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident Seq Time-span Yrs

: : : : : : : : : : : : : : : : : : : : : -------- --- ---- ---- ----

. . . . . . . . . . . . . . . . . .<=========> . 1338A 1 1916 2015 100

. . . . . . . . . . . . . . . . . . <=======> . 1338B 2 1937 2015 79

. . . . . . . . . . . . . . . . . <==========> . 1339A 3 1908 2015 108

. . . . . . . . . . . . . . . . . <==========> . 1339B 4 1908 2015 108

. . . . . . . . . . . . . . . . . . <=======> . 1340A 5 1932 2015 84

. . . . . . . . . . . . . . . . . . <=======> . 1340B 6 1932 2015 84

. . . . . . . . . . . . . . . . . <===========> . 1341A 7 1893 2015 123

. . . . . . . . . . . . . . . . . <============> . 1341B 8 1887 2015 129

. . . . . . . . . . . . . . . . . <==========> . 1342A 9 1902 2015 114

. . . . . . . . . . . . . . . . . . <========> . 1342B 10 1928 2015 88

. . . . . . . . . . . . . . . . . . <=====> . 1343A 11 1956 2015 60

. . . . . . . . . . . . . . . . . . <=====> . 1343B 12 1956 2015 60

. . . . . . . . . . . . . . . . . . <========> . 1344A 13 1920 2015 96

. . . . . . . . . . . . . . . . . <===========> . 1344B 14 1898 2015 118

. . . . . . . . . . . . . . . . . . <========> . 1345A 15 1920 2015 96

. . . . . . . . . . . . . . . . . . <========> . 1390A 16 1924 2015 92

. . . . . . . . . . . . . . . . . . <========> . 1390B 17 1927 2015 89

. . . . . . . . . . . . . . . . . . <=======> . 1455A 18 1934 2015 82

. . . . . . . . . . . . . . . . . <==========> . 1455B 19 1906 2015 110

. . . . . . . . . . . . . . . . . .<=========> . 1456A 20 1915 2015 101

. . . . . . . . . . . . . . . . . <==========> . 1456B 21 1909 2015 107

. . . . . . . . . . . . . . . . . .<=========> . 1463A 22 1917 2015 99

. . . . . . . . . . . . . . . . . <==========> . 1463B 23 1900 2015 116

. . . . . . . . . . . . . . . . . <===========> . 1473A 24 1893 2015 123

. . . . . . . . . . . . . . . . . <===========> . 1473B 25 1893 2015 123

. . . . . . . . . . . . . . . . . <===========> . 1474A 26 1897 2015 119

. . . . . . . . . . . . . . . . . .<=========> . 1474B 27 1912 2015 104

. . . . . . . . . . . . . . . . . . <=======> . 1477A 28 1939 2015 77

. . . . . . . . . . . . . . . . . . <=======> . 1477B 29 1931 2015 85

. . . . . . . . . . . . . . . . . .<=========> . 1478A 30 1913 2015 103

. . . . . . . . . . . . . . . . . . <========> . 1478B 31 1929 2015 87

. . . . . . . . . . . . . . . . . .<=========> . 1481A 32 1918 2015 98

. . . . . . . . . . . . . . . . . <==========> . 1481B 33 1903 2015 113

. . . . . . . . . . . . . . . . . <===========> . 1492A 34 1895 2015 121

. . . . . . . . . . . . . . . . . <===========> . 1492B 35 1895 2015 121

. . . . . . . . . . . . . . . . . . <=======> . 1493A 36 1933 2015 83

. . . . . . . . . . . . . . . . . <===========> . 1493B 37 1896 2015 120

. . . . . . . . . . . . . . . . . .<=========> . 1464A 38 1916 2015 100

. . . . . . . . . . . . . . . . . .<=========> . 1464B 39 1917 2015 99

: : : : : : : : : : : : : : : : : : : : :

1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050

PART 3: Master Dating Series: NAMP5\_ACSA\_Corr2\_Final2 15:17 Mon 13 Mar 2017 Page 3

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Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab Year Value No Ab

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1900 -.885 10 1950 .500 37 2000 -.033 39

1901 -.576 10 1951 .064 37 2001 -.273 39

1902 -.836 11 1952 .274 37 2002 .921 39

1903 .174 12 1953 -1.079 37 2003 .057 39

1904 -.782 12 1954 -1.019 37 2004 -1.331 39

1905 -2.103 12 1955 .308 37 2005 -.028 39

1906 .447 13 1956 -.851 39 2006 -.925 39

1907 .631 13 1957 -.491 39 2007 -2.574 39 4

1908 1.051 15 1958 -.170 39 2008 .506 39 1<<

1909 .893 16 1959 -.927 39 2009 .793 39

1910 .935 16 1960 -.088 39 2010 .708 39

1911 -.031 16 1961 .631 39 2011 .199 39

1912 -.148 17 1962 .256 39 2012 .857 39 1<<

1913 .133 18 1963 1.379 39 2013 -.561 39 1

1914 .052 18 1964 -.598 39 2014 .377 39 1<<

1915 .216 19 1965 -2.885 39 1 2015 -.030 39 1<<

1916 .191 21 1966 -.457 39 1

1917 -.185 23 1967 .755 39

1918 -1.083 24 1968 .958 39

1919 .480 24 1969 .899 39

1920 .733 26 1970 .785 39

1921 1.015 26 1971 -.007 39

1922 .120 26 1972 .034 39

1923 -.909 26 1973 .486 39

1924 .331 27 1974 .343 39

1925 -.572 27 1975 .404 39

1926 -.449 27 1976 .191 39

1927 -.532 28 1977 .225 39

1928 -.083 29 1978 .513 39

1929 -.727 30 1979 -.307 39

1930 -.147 30 1980 -5.736 39

1931 .536 31 1981 -1.927 39

1932 -.818 33 1982 .456 39

1933 -.193 34 1<< 1983 .279 39

1934 .832 35 1984 .677 39

1935 .980 35 1985 .802 39

1936 -2.100 35 1986 -.167 39

1887 -1.565 1 1937 1.203 36 1987 1.598 39

1888 -.145 1 1938 .348 36 1988 -.674 39

1889 1.186 1 1939 .026 37 1989 -1.159 39

1890 .782 1 1940 -1.070 37 1990 .482 39

1891 2.262 1 1941 -.120 37 1991 .813 39

1892 .694 1 1942 .326 37 1992 -.315 39 2<<

1893 1.593 4 1943 1.041 37 1993 .359 39

1894 1.323 4 1944 -.004 37 1994 .717 39

1895 -.784 6 1945 -.795 37 1995 -.367 39

1896 .885 7 1946 -.136 37 1996 -1.408 39

1897 .028 8 1947 1.386 37 1997 -.198 39

1898 -.254 9 1948 -.987 37 1998 .566 39

1899 -.036 9 1949 .792 37 1999 1.845 39

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PART 4: Master Bar Plot: NAMP5\_ACSA\_Corr2\_Final2 15:17 Mon 13 Mar 2017 Page 4

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Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value Year Rel value

1900-d 1950-------B 2000----@

1901--b 1951-----@ 2001---a

1902-c 1952------A 2002---------D

1903-----A 1953-d 2003-----@

1904-c 1954-d 2004e

1905h 1955------A 2005----@

1906-------B 1956-c 2006-d

1907--------C 1957--b 2007j

1908---------D 1958---a 2008-------B

1909---------D 1959-d 2009--------C

1910---------D 1960----@ 2010--------C

1911----@ 1961--------C 2011------A

1912---a 1962------A 2012---------C

1913-----A 1963----------F 2013--b

1914-----@ 1964--b 2014------B

1915------A 1965l 2015----@

1916------A 1966--b

1917---a 1967--------C

1918-d 1968---------D

1919-------B 1969---------D

1920--------C 1970--------C

1921---------D 1971----@

1922-----@ 1972-----@

1923-d 1973-------B

1924------A 1974------A

1925--b 1975-------B

1926--b 1976------A

1927--b 1977------A

1928----@ 1978-------B

1929--c 1979---a

1930---a 1980w

1931-------B 1981h

1932-c 1982-------B

1933---a 1983------A

1934---------C 1984--------C

1935---------D 1985--------C

1936h 1986---a

1887f 1937----------E 1987----------F

1888---a 1938------A 1988--c

1889----------E 1939-----@ 1989-e

1890--------C 1940-d 1990-------B

1891----------I 1941---@ 1991---------C

1892--------C 1942------A 1992---a

1893----------F 1943---------D 1993------A

1894----------E 1944----@ 1994--------C

1895-c 1945-c 1995---a

1896---------D 1946---a 1996f

1897-----@ 1947----------F 1997---a

1898---a 1948-d 1998-------B

1899----@ 1949--------C 1999----------G

PART 5: CORRELATION OF SERIES BY SEGMENTS: NAMP5\_ACSA\_Corr2\_Final2 15:17 Mon 13 Mar 2017 Page 5

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Correlations of 50-year dated segments, lagged 25 years

Flags: A = correlation under .3281 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1875 1900 1925 1950 1975

1924 1949 1974 1999 2024

--- -------- --------- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----

1 1338A 1916 2015 .64 .65 .71 .71

2 1338B 1937 2015 .61 .70 .70

3 1339A 1908 2015 .48 .64 .64 .65

4 1339B 1908 2015 .46 .64 .62 .63

5 1340A 1932 2015 .49 .59 .59

6 1340B 1932 2015 .60 .60 .60

7 1341A 1893 2015 .37 .42 .52 .70 .68

8 1341B 1887 2015 .28A .37 .55 .83 .88

9 1342A 1902 2015 .44 .68 .64 .54

10 1342B 1928 2015 .70 .78 .72

11 1343A 1956 2015 .67 .74

12 1343B 1956 2015 .53 .59

13 1344A 1920 2015 .61 .60 .68 .67

14 1344B 1898 2015 .62 .62 .76 .70 .60

15 1345A 1920 2015 .57 .57 .69 .67

16 1390A 1924 2015 .55 .56 .79 .77

17 1390B 1927 2015 .51 .73 .70

18 1455A 1934 2015 .82 .85 .85

19 1455B 1906 2015 .43 .69 .82 .78

20 1456A 1915 2015 .55 .75 .75 .75

21 1456B 1909 2015 .63 .71 .70 .66

22 1463A 1917 2015 .41 .44 .77 .53

23 1463B 1900 2015 .55 .64 .81 .74

24 1473A 1893 2015 .43 .39 .41 .74 .69

25 1473B 1893 2015 .53 .51 .63 .84 .86

26 1474A 1897 2015 .56 .68 .74 .86 .81

27 1474B 1912 2015 .54 .47 .70 .76

28 1477A 1939 2015 .69 .75 .82

29 1477B 1931 2015 .73 .68 .61

30 1478A 1913 2015 .49 .60 .81 .86

31 1478B 1929 2015 .48 .54 .66

32 1481A 1918 2015 .74 .72 .49 .49

33 1481B 1903 2015 .71 .65 .77 .84

34 1492A 1895 2015 .45 .43 .57 .72 .75

35 1492B 1895 2015 .55 .54 .71 .80 .80

36 1493A 1933 2015 .79 .70 .66

37 1493B 1896 2015 .59 .65 .65 .60 .69

38 1464A 1916 2015 .71 .72 .89 .88

39 1464B 1917 2015 .56 .60 .84 .86

Av segment correlation .49 .54 .63 .72 .71

PART 6: POTENTIAL PROBLEMS: NAMP5\_ACSA\_Corr2\_Final2 15:17 Mon 13 Mar 2017 Page 5

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

[A] Correlations with master dating series of flagged 50-year segments of series filtered with 32-year spline,

at every point from ten years earlier (-10) to ten years later (+10) than dated

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

Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

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

[D] Absent rings (zero values)

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

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1338A 1916 to 2015 100 years Series 1

[B] Entire series, effect on correlation ( .674) is:

Lower 1998< -.024 1939< -.023 1975< -.016 1948> -.011 1918> -.008 1934< -.006 Higher 1980 .059 1936 .027

1338A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1916 377 312 304 330

1920 353 272 215 180 244 199 118 111 81 101

1930 79 120 127 157 112 178 42 170 167 47

1940 23 145 286 329 288 246 232 432 310 374

1950 313 301 266 202 206 299 219 231 238 227

1960 234 289 223 225 142 125 166 209 200 277

1970 234 227 256 181 216 123 174 203 160 131

1980 49 95 204 228 248 288 244 281 171 194

1990 276 264 130 182 192 211 126 194 100 213

2000 107 191 255 204 125 124 95 61 133 155

2010 164 152 172 66 90 40

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1338B 1937 to 2015 79 years Series 2

[B] Entire series, effect on correlation ( .607) is:

Lower 1944< -.038 1940> -.033 1989> -.020 1959> -.016 1939< -.012 1988> -.009 Higher 1980 .095 1965 .028

1338B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1937 370 245 77

1940 426 285 169 221 57 176 112 199 90 177

1950 215 180 138 124 99 181 159 124 155 189

1960 156 196 147 142 64 33 66 110 124 118

1970 151 120 119 81 159 97 95 122 101 59

1980 16 17 121 170 136 205 144 191 186 278

1990 329 317 192 204 232 235 129 175 209 324

2000 179 158 187 130 91 122 84 91 117 166

2010 158 218 335 125 127 120

====================================================================================================================================

1339A 1908 to 2015 108 years Series 3

[B] Entire series, effect on correlation ( .565) is:

Lower 1911< -.055 1998< -.015 1997< -.014 1939< -.013 1945> -.009 1918> -.008 Higher 1980 .023 1936 .020

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

1911 -6.9 SD

1339A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1908 105 151

1910 100 36 124 163 123 154 169 177 201 230

1920 223 284 251 227 274 227 206 231 253 174

1930 272 276 209 275 243 258 158 317 293 139

1940 189 225 307 243 191 248 230 224 119 196

1950 225 206 206 101 160 181 138 131 148 125

1960 184 149 114 137 81 75 137 154 224 206

1970 240 208 143 139 106 102 124 152 183 98

1980 40 140 188 211 159 167 138 217 92 89

1990 166 169 116 139 92 105 28 14 33 151

2000 57 97 83 72 57 66 64 45 131 95

2010 76 72 138 60 65 52

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1339B 1908 to 2015 108 years Series 4

[B] Entire series, effect on correlation ( .541) is:

Lower 1911< -.075 1983< -.017 2014< -.013 1945> -.012 1918> -.010 1998< -.009 Higher 1936 .020 1999 .012

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

1911 -5.9 SD

1339B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1908 106 116

1910 87 29 87 125 116 164 149 152 166 152

1920 181 220 182 169 222 195 182 160 184 136

1930 211 253 208 256 223 303 180 314 270 202

1940 186 188 231 235 204 266 236 243 160 229

1950 219 218 147 131 125 128 101 133 137 133

1960 136 157 108 159 86 88 205 232 196 200

1970 224 180 113 188 203 251 185 176 161 66

1980 29 70 131 52 136 181 154 219 133 126

1990 149 195 147 159 150 150 76 94 85 197

2000 136 146 170 126 90 108 85 66 133 104

2010 107 117 150 105 57 63

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1340A 1932 to 2015 84 years Series 5

[B] Entire series, effect on correlation ( .470) is:

Lower 1936> -.038 2002< -.024 1956> -.021 1970< -.021 2010< -.016 2015< -.015 Higher 1980 .169 1963 .013

1340A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1932 32 57 129 131 117 109 97 132

1940 73 131 92 107 77 50 59 62 55 50

1950 80 43 37 49 40 34 94 86 80 34

1960 40 49 65 178 151 65 106 153 120 130

1970 77 140 127 118 143 210 249 264 267 245

1980 62 58 212 197 232 224 118 167 165 170

1990 238 240 258 261 304 215 143 164 219 256

2000 208 159 108 110 110 172 167 122 186 140

2010 81 103 136 91 94 57

====================================================================================================================================

1340B 1932 to 2015 84 years Series 6

[B] Entire series, effect on correlation ( .552) is:

Lower 1970< -.048 2015< -.023 1952< -.022 2002< -.020 1988> -.019 1953> -.016 Higher 1980 .166 1965 .016

1340B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1932 25 42 95 122 70 100 178 118

1940 96 117 89 98 76 59 43 56 39 31

1950 44 53 33 66 70 62 70 122 117 64

1960 64 61 94 227 188 74 167 200 168 126

1970 54 121 141 129 159 196 172 201 202 147

1980 42 51 153 200 243 272 219 306 327 256

1990 265 264 185 134 140 92 104 140 179 212

2000 168 145 118 111 105 138 141 114 208 191

2010 133 148 151 99 102 66

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1341A 1893 to 2015 123 years Series 7

[B] Entire series, effect on correlation ( .569) is:

Lower 1938< -.018 2006> -.013 1940> -.012 1969< -.012 1958< -.012 1895> -.011 Higher 1980 .048 1965 .032

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

1938 -4.9 SD

1341A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1893 98 118 100 58 60 48 43

1900 31 50 60 90 74 71 98 110 141 152

1910 199 177 203 147 160 164 121 104 101 107

1920 83 102 89 56 46 27 67 110 143 133

1930 165 150 113 122 166 142 64 122 70 187

1940 243 214 201 246 261 313 334 353 278 287

1950 293 232 254 202 190 219 195 192 129 145

1960 160 215 195 216 207 97 108 138 166 118

1970 146 152 123 129 198 200 223 196 189 166

1980 83 113 189 144 207 166 189 232 132 100

1990 131 201 194 210 270 191 156 218 239 303

2000 167 155 218 150 72 137 230 143 175 135

2010 341 207 181 120 108 96

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1341B 1887 to 2015 129 years Series 8

[\*] Early part of series cannot be checked from 1887 to 1892 -- not matched by another series

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

--------- ---- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

1893 1942 0 - - - - -.22 .01 -.12 -.09 .13 -.22 .28\*-.12 .03 .09 .21 .06 -.17 .25 .07 -.17 .03

[B] Entire series, effect on correlation ( .680) is:

Lower 1938< -.013 2006> -.012 1937< -.011 2014< -.009 1912> -.009 1964> -.007 Higher 1980 .120 1965 .018

1893 to 1942 segment:

Lower 1938< -.027 1912> -.026 1937< -.024 1901> -.022 1929> -.021 1924< -.019 Higher 1936 .118 1906 .022

1341B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1887 68 89 114

1890 104 139 100 103 102 75 77 59 45 55

1900 44 91 89 91 94 84 123 112 128 108

1910 133 126 146 105 112 69 66 64 65 45

1920 46 52 42 33 26 13 51 94 119 126

1930 168 145 95 96 117 106 58 82 49 142

1940 134 134 184 200 170 191 179 227 154 247

1950 370 341 359 271 249 262 238 157 124 195

1960 211 282 240 262 239 138 147 190 230 225

1970 211 185 183 170 197 176 197 160 149 128

1980 54 94 180 143 199 184 135 231 174 165

1990 205 186 181 193 236 182 170 222 266 294

2000 188 162 234 190 121 163 209 102 192 177

2010 185 160 194 121 82 90

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1342A 1902 to 2015 114 years Series 9

[B] Entire series, effect on correlation ( .423) is:

Lower 1992< -.056 2008< -.019 2007> -.014 1998< -.011 1907< -.010 1995> -.009 Higher 1980 .028 1965 .019

[C] Year-to-year changes diverging by over 4.0 std deviations:

1991 1992 -4.1 SD

[D] 2 Absent rings: Year Master N series Absent

1992 -.315 39 2 >> WARNING: Ring is not usually narrow

2008 .506 39 1 >> WARNING: Ring is not usually narrow

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

1992 -7.3 SD

1342A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1902 74 138 106 69 68 51 77 75

1910 97 63 75 76 127 138 169 172 143 163

1920 136 174 163 144 168 125 137 138 176 196

1930 150 186 97 138 236 252 111 183 171 220

1940 91 136 106 151 163 166 114 136 81 123

1950 128 97 117 89 95 134 84 110 117 41

1960 70 106 83 148 96 52 100 156 203 200

1970 176 111 108 128 163 160 158 82 122 112

1980 47 72 126 157 169 178 150 198 99 106

1990 128 151 0 69 90 113 49 49 35 74

2000 60 59 34 42 27 25 21 22 0 25

2010 7 9 14 13 21 18

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1342B 1928 to 2015 88 years Series 10

[B] Entire series, effect on correlation ( .630) is:

Lower 1992< -.074 2008< -.009 2013> -.007 2000> -.007 1948> -.006 2003> -.006 Higher 1980 .062 1936 .026

[D] 2 Absent rings: Year Master N series Absent

1992 -.315 39 2 >> WARNING: Ring is not usually narrow

2007 -2.574 39 4

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

1992 -5.7 SD

1342B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 176 172

1930 150 221 124 202 248 246 98 159 195 214

1940 90 132 122 163 199 182 156 181 153 196

1950 194 149 157 115 127 175 118 125 139 73

1960 87 123 93 138 115 66 95 143 185 236

1970 184 143 167 163 175 207 186 136 135 122

1980 50 97 131 128 122 90 90 147 96 51

1990 62 89 0 48 46 67 47 63 66 124

2000 98 84 71 93 56 58 16 0 14 31

2010 23 19 23 25 27 28

====================================================================================================================================

1343A 1956 to 2015 60 years Series 11

[B] Entire series, effect on correlation ( .619) is:

Lower 1965> -.041 2012< -.037 1964> -.036 2004> -.018 1970< -.012 1969< -.010 Higher 1980 .130 2007 .017

[D] 4 Absent rings: Year Master N series Absent

2012 .857 39 1 >> WARNING: Ring is not usually narrow

2013 -.561 39 1

2014 .377 39 1 >> WARNING: Ring is not usually narrow

2015 -.030 39 1 >> WARNING: Ring is not usually narrow

>> WARNING: Last ring in series is ABSENT

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

1965 +3.0 SD

1343A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1956 66 78 99 73

1960 102 137 156 245 255 173 210 187 160 137

1970 134 164 230 210 180 165 182 161 192 131

1980 53 134 224 217 173 162 126 232 142 101

1990 171 181 115 198 196 101 74 163 162 166

2000 121 116 182 102 83 99 83 14 52 68

2010 35 22 0 0 0 0

====================================================================================================================================

1343B 1956 to 2015 60 years Series 12

[B] Entire series, effect on correlation ( .558) is:

Lower 1979< -.065 1965> -.035 1977< -.021 2004> -.017 2011< -.016 1964> -.010 Higher 1980 .048 2007 .020

1343B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1956 24 34 42 30

1960 83 141 198 260 196 145 179 246 216 180

1970 189 202 216 177 137 158 140 95 191 108

1980 47 117 209 194 167 155 118 203 116 54

1990 126 130 110 203 192 98 37 119 135 131

2000 137 122 177 124 98 73 34 21 119 141

2010 139 38 55 58 101 91

====================================================================================================================================

1344A 1920 to 2015 96 years Series 13

[B] Entire series, effect on correlation ( .659) is:

Lower 1982< -.026 1940> -.020 1980> -.017 1948> -.008 1936> -.008 2013> -.007 Higher 1965 .016 2007 .011

[D] 1 Absent rings: Year Master N series Absent

1965 -2.885 39 1

1344A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 250 238 176 184 208 122 157 98 101 66

1930 79 102 75 97 332 281 127 280 134 54

1940 241 200 213 165 89 39 158 217 157 211

1950 202 162 155 77 83 106 90 102 98 120

1960 127 143 135 228 154 0 76 172 222 232

1970 203 163 118 189 123 123 127 142 125 93

1980 41 95 48 75 108 128 122 160 32 52

1990 105 121 79 146 124 77 66 83 129 166

2000 73 65 101 66 33 39 16 7 57 32

2010 44 26 39 38 57 29

====================================================================================================================================

1344B 1898 to 2015 118 years Series 14

[B] Entire series, effect on correlation ( .626) is:

Lower 1900> -.018 2013> -.013 1982< -.012 1911> -.008 1984< -.008 1904< -.008 Higher 1965 .029 1937 .009

[D] 1 Absent rings: Year Master N series Absent

2007 -2.574 39 4

1344B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1898 110 162

1900 215 92 89 107 40 43 181 173 133 130

1910 98 165 104 118 82 147 100 103 37 176

1920 176 256 188 131 129 82 103 82 83 54

1930 68 92 64 93 169 213 74 278 156 144

1940 50 85 154 143 72 13 73 154 90 133

1950 101 102 60 47 42 59 61 62 57 46

1960 68 61 60 139 96 46 108 162 154 129

1970 138 121 186 158 174 229 205 217 192 177

1980 41 62 42 33 41 83 61 109 39 47

1990 81 90 57 70 72 44 32 50 51 69

2000 57 42 59 43 7 39 9 0 8 49

2010 36 9 11 29 8 30

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1345A 1920 to 2015 96 years Series 15

[B] Entire series, effect on correlation ( .499) is:

Lower 1966< -.096 1934< -.039 1959> -.008 2012< -.006 1988> -.006 1922< -.004 Higher 2007 .018 1980 .017

[C] Year-to-year changes diverging by over 4.0 std deviations:

1965 1966 -5.6 SD

[D] 1 Absent rings: Year Master N series Absent

1966 -.457 39 1

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

1966 -6.8 SD

1345A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 289 319 270 233 266 254 240 203 216 229

1930 216 253 220 222 119 215 126 260 147 147

1940 72 197 253 236 222 149 149 278 145 150

1950 136 130 135 102 111 132 103 124 169 186

1960 169 194 186 207 127 101 0 127 166 170

1970 210 188 144 155 158 134 120 90 94 96

1980 59 48 97 112 115 115 121 164 124 105

1990 124 132 97 82 88 57 51 49 93 128

2000 94 93 107 77 57 47 38 13 34 60

2010 88 54 34 22 31 49

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1390A 1924 to 2015 92 years Series 16

[B] Entire series, effect on correlation ( .687) is:

Lower 1933< -.020 2013> -.017 1925> -.015 1936> -.013 1965> -.013 1930< -.009 Higher 1980 .103 1987 .008

1390A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1924 304 415 361 357 266 207

1930 146 209 158 99 136 229 161 198 172 181

1940 90 130 136 216 156 125 180 271 162 242

1950 169 133 145 116 89 158 127 123 146 101

1960 160 231 296 361 200 182 292 280 241 254

1970 226 211 212 338 243 231 190 204 199 173

1980 101 123 170 128 147 160 130 228 109 92

1990 142 169 159 244 169 197 140 227 274 280

2000 138 91 120 103 56 69 41 30 57 86

2010 91 58 44 68 63 52

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1390B 1927 to 2015 89 years Series 17

[B] Entire series, effect on correlation ( .670) is:

Lower 1968< -.028 1935< -.017 2002< -.015 1973< -.014 1972< -.012 1942< -.010 Higher 1980 .151 1948 .010

1390B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1927 237 341 221

1930 196 195 118 191 298 139 90 222 153 154

1940 86 95 101 175 147 139 154 180 104 188

1950 157 152 193 154 143 255 197 145 181 215

1960 260 284 281 207 136 100 193 193 108 166

1970 158 154 110 113 197 183 159 167 165 206

1980 93 175 217 189 204 275 227 330 176 195

1990 331 336 281 362 329 192 203 166 217 232

2000 186 135 105 110 54 90 96 69 120 110

2010 98 64 53 66 69 68

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1455A 1934 to 2015 82 years Series 18

[B] Entire series, effect on correlation ( .781) is:

Lower 1939< -.019 1936> -.018 2012< -.013 1962< -.011 1995< -.011 1999< -.009 Higher 1980 .126 2007 .012

1455A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1934 274 241 141 284 278 64

1940 37 93 153 158 209 213 160 278 166 242

1950 209 195 272 191 154 185 157 148 128 117

1960 141 163 101 155 99 43 99 187 176 204

1970 212 100 103 151 136 148 131 120 129 112

1980 15 75 121 108 151 160 138 149 96 77

1990 131 142 113 84 98 55 62 84 113 98

2000 84 64 98 93 67 70 46 18 68 79

2010 66 40 26 28 30 31

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1455B 1906 to 2015 110 years Series 19

[B] Entire series, effect on correlation ( .670) is:

Lower 1906< -.022 1910< -.014 2005< -.012 2014< -.011 1936> -.010 1956> -.009 Higher 1980 .155 1965 .010

1455B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1906 74 131 165 124

1910 94 173 169 131 102 115 112 210 211 239

1920 257 326 268 232 259 199 171 162 94 83

1930 128 97 91 88 189 203 145 204 224 202

1940 133 169 186 267 242 247 191 298 139 213

1950 186 155 185 158 155 215 208 173 148 125

1960 174 222 153 223 117 73 112 191 196 175

1970 221 144 134 227 158 110 107 89 109 114

1980 20 37 89 95 75 93 96 115 77 72

1990 99 136 129 87 151 77 89 95 135 122

2000 102 81 95 78 55 30 32 20 67 96

2010 83 63 56 58 31 36

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1456A 1915 to 2015 101 years Series 20

[B] Entire series, effect on correlation ( .687) is:

Lower 1922< -.048 1921< -.011 1915> -.007 1955< -.006 1941< -.006 1996> -.006 Higher 2007 .014 1965 .013

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

1922 -4.6 SD

1456A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1915 134 91 90 72 108

1920 105 89 59 84 136 141 149 156 170 156

1930 151 164 132 205 180 250 149 337 295 245

1940 155 151 215 355 244 248 271 388 223 327

1950 252 286 289 207 223 223 212 306 302 299

1960 277 260 284 347 234 177 278 382 388 440

1970 392 331 286 329 223 227 172 199 219 217

1980 86 121 257 212 244 174 139 181 74 56

1990 160 149 95 119 145 153 136 148 171 184

2000 121 113 168 143 108 127 117 68 147 132

2010 146 114 104 81 109 97

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1456B 1909 to 2015 107 years Series 21

[B] Entire series, effect on correlation ( .616) is:

Lower 1921< -.018 1918< -.018 2000> -.007 1932> -.007 1981> -.006 1998< -.006 Higher 1936 .028 1980 .014

1456B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1909 229

1910 179 185 118 116 111 110 136 128 59 148

1920 127 103 106 100 160 168 175 184 265 232

1930 232 269 250 276 263 239 91 251 277 257

1940 212 202 282 349 291 151 172 351 217 324

1950 347 370 385 305 295 286 237 304 284 246

1960 247 337 380 442 335 261 371 415 472 530

1970 429 407 318 372 274 271 283 315 335 378

1980 128 301 472 449 333 267 125 198 113 94

1990 159 114 102 157 193 151 87 68 64 155

2000 153 94 169 160 104 94 77 48 103 81

2010 108 98 91 78 77 66

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1463A 1917 to 2015 99 years Series 22

[B] Entire series, effect on correlation ( .477) is:

Lower 2003< -.077 1936> -.033 1935< -.017 1930< -.015 1917< -.015 1927> -.009 Higher 1980 .055 1965 .041

[C] Year-to-year changes diverging by over 4.0 std deviations:

2003 2004 4.7 SD

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

2003 -7.2 SD

1463A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 117 167 191

1920 211 166 155 191 187 173 155 232 142 177

1930 77 127 137 154 206 89 198 203 225 81

1940 64 235 223 258 234 86 252 269 187 290

1950 221 226 266 166 148 247 110 137 182 198

1960 201 229 236 263 114 55 132 153 158 173

1970 205 157 196 244 185 215 209 239 253 118

1980 60 156 183 219 213 223 144 328 82 131

1990 152 162 100 151 164 138 155 182 137 199

2000 121 113 177 13 125 199 123 114 226 189

2010 162 130 171 149 188 100

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1463B 1900 to 2015 116 years Series 23

[B] Entire series, effect on correlation ( .674) is:

Lower 1945< -.022 2007> -.017 1990< -.012 1969< -.010 1931< -.010 1922> -.010 Higher 1980 .065 1965 .022

1463B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1900 96 133 109 136 158 83 187 239 212 218

1910 248 189 146 180 189 193 185 198 134 173

1920 167 237 269 214 214 211 174 155 180 118

1930 189 128 121 145 207 260 119 300 239 259

1940 149 236 204 282 273 64 206 240 139 208

1950 206 201 252 129 126 241 102 160 163 139

1960 150 158 214 210 84 56 139 186 134 117

1970 245 245 254 317 230 291 217 221 233 111

1980 49 161 211 230 190 197 126 319 136 191

1990 127 183 132 169 228 143 133 168 183 233

2000 122 143 195 146 143 223 152 153 172 154

2010 149 138 216 114 193 124

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1473A 1893 to 2015 123 years Series 24

[B] Entire series, effect on correlation ( .574) is:

Lower 1918> -.028 2007> -.025 1943< -.020 2004< -.016 1936> -.012 1997< -.011 Higher 1980 .101 1987 .011

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

1918 +3.3 SD

1473A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1893 15 27 26 33 38 19 39

1900 27 26 35 47 29 22 149 166 181 194

1910 202 182 146 208 174 212 178 233 365 315

1920 285 289 197 93 94 65 78 48 45 56

1930 40 30 16 10 78 74 54 119 86 154

1940 142 130 98 48 14 113 109 159 96 212

1950 203 240 250 215 215 322 245 176 141 138

1960 162 198 196 268 210 199 295 324 310 320

1970 317 289 241 290 245 260 280 290 240 185

1980 78 92 165 172 186 184 122 248 177 89

1990 167 188 200 183 192 139 132 85 91 145

2000 118 101 138 141 70 151 116 138 170 157

2010 187 151 186 123 143 113

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1473B 1893 to 2015 123 years Series 25

[B] Entire series, effect on correlation ( .683) is:

Lower 1943< -.020 1933< -.019 1988> -.015 1940> -.012 1945> -.009 1895> -.008 Higher 1980 .125 1936 .012

[D] 1 Absent rings: Year Master N series Absent

1933 -.193 34 1 >> WARNING: Ring is not usually narrow

1473B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1893 15 29 26 34 31 17 43

1900 28 30 48 51 19 11 128 188 160 179

1910 215 162 167 155 194 219 229 210 102 95

1920 82 87 83 75 47 44 49 37 40 39

1930 41 38 48 0 78 89 30 102 84 95

1940 124 103 92 44 15 124 175 244 131 251

1950 193 211 223 180 178 230 73 72 107 160

1960 213 235 220 315 194 159 218 286 316 309

1970 324 308 279 293 276 254 268 269 260 246

1980 84 133 164 165 179 207 158 305 288 186

1990 231 174 181 205 202 132 125 162 201 256

2000 210 144 162 135 72 81 85 68 114 110

2010 135 131 158 103 100 117

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1474A 1897 to 2015 119 years Series 26

[B] Entire series, effect on correlation ( .770) is:

Lower 1988> -.017 2008< -.013 2013> -.012 1934< -.012 1897> -.010 1986> -.007 Higher 1980 .103 1965 .014

[D] 1 Absent rings: Year Master N series Absent

2007 -2.574 39 4

1474A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1897 66 56 28

1900 30 15 35 62 38 21 236 207 197 163

1910 191 225 176 180 116 171 160 167 126 194

1920 189 181 114 87 114 52 73 65 51 77

1930 211 272 132 141 88 140 58 147 153 163

1940 148 203 214 184 121 84 118 168 85 142

1950 110 95 109 82 54 83 60 51 56 39

1960 103 89 87 116 96 49 112 134 190 184

1970 169 167 145 172 173 167 177 184 170 172

1980 30 127 202 160 247 211 260 313 265 110

1990 171 144 114 155 117 139 88 126 142 198

2000 91 73 122 67 19 66 51 0 11 58

2010 58 27 71 94 119 66

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1474B 1912 to 2015 104 years Series 27

[B] Entire series, effect on correlation ( .661) is:

Lower 1988> -.030 1962> -.022 1987< -.015 1936> -.014 2008< -.010 1973< -.009 Higher 1980 .203 1948 .009

[D] 1 Absent rings: Year Master N series Absent

2007 -2.574 39 4

[E] Outliers 2 3.0 SD above or -4.5 SD below mean for year

1962 +3.4 SD; 1980 -4.8 SD

1474B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1912 172 211 160 190 163 142 125 183

1920 212 160 122 99 110 105 119 102 130 141

1930 234 272 161 175 308 286 150 211 192 147

1940 74 84 98 88 67 43 70 100 48 92

1950 88 90 58 60 62 81 93 69 70 61

1960 102 97 218 147 79 60 106 110 102 94

1970 96 122 98 81 113 116 120 138 130 112

1980 11 123 209 183 204 182 161 166 273 180

1990 277 292 213 252 288 207 134 131 142 215

2000 113 87 113 77 64 80 42 0 10 57

2010 66 23 37 24 56 35

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1477A 1939 to 2015 77 years Series 28

[B] Entire series, effect on correlation ( .704) is:

Lower 1964> -.025 1971< -.021 1957> -.014 2004> -.014 1949< -.013 1944> -.010 Higher 1980 .151 1965 .027

1477A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1939 389

1940 313 307 358 601 631 432 478 343 195 204

1950 191 170 154 208 193 220 204 268 220 182

1960 168 163 180 160 190 95 152 174 183 143

1970 141 80 118 120 85 123 117 124 99 134

1980 15 92 146 135 178 179 163 165 68 46

1990 119 137 101 150 126 88 68 103 121 163

2000 123 132 148 131 132 132 96 77 160 168

2010 111 143 139 86 114 89

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1477B 1931 to 2015 85 years Series 29

[B] Entire series, effect on correlation ( .621) is:

Lower 2007> -.037 1993< -.023 2003> -.011 1970< -.011 1939> -.010 1946< -.009 Higher 1980 .158 1965 .017

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

2007 +3.1 SD

1477B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1931 288 244 250 298 324 201 384 297 473

1940 244 219 261 522 262 112 117 219 196 274

1950 249 198 203 170 215 284 159 276 247 147

1960 216 287 274 235 186 104 135 148 141 120

1970 106 93 134 142 140 161 151 214 175 193

1980 20 110 294 227 210 190 119 143 99 125

1990 138 112 77 66 87 97 94 139 150 117

2000 106 100 123 153 102 111 100 127 135 136

2010 106 123 153 79 163 103

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1478A 1913 to 2015 103 years Series 30

[B] Entire series, effect on correlation ( .731) is:

Lower 1919< -.015 1956> -.013 1925> -.010 1932> -.010 1913> -.010 1975< -.009 Higher 1980 .117 1936 .011

1478A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 373 261 249 220 211 187 185

1920 244 262 265 174 286 299 227 232 289 223

1930 268 221 249 205 304 263 109 267 240 135

1940 125 88 172 246 127 102 128 239 154 190

1950 219 201 138 170 165 174 233 138 172 144

1960 233 266 207 318 252 191 269 387 473 457

1970 458 299 344 392 318 217 224 302 280 274

1980 98 194 246 291 293 301 243 361 192 219

1990 267 292 200 212 248 227 205 228 310 282

2000 158 132 178 137 123 177 157 116 187 145

2010 189 226 307 150 261 209

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1478B 1929 to 2015 87 years Series 31

[B] Entire series, effect on correlation ( .619) is:

Lower 1971< -.052 1965> -.022 1957< -.022 1955< -.022 2001< -.012 1981> -.008 Higher 1980 .076 1936 .027

1478B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 280

1930 297 378 316 319 415 325 154 337 300 191

1940 222 200 277 295 222 227 198 345 188 222

1950 259 262 200 166 192 142 178 124 204 155

1960 223 234 189 283 206 205 271 341 385 347

1970 335 79 181 241 246 263 288 344 324 331

1980 138 434 619 510 491 357 438 443 302 334

1990 379 358 298 309 292 295 249 284 357 353

2000 246 163 257 225 198 304 188 113 211 193

2010 178 192 212 158 235 214

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1481A 1918 to 2015 98 years Series 32

[B] Entire series, effect on correlation ( .600) is:

Lower 1980> -.058 1976< -.040 1965> -.015 2014< -.014 1988> -.010 2008< -.010 Higher 1936 .035 2007 .025

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

1980 +3.2 SD

1481A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1918 193 287

1920 284 308 304 214 258 244 220 208 201 202

1930 187 223 164 151 182 202 103 221 154 176

1940 143 136 142 182 149 99 109 145 72 149

1950 81 112 147 69 55 111 55 75 112 125

1960 145 153 109 246 120 142 153 156 184 275

1970 278 222 268 207 231 250 106 157 200 170

1980 149 168 231 248 268 290 297 322 244 155

1990 233 250 171 202 198 171 83 176 328 362

2000 134 156 225 211 135 193 86 22 90 156

2010 179 141 135 109 63 100

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1481B 1903 to 2015 113 years Series 33

[B] Entire series, effect on correlation ( .737) is:

Lower 1965> -.018 1950< -.010 1918> -.010 1962< -.009 1941> -.008 1929> -.006 Higher 1980 .025 1936 .019

1481B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1903 54 28 30 183 187 227 202

1910 245 276 244 248 223 240 287 252 269 333

1920 306 337 264 218 247 205 201 201 222 247

1930 276 245 167 185 245 186 78 241 215 199

1940 159 295 217 195 177 119 139 150 44 96

1950 54 49 68 50 52 77 50 42 75 77

1960 88 106 73 116 105 124 126 216 332 313

1970 346 218 275 402 297 310 219 242 256 212

1980 99 169 290 275 230 246 213 369 167 120

1990 251 292 161 174 150 109 58 88 110 175

2000 69 91 161 102 74 78 32 11 87 112

2010 115 55 85 62 55 67

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1492A 1895 to 2015 121 years Series 34

[B] Entire series, effect on correlation ( .602) is:

Lower 1915< -.033 1948> -.014 1959> -.011 1904> -.011 1972< -.009 1942< -.009 Higher 1980 .064 1937 .008

1492A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1895 135 331 227 270 285

1900 205 205 179 276 288 198 183 193 277 225

1910 230 205 117 109 173 53 107 61 34 79

1920 128 211 100 96 192 136 180 144 179 94

1930 138 232 85 100 246 227 76 287 199 201

1940 89 186 73 137 78 41 176 201 138 149

1950 102 79 114 55 40 90 32 75 191 184

1960 91 143 158 165 133 62 97 113 168 143

1970 113 82 57 119 107 99 98 58 121 64

1980 16 99 134 107 142 167 116 163 45 36

1990 59 52 64 109 121 69 47 75 125 127

2000 58 55 81 79 29 73 30 23 45 44

2010 47 29 22 9 28 16

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1492B 1895 to 2015 121 years Series 35

[B] Entire series, effect on correlation ( .659) is:

Lower 1913< -.020 1915< -.013 1945< -.012 1904> -.009 2007> -.008 1905> -.008 Higher 1980 .061 1965 .015

1492B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1895 95 268 161 244 254

1900 200 191 168 250 231 181 175 202 268 161

1910 178 180 97 59 180 73 142 93 36 129

1920 167 148 86 83 170 105 142 116 160 105

1930 147 238 106 167 270 279 98 327 189 268

1940 142 218 183 216 124 43 144 177 106 140

1950 74 57 107 45 58 110 68 87 136 115

1960 83 138 113 149 117 57 90 136 183 139

1970 114 86 85 117 95 107 86 74 95 50

1980 11 48 89 57 64 120 56 137 34 28

1990 44 75 87 86 61 31 18 25 34 70

2000 43 67 75 54 39 54 43 40 74 65

2010 70 57 46 35 35 30

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1493A 1933 to 2015 83 years Series 36

[B] Entire series, effect on correlation ( .680) is:

Lower 1985< -.021 1996> -.017 1938< -.014 2007< -.014 2015> -.011 1987< -.010 Higher 1980 .068 1965 .013

1493A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1933 231 205 221 139 231 142 152

1940 114 149 220 231 187 138 122 166 128 176

1950 196 160 153 138 174 173 177 217 219 136

1960 163 244 225 225 144 95 130 201 198 208

1970 199 185 182 197 198 180 183 195 215 212

1980 54 57 113 110 160 101 73 123 144 163

1990 201 186 173 194 206 166 199 207 209 258

2000 168 162 213 167 112 92 102 41 121 138

2010 116 110 118 96 112 149

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1493B 1896 to 2015 120 years Series 37

[B] Entire series, effect on correlation ( .612) is:

Lower 1951< -.019 1907< -.015 1953> -.014 1996> -.011 2006> -.010 1932> -.007 Higher 1936 .031 1980 .028

1493B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1896 130 69 55 52

1900 36 44 28 60 43 32 80 41 70 129

1910 183 170 102 129 144 122 93 95 106 119

1920 148 128 177 138 160 122 140 142 143 148

1930 181 217 185 176 159 137 71 151 118 115

1940 92 139 160 158 117 134 130 181 108 138

1950 134 91 99 141 120 131 134 157 160 165

1960 196 170 162 163 96 67 141 197 203 160

1970 185 193 195 174 197 201 196 176 140 161

1980 67 48 125 169 244 237 138 175 137 132

1990 131 130 99 146 147 107 154 191 177 209

2000 147 138 191 135 89 96 159 108 189 199

2010 158 167 139 97 117 114

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1464A 1916 to 2015 100 years Series 38

[B] Entire series, effect on correlation ( .805) is:

Lower 1918> -.013 1948> -.010 1932> -.010 1944> -.007 1959> -.007 1966< -.006 Higher 1980 .096 1936 .013

1464A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1916 125 107 165 182

1920 214 179 191 139 124 105 103 97 114 88

1930 120 178 234 248 283 302 74 280 249 264

1940 222 205 267 304 341 252 290 338 260 296

1950 258 252 344 152 160 254 170 214 238 233

1960 225 245 211 264 115 66 130 172 167 201

1970 176 141 161 173 152 157 178 169 240 185

1980 61 181 211 219 202 229 170 278 172 188

1990 232 223 150 178 208 148 86 158 199 277

2000 119 141 191 165 91 160 104 48 146 113

2010 79 70 88 41 57 83

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1464B 1917 to 2015 99 years Series 39

[B] Entire series, effect on correlation ( .749) is:

Lower 1918> -.019 1953< -.008 1948> -.008 1932> -.008 1973< -.007 1949< -.006 Higher 1980 .106 1965 .015

1464B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 156 163 121

1920 107 81 104 66 75 43 41 39 57 65

1930 76 132 176 223 280 360 146 279 244 173

1940 208 214 275 270 298 240 191 270 216 200

1950 180 204 263 121 145 160 122 189 161 176

1960 197 224 180 203 112 62 102 135 147 168

1970 224 149 196 135 131 170 191 179 258 201

1980 53 152 191 199 172 183 163 250 107 110

1990 131 152 147 146 182 128 112 154 206 224

2000 122 131 197 178 94 114 71 35 108 110

2010 82 102 140 68 109 117

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PART 7: DESCRIPTIVE STATISTICS: NAMP5\_ACSA\_Corr2\_Final2 15:17 Mon 13 Mar 2017 Page 6

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Corr //-------- Unfiltered --------\\ //---- Filtered -----\\

No. No. No. with Mean Max Std Auto Mean Max Std Auto AR

Seq Series Interval Years Segmt Flags Master msmt msmt dev corr sens value dev corr ()

--- -------- --------- ----- ----- ----- ------ ----- ----- ----- ----- ----- ----- ----- ----- --

1 1338A 1916 2015 100 4 0 .674 1.96 4.32 .830 .682 .318 2.58 .523 .020 1

2 1338B 1937 2015 79 3 0 .607 1.60 4.26 .777 .446 .375 2.70 .548 .084 1

3 1339A 1908 2015 108 4 0 .565 1.57 3.17 .703 .698 .317 2.58 .448 .012 2

4 1339B 1908 2015 108 4 0 .541 1.58 3.14 .582 .660 .267 2.52 .397 .030 1

5 1340A 1932 2015 84 3 0 .470 1.31 3.04 .696 .756 .294 2.65 .479 .006 2

6 1340B 1932 2015 84 3 0 .552 1.30 3.27 .683 .776 .295 2.69 .437 .042 4

7 1341A 1893 2015 123 5 0 .569 1.58 3.53 .691 .747 .253 2.73 .408 .030 1

8 1341B 1887 2015 129 5 1 .680 1.49 3.70 .713 .825 .235 2.47 .337 .025 1

9 1342A 1902 2015 114 4 0 .423 1.09 2.52 .559 .703 .356 2.39 .327 -.045 1

10 1342B 1928 2015 88 3 0 .630 1.17 2.48 .614 .765 .354 2.44 .404 -.025 1

11 1343A 1956 2015 60 2 0 .619 1.32 2.55 .665 .730 .339 2.56 .436 .039 2

12 1343B 1956 2015 60 2 0 .558 1.30 2.60 .606 .633 .377 2.57 .487 .130 2

13 1344A 1920 2015 96 4 0 .659 1.21 3.32 .679 .570 .428 2.47 .360 .037 1

14 1344B 1898 2015 118 5 0 .626 .95 2.78 .594 .630 .465 2.72 .483 .015 1

15 1345A 1920 2015 96 4 0 .499 1.39 3.19 .710 .783 .287 2.76 .382 .048 1

16 1390A 1924 2015 92 4 0 .687 1.73 4.15 .803 .733 .283 2.72 .434 .042 1

17 1390B 1927 2015 89 3 0 .670 1.74 3.62 .721 .637 .271 2.47 .375 -.017 2

18 1455A 1934 2015 82 3 0 .781 1.27 2.84 .658 .675 .328 2.44 .341 .021 2

19 1455B 1906 2015 110 4 0 .670 1.40 3.26 .654 .747 .277 2.46 .321 .049 1

20 1456A 1915 2015 101 4 0 .687 1.94 4.40 .879 .768 .239 2.59 .471 .043 1

21 1456B 1909 2015 107 4 0 .616 2.21 5.30 1.139 .816 .250 2.43 .379 -.035 1

22 1463A 1917 2015 99 4 0 .477 1.72 3.28 .564 .162 .348 2.56 .381 .037 1

23 1463B 1900 2015 116 4 0 .674 1.80 3.19 .549 .190 .309 2.64 .475 .016 1

24 1473A 1893 2015 123 5 0 .574 1.53 3.65 .861 .846 .293 2.54 .386 -.014 1

25 1473B 1893 2015 123 5 0 .683 1.45 3.24 .855 .837 .305 2.56 .329 -.010 1

26 1474A 1897 2015 119 5 0 .770 1.24 3.13 .644 .676 .394 2.40 .313 -.016 1

27 1474B 1912 2015 104 4 0 .661 1.27 3.08 .691 .752 .342 2.65 .278 .004 2

28 1477A 1939 2015 77 3 0 .704 1.73 6.31 1.097 .855 .268 2.40 .396 -.053 1

29 1477B 1931 2015 85 3 0 .621 1.79 5.22 .867 .584 .290 2.66 .404 .006 1

30 1478A 1913 2015 103 4 0 .731 2.30 4.73 .773 .574 .262 2.45 .353 .002 1

31 1478B 1929 2015 87 3 0 .619 2.69 6.19 .944 .596 .252 2.67 .520 -.057 2

32 1481A 1918 2015 98 4 0 .600 1.78 3.62 .698 .627 .300 2.57 .455 -.025 1

33 1481B 1903 2015 113 4 0 .737 1.73 4.02 .920 .772 .312 2.64 .477 .002 1

34 1492A 1895 2015 121 5 0 .602 1.23 3.31 .715 .603 .444 2.58 .524 .027 2

35 1492B 1895 2015 121 5 0 .659 1.16 3.27 .682 .597 .412 2.62 .489 .040 1

36 1493A 1933 2015 83 3 0 .680 1.64 2.58 .472 .574 .220 2.42 .374 -.007 2

37 1493B 1896 2015 120 5 0 .612 1.36 2.44 .456 .670 .241 2.53 .425 .023 1

38 1464A 1916 2015 100 4 0 .805 1.82 3.44 .708 .586 .288 2.40 .334 .020 2

39 1464B 1917 2015 99 4 0 .749 1.58 3.60 .651 .633 .281 2.45 .366 .000 1

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Total or mean: 3919 151 1 .635 1.56 6.31 .719 .666 .312 2.76 .410 .013

- = [ COFECHA NAMP5COF ] = -