[] Dendrochronology Program Library Run MGF Program COF 13:43 Mon 20 Nov 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30276

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: MGF\_TSCA\_original-50

File of DATED series: MGF\_TSCA\_original.txt

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 1851 to 2016 166 years

Continuous time span is 1851 to 2016 166 years

Portion with two or more series is 1869 to 2016 148 years

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

\*C\* Number of dated series 36 \*C\*

\*O\* Master series 1851 2016 166 yrs \*O\*

\*F\* Total rings in all series 3854 \*F\*

\*E\* Total dated rings checked 3836 \*E\*

\*C\* Series intercorrelation .648 \*C\*

\*H\* Average mean sensitivity .267 \*H\*

\*A\* Segments, possible problems 8 \*A\*

\*\*\* Mean length of series 107.1 \*\*\*

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

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

No ring measurements of zero value

PART 2: TIME PLOT OF TREE-RING SERIES: MGF\_TSCA\_original-50 13:43 Mon 20 Nov 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

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

. . . . . . . . . . . . . . . . . <===========> . 1708A 1 1891 2016 126

. . . . . . . . . . . . . . . . . <===========> . 1708B 2 1891 2016 126

. . . . . . . . . . . . . . . . . .<=========> . 1709A 3 1911 2016 106

. . . . . . . . . . . . . . . . . . <=======> . 1709B 4 1939 2016 78

. . . . . . . . . . . . . . . . <===============> . 1710A 5 1851 2016 166

. . . . . . . . . . . . . . . . . .<=========> . 1710B 6 1916 2016 101

. . . . . . . . . . . . . . . . . .<=========> . 1711A 7 1917 2016 100

. . . . . . . . . . . . . . . . . .<=========> . 1711B 8 1913 2016 104

. . . . . . . . . . . . . . . . . .<=========> . 1712A 9 1913 2016 104

. . . . . . . . . . . . . . . . . .<=========> . 1712B 10 1913 2016 104

. . . . . . . . . . . . . . . . . <===========> . 1713A 11 1891 2016 126

. . . . . . . . . . . . . . . . . <===========> . 1713B 12 1891 2016 126

. . . . . . . . . . . . . . . . . .<=========> . 1714A 13 1918 2016 99

. . . . . . . . . . . . . . . . . .<=========> . 1714B 14 1910 2016 107

. . . . . . . . . . . . . . . . . .<=========> . 1715A 15 1912 2016 105

. . . . . . . . . . . . . . . . . .<=========> . 1715B 16 1918 2016 99

. . . . . . . . . . . . . . . . . . <=======> . 1716A 17 1935 2016 82

. . . . . . . . . . . . . . . . . <===========> . 1716B 18 1890 2016 127

. . . . . . . . . . . . . . . . . . <=======> . 1717A 19 1938 2016 79

. . . . . . . . . . . . . . . . . <============> . 1717B 20 1882 2016 135

. . . . . . . . . . . . . . . . . .<=========> . 1718A 21 1916 2016 101

. . . . . . . . . . . . . . . . . .<=========> . 1718B 22 1918 2016 99

. . . . . . . . . . . . . . . . . . <========> . 1719A 23 1925 2016 92

. . . . . . . . . . . . . . . . . . <========> . 1719B 24 1926 2016 91

. . . . . . . . . . . . . . . . .<==============> . 1720A 25 1869 2016 148

. . . . . . . . . . . . . . . . . <=============> . 1720B 26 1877 2016 140

. . . . . . . . . . . . . . . . . <=============> . 1721A 27 1879 2016 138

. . . . . . . . . . . . . . . . . <=============> . 1721B 28 1879 2016 138

. . . . . . . . . . . . . . . . . <===========> . 1722A 29 1899 2016 118

. . . . . . . . . . . . . . . . . . <=====> . 1723A 30 1950 2016 67

. . . . . . . . . . . . . . . . . . <=======> . 1723B 31 1935 2016 82

. . . . . . . . . . . . . . . . . . <========> . 1724A 32 1926 2016 91

. . . . . . . . . . . . . . . . . . <=======> . 1724B 33 1932 2016 85

. . . . . . . . . . . . . . . . . . <======> . 1725A 34 1946 2016 71

. . . . . . . . . . . . . . . . . . <======> . 1725B 35 1942 2016 75

. . . . . . . . . . . . . . . . . <===========> . 1722B 36 1899 2016 118

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

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: MGF\_TSCA\_original-50 13:43 Mon 20 Nov 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

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

1900 -.733 13 1950 -2.568 36 2000 .110 36

1851 -.676 1 1901 -1.359 13 1951 .390 36 2001 .015 36

1852 1.698 1 1902 .540 13 1952 1.211 36 2002 -.001 36

1853 .895 1 1903 .883 13 1953 .647 36 2003 -1.467 36

1854 1.500 1 1904 .892 13 1954 .564 36 2004 -.746 36

1855 .182 1 1905 1.046 13 1955 .687 36 2005 -.343 36

1856 -3.041 1 1906 -.193 13 1956 -.643 36 2006 -1.774 36

1857 -.915 1 1907 -.601 13 1957 .588 36 2007 -.085 36

1858 .207 1 1908 -.877 13 1958 .293 36 2008 .628 36

1859 -1.627 1 1909 -.914 13 1959 .046 36 2009 1.828 36

1860 -.812 1 1910 -.548 14 1960 -1.901 36 2010 1.368 36

1861 .334 1 1911 -1.547 15 1961 1.008 36 2011 -1.875 36

1862 .247 1 1912 -.237 16 1962 -.715 36 2012 .183 36

1863 -1.635 1 1913 .536 19 1963 .109 36 2013 .702 36

1864 1.006 1 1914 .474 19 1964 -.702 36 2014 1.028 36

1865 1.738 1 1915 1.244 19 1965 .659 36 2015 -.553 36

1866 2.637 1 1916 1.831 21 1966 .659 36 2016 -.275 36

1867 1.616 1 1917 .928 22 1967 1.457 36

1868 .573 1 1918 -.401 25 1968 -.771 36

1869 .499 2 1919 -.222 25 1969 .383 36

1870 -1.922 2 1920 -.064 25 1970 -.279 36

1871 -1.062 2 1921 .280 25 1971 -.198 36

1872 -1.293 2 1922 .412 25 1972 -1.112 36

1873 -1.367 2 1923 -.695 25 1973 1.234 36

1874 .096 2 1924 .514 25 1974 -.413 36

1875 .935 2 1925 -1.146 26 1975 -1.769 36

1876 .066 2 1926 -.310 28 1976 -1.105 36

1877 .299 3 1927 -.059 28 1977 .269 36

1878 .931 3 1928 -1.443 28 1978 .354 36

1879 .514 5 1929 .133 28 1979 .383 36

1880 .307 5 1930 -.284 28 1980 .738 36

1881 .479 5 1931 -.306 28 1981 -2.439 36

1882 1.272 6 1932 -.331 29 1982 -.303 36

1883 .549 6 1933 -.244 29 1983 .756 36

1884 .201 6 1934 -1.153 29 1984 -.074 36

1885 -.887 6 1935 -.655 31 1985 1.520 36

1886 .489 6 1936 -.276 31 1986 .614 36

1887 -.490 6 1937 .775 31 1987 1.823 36

1888 -.596 6 1938 .954 32 1988 -.125 36

1889 -.023 6 1939 .221 33 1989 -1.436 36

1890 -2.966 7 1940 -.030 33 1990 -1.064 36

1891 -1.117 11 1941 .019 33 1991 .251 36

1892 -.521 11 1942 .467 34 1992 .677 36

1893 -.826 11 1943 .897 34 1993 .087 36

1894 -.113 11 1944 -.283 34 1994 -.960 36

1895 .064 11 1945 .951 34 1995 1.090 36

1896 1.241 11 1946 .628 35 1996 -.909 36

1897 1.695 11 1947 .513 35 1997 .029 36

1898 1.211 11 1948 -1.434 35 1998 .977 36

1899 .312 13 1949 -.910 35 1999 1.453 36

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PART 4: Master Bar Plot: MGF\_TSCA\_original-50 13:43 Mon 20 Nov 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--c 1950j 2000-----@

1851--c 1901-e 1951------B 2001-----@

1852----------G 1902-------B 1952---------E 2002-----@

1853---------D 1903---------D 1953--------C 2003f

1854----------F 1904---------D 1954-------B 2004--c

1855-----A 1905---------D 1955--------C 2005---a

1856l 1906----a 1956--c 2006g

1857-d 1907--b 1957-------B 2007----@

1858------A 1908--d 1958------A 2008--------C

1859g 1909-d 1959-----@ 2009----------G

1860--c 1910--b 1960h 2010----------E

1861------A 1911f 1961---------D 2011g

1862------A 1912---a 1962--c 2012-----A

1863g 1913-------B 1963-----@ 2013--------C

1864---------D 1914-------B 1964--c 2014---------D

1865----------G 1915---------E 1965--------C 2015--b

1866----------K 1916----------G 1966--------C 2016---a

1867----------F 1917---------D 1967----------F

1868-------B 1918---b 1968--c

1869-------B 1919---a 1969------B

1870h 1920----@ 1970---a

1871-d 1921------A 1971----a

1872-e 1922-------B 1972-d

1873-e 1923--c 1973---------E

1874-----@ 1924-------B 1974---b

1875---------D 1925-e 1975g

1876-----@ 1926---a 1976-d

1877------A 1927----@ 1977------A

1878---------D 1928f 1978------A

1879-------B 1929-----A 1979------B

1880------A 1930---a 1980--------C

1881-------B 1931---a 1981j

1882---------E 1932---a 1982---a

1883-------B 1933---a 1983--------C

1884-----A 1934-e 1984----@

1885--d 1935--c 1985----------F

1886-------B 1936---a 1986--------B

1887---b 1937--------C 1987----------G

1888--b 1938---------D 1988----@

1889----@ 1939------A 1989-f

1890l 1940----@ 1990-d

1891-d 1941-----@ 1991------A

1892---b 1942-------B 1992--------C

1893--c 1943---------D 1993-----@

1894----@ 1944---a 1994-d

1895-----@ 1945---------D 1995---------D

1896---------E 1946--------C 1996--d

1897----------G 1947-------B 1997-----@

1898---------E 1948-f 1998---------D

1899------A 1949--d 1999----------F

PART 5: CORRELATION OF SERIES BY SEGMENTS: MGF\_TSCA\_original-50 13:43 Mon 20 Nov 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 1850 1875 1900 1925 1950 1975

1899 1924 1949 1974 1999 2024

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

1 1708A 1891 2016 .00B-.09B-.29B-.01B .34 zero added at ring 42

2 1708B 1891 2016 .19B .32B .49 .68 .73 measured and added original ring 75 since ring 42 was added to 1708A.

3 1709A 1911 2016 .73 .73 .78 .76

4 1709B 1939 2016 .76 .85 .84

5 1710A 1851 2016 .46 .54 .47 .59 .79 .83

6 1710B 1916 2016 .62 .62 .84 .86

7 1711A 1917 2016 .54 .53 .70 .78

8 1711B 1913 2016 .53 .53 .65 .74

9 1712A 1913 2016 .60 .74 .75 .65

10 1712B 1913 2016 .37 .43 .50 .63

11 1713A 1891 2016 .44 .45 .49 .74 .59

12 1713B 1891 2016 .61 .54 .48 .76 .73

13 1714A 1918 2016 .60 .64 .78 .84

14 1714B 1910 2016 .59 .56 .64 .67

15 1715A 1912 2016 .49 .54 .71 .76

16 1715B 1918 2016 .60 .57 .66 .60

17 1716A 1935 2016 .77 .78 .79

18 1716B 1890 2016 .66 .68 .69 .84 .85

19 1717A 1938 2016 .76 .80 .90

20 1717B 1882 2016 .67 .57 .64 .79 .84

21 1718A 1916 2016 .47 .55 .74 .72

22 1718B 1918 2016 .60 .65 .76 .73

23 1719A 1925 2016 .65 .77 .81

24 1719B 1926 2016 .35 .80 .83

25 1720A 1869 2016 .26B .27B .64 .64 .67 .74 zero added at ring 127

26 1720B 1877 2016 .74 .73 .84 .84 .80

27 1721A 1879 2016 .77 .70 .69 .65 .69

28 1721B 1879 2016 .72 .56 .57 .61 .64

29 1722A 1899 2016 .56 .57 .70 .65 .63

30 1723A 1950 2016 .74 .75

31 1723B 1935 2016 .71 .76 .76

32 1724A 1926 2016 .66 .66 .64

33 1724B 1932 2016 .60 .70 .69

34 1725A 1946 2016 .68 .71 .74

35 1725B 1942 2016 .67 .72 .79

36 1722B 1899 2016 .58 .59 .69 .84 .84

Av segment correlation .36 .52 .54 .60 .71 .74

PART 6: POTENTIAL PROBLEMS: MGF\_TSCA\_original-50 13:43 Mon 20 Nov 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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1708A 1891 to 2016 126 years Series 1

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

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

1891 1940 -1 .19 .12 .04 .13 .03 -.04 .09 -.05 .20 .43\* .00| .04 -.23 -.38 -.05 -.11 .05 -.02 .00 -.05 .03

1900 1949 -1 .21 .21 .14 .24 .13 -.03 .04 -.25 .09 .59\*-.09| .08 -.29 -.27 -.09 -.06 -.11 .02 .00 .12 .11

1925 1974 -1 .12 .18 -.19 .29 -.23 .02 -.09 -.01 -.11 .59\*-.29| .16 -.25 -.04 -.13 .40 -.16 .01 .01 .04 -.21

1950 1999 -1 -.11 .07 .10 .24 -.36 -.12 -.20 -.18 -.03 .48\*-.01| .06 -.15 .00 -.21 .30 .01 .00 -.03 -.22 -.12

[B] Entire series, effect on correlation ( .124) is:

Lower 1981> -.049 1925> -.023 1950> -.019 1929< -.017 1915< -.016 1969< -.016 Higher 2011 .049 2006 .046

1891 to 1940 segment:

Lower 1925> -.078 1915< -.052 1929< -.051 1912< -.023 1923> -.020 1934> -.020 Higher 1937 .036 1900 .033

1900 to 1949 segment:

Lower 1925> -.065 1915< -.048 1929< -.044 1948> -.041 1912< -.020 1945< -.017 Higher 1937 .040 1900 .033

1925 to 1974 segment:

Lower 1925> -.039 1961< -.025 1948> -.024 1972> -.022 1969< -.020 1962> -.020 Higher 1960 .040 1937 .040

1950 to 1999 segment:

Lower 1981> -.096 1950> -.033 1961< -.031 1969< -.030 1972> -.026 1962> -.023 Higher 1989 .049 1987 .044

[E] Outliers 4 3.0 SD above or -4.5 SD below mean for year

1925 +3.6 SD; 1948 +3.6 SD; 1950 +3.6 SD; 1981 +5.6 SD

1708A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1891 102 91 77 89 90 110 110 165 146

1900 88 103 103 145 190 192 162 104 83 78

1910 72 87 55 78 86 59 66 70 67 52

1920 62 62 85 84 61 100 92 59 58 25

1930 28 71 69 110 118 60 67 200 186 141

1940 88 58 117 154 223 142 223 260 251 137

1950 188 115 145 192 229 179 178 110 133 106

1960 90 70 111 63 62 79 62 59 57 31

1970 25 25 51 32 43 33 21 33 35 37

1980 42 47 28 18 28 31 23 35 22 13

1990 9 17 24 20 19 25 20 24 28 39

2000 31 25 25 17 31 34 17 25 23 24

2010 36 21 46 36 43 31 44

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1708B 1891 to 2016 126 years Series 2

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

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

1891 1940 -1 .19 .33 .14 .12 -.11 -.11 -.06 .06 .20 .36\* .19| .12 -.27 -.37 -.19 -.20 .10 .07 .07 .00 -.31

1900 1949 -1 .18 .31 .20 .13 -.06 -.17 -.07 -.02 .12 .47\* .32| .12 -.04 -.36 -.09 -.26 .00 -.09 .05 -.03 -.13

[B] Entire series, effect on correlation ( .551) is:

Lower 1925> -.022 1891> -.015 1923> -.013 1937< -.013 1960> -.012 1919< -.011 Higher 1981 .025 2011 .019

1891 to 1940 segment:

Lower 1925> -.063 1891> -.042 1923> -.036 1937< -.034 1906> -.019 1894< -.016 Higher 1916 .069 1938 .031

1900 to 1949 segment:

Lower 1925> -.066 1937< -.042 1923> -.036 1919< -.024 1906> -.019 1929< -.018 Higher 1948 .064 1916 .057

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

1891 +3.8 SD; 2005 +3.3 SD

1708B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1891 107 87 83 79 97 120 129 135 128

1900 107 101 138 184 223 276 243 190 187 160

1910 108 138 117 176 168 162 247 170 167 101

1920 129 172 173 204 159 192 133 116 98 90

1930 90 156 144 168 203 65 124 95 509 377

1940 413 485 455 392 326 510 382 380 215 271

1950 200 319 330 286 283 247 145 200 191 183

1960 208 318 174 284 312 331 308 433 201 176

1970 155 266 195 227 159 110 117 194 198 215

1980 212 72 78 102 186 196 145 150 76 38

1990 27 44 62 72 50 67 62 53 60 59

2000 58 53 55 49 53 68 45 55 56 58

2010 63 43 65 66 63 41 43

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1709A 1911 to 2016 106 years Series 3

[B] Entire series, effect on correlation ( .739) is:

Lower 1981> -.022 1934> -.019 1996< -.015 1925> -.012 1936> -.005 1987< -.004 Higher 2011 .018 1950 .017

1709A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 94 138 178 149 210 225 160 130 174

1920 162 190 203 152 190 180 104 157 96 123

1930 97 119 103 135 398 407 595 738 565 408

1940 440 322 388 384 299 394 411 433 323 267

1950 189 336 456 383 304 373 253 306 265 301

1960 157 228 162 246 195 203 220 244 143 169

1970 129 103 101 148 91 60 60 88 90 79

1980 85 67 113 133 111 183 134 120 98 67

1990 55 95 110 100 79 112 44 79 138 122

2000 105 121 94 86 111 90 67 100 117 143

2010 151 77 89 111 158 102 132

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1709B 1939 to 2016 78 years Series 4

[B] Entire series, effect on correlation ( .779) is:

Lower 1948> -.033 2006> -.011 1944< -.009 1988> -.008 1974> -.008 2003> -.006 Higher 1981 .034 2011 .022

1709B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1939 404

1940 436 343 373 412 281 367 431 489 399 324

1950 213 304 330 303 287 399 250 307 310 291

1960 183 304 209 271 205 198 217 244 140 185

1970 137 133 113 169 133 72 75 114 101 105

1980 121 49 101 108 97 108 115 129 104 62

1990 56 97 133 113 89 116 64 105 160 195

2000 120 155 125 121 116 117 131 187 195 212

2010 208 94 175 188 261 140 211

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1710A 1851 to 2016 166 years Series 5

[\*] Early part of series cannot be checked from 1851 to 1868 -- not matched by another series

[B] Entire series, effect on correlation ( .644) is:

Lower 1938< -.011 1875< -.010 1872< -.009 1873< -.008 1926> -.008 1871> -.008 Higher 2011 .025 1960 .014

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

1871 +3.0 SD; 1933 +3.2 SD

1710A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1851 110 158 132 142 107 62 81 95 65

1860 72 87 82 53 90 103 122 91 67 65

1870 42 51 27 22 35 34 26 29 28 21

1880 24 33 41 25 27 13 34 23 27 22

1890 11 19 12 9 23 21 47 38 63 22

1900 21 14 38 68 77 65 47 60 55 49

1910 49 53 86 87 93 90 115 90 53 68

1920 71 77 78 68 95 46 138 115 101 154

1930 124 132 126 185 97 85 71 89 48 46

1940 27 63 53 53 36 85 127 121 69 112

1950 65 111 146 142 155 141 111 132 124 138

1960 73 137 75 156 118 141 144 126 98 107

1970 93 124 119 181 88 81 73 139 173 167

1980 163 80 126 154 147 146 112 135 88 68

1990 79 114 142 138 60 104 72 106 121 142

2000 82 94 96 65 86 78 41 92 103 145

2010 120 39 95 103 109 73 98

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1710B 1916 to 2016 101 years Series 6

[B] Entire series, effect on correlation ( .740) is:

Lower 1925< -.034 1935> -.025 1934> -.021 1996> -.013 1941< -.008 1964> -.005 Higher 1981 .032 1950 .016

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

1934 +3.0 SD; 1935 +4.6 SD

1710B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1916 304 217 152 190

1920 201 167 156 124 193 88 203 219 176 233

1930 206 204 192 259 278 382 259 233 234 188

1940 191 155 191 222 177 237 215 180 138 137

1950 103 171 194 162 143 156 116 127 156 134

1960 101 169 104 164 139 133 138 141 96 107

1970 125 142 116 164 99 100 115 130 123 142

1980 138 55 86 121 91 132 114 148 109 81

1990 91 138 159 140 90 167 143 149 181 189

2000 118 137 129 101 128 136 103 155 169 199

2010 163 96 158 175 173 116 164

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1711A 1917 to 2016 100 years Series 7

[B] Entire series, effect on correlation ( .648) is:

Lower 1925< -.033 1960> -.018 1950> -.015 1989> -.011 1940< -.010 1928> -.009 Higher 1981 .049 1948 .013

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

1925 -6.1 SD

1711A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 233 185 226

1920 171 175 184 129 177 44 123 151 135 196

1930 160 133 151 98 77 110 200 182 128 90

1940 52 91 156 146 80 147 186 155 61 167

1950 141 164 177 229 194 276 132 197 204 187

1960 172 238 146 167 153 161 169 150 120 109

1970 98 100 83 127 93 61 73 88 94 100

1980 89 31 63 67 69 91 68 106 82 88

1990 88 91 149 92 79 125 82 105 102 114

2000 113 89 85 63 79 89 71 127 154 227

2010 157 94 179 173 149 118 168

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1711B 1913 to 2016 104 years Series 8

[B] Entire series, effect on correlation ( .649) is:

Lower 1960> -.031 1968> -.010 1937< -.009 1950> -.009 1956< -.008 2014< -.007 Higher 1981 .047 1948 .013

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

1960 +3.1 SD

1711B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 260 250 264 249 181 128 170

1920 189 195 185 155 171 67 156 117 126 226

1930 125 171 130 116 103 117 136 125 171 280

1940 187 189 290 324 147 235 270 277 99 190

1950 165 246 254 268 221 250 106 177 261 253

1960 239 287 190 181 164 229 230 212 165 153

1970 121 143 72 125 94 76 83 97 104 104

1980 152 39 77 120 86 153 107 148 112 101

1990 109 151 114 113 66 158 129 127 152 183

2000 189 196 150 88 118 238 155 224 246 350

2010 299 179 286 302 243 272 272

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1712A 1913 to 2016 104 years Series 9

[B] Entire series, effect on correlation ( .620) is:

Lower 1913< -.020 1918> -.015 1920< -.011 2010< -.010 1992< -.010 1994> -.009 Higher 1981 .013 1960 .012

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

1918 +3.3 SD

1712A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 208 297 295 297 391 388 302

1920 190 215 222 225 249 171 196 154 129 173

1930 167 190 174 156 116 143 144 215 177 206

1940 200 196 212 248 184 244 262 276 160 226

1950 175 243 332 311 308 376 278 296 266 226

1960 173 237 201 232 230 247 241 233 123 171

1970 207 169 125 221 152 93 116 180 207 157

1980 177 97 173 154 162 184 162 173 125 86

1990 82 119 96 85 133 149 130 148 187 224

2000 171 143 167 146 153 139 144 172 202 222

2010 172 149 187 190 247 214 153

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

1712B 1913 to 2016 104 years Series 10

[B] Entire series, effect on correlation ( .507) is:

Lower 1957< -.027 1928> -.016 1994> -.014 1950> -.013 2000> -.010 1979< -.008 Higher 2006 .020 2011 .018

1712B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 245 233 261 282 447 252 250

1920 233 176 147 123 176 80 183 216 196 190

1930 146 120 140 144 134 171 186 168 199 196

1940 186 228 259 236 149 215 225 163 99 184

1950 160 209 278 247 246 253 182 52 45 39

1960 68 133 109 139 116 178 207 220 157 189

1970 188 156 86 123 69 72 65 107 120 71

1980 85 55 133 95 91 95 64 116 75 60

1990 59 95 82 92 115 137 92 82 128 118

2000 162 110 144 110 124 135 93 110 144 216

2010 191 127 200 185 158 159 157

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

1713A 1891 to 2016 126 years Series 11

[B] Entire series, effect on correlation ( .474) is:

Lower 1898< -.039 2011> -.033 1946< -.014 1945< -.014 2006> -.012 1996> -.011 Higher 1981 .040 2003 .013

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

1898 -4.6 SD; 1925 -6.1 SD

1713A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1891 84 106 116 99 109 135 157 58 126

1900 106 41 102 131 87 142 117 112 90 93

1910 115 74 108 131 112 121 142 144 120 127

1920 160 169 173 134 145 68 129 162 137 160

1930 142 115 120 133 101 140 158 156 203 282

1940 280 166 199 220 203 116 72 134 98 213

1950 172 215 316 278 283 233 191 219 205 198

1960 165 283 177 146 146 234 206 237 145 213

1970 190 122 87 216 175 128 161 164 216 248

1980 269 67 154 221 124 208 191 306 155 148

1990 161 183 138 92 97 180 168 140 157 175

2000 107 127 106 51 121 237 187 123 136 277

2010 226 232 212 313 205 178 205

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1713B 1891 to 2016 126 years Series 12

[B] Entire series, effect on correlation ( .591) is:

Lower 1925< -.072 2011> -.028 1950> -.017 1945< -.016 1946< -.008 1949> -.007 Higher 1981 .016 1987 .012

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

1924 1925 -4.3 SD 1925 1926 4.4 SD

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

1925 -8.0 SD; 1950 +3.0 SD

1713B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1891 125 152 161 128 137 226 192 146 105

1900 85 60 104 105 116 138 103 84 89 103

1910 99 73 98 122 119 142 151 143 101 82

1920 97 124 122 94 112 39 90 104 84 99

1930 91 82 100 98 84 91 73 99 150 128

1940 115 123 150 158 88 55 43 72 46 179

1950 154 177 238 242 253 274 218 216 162 156

1960 105 175 149 132 122 163 161 166 89 92

1970 101 85 36 102 97 56 55 58 86 106

1980 111 58 89 112 92 178 119 214 149 128

1990 115 140 170 112 91 180 111 150 144 167

2000 96 93 83 51 74 57 34 61 85 205

2010 277 211 262 257 237 112 156

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

1714A 1918 to 2016 99 years Series 13

[B] Entire series, effect on correlation ( .726) is:

Lower 1925> -.033 1960> -.024 1996> -.010 1937< -.010 1962> -.008 1986< -.007 Higher 1981 .035 1950 .022

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

1925 +3.1 SD

1714A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1918 261 283

1920 291 370 338 240 252 281 207 182 136 178

1930 188 179 194 160 134 154 173 161 208 191

1940 195 232 270 308 160 284 240 274 202 199

1950 112 186 268 283 279 213 186 255 317 227

1960 220 309 238 195 139 200 223 204 114 155

1970 145 133 131 266 140 95 89 114 131 138

1980 158 61 119 171 112 175 94 148 78 80

1990 111 128 106 119 80 149 117 152 190 158

2000 91 86 107 55 71 69 66 91 135 176

2010 184 86 119 183 213 121 145

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

1714B 1910 to 2016 107 years Series 14

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

Lower 1937< -.027 1914< -.027 1960> -.016 1925> -.016 1963< -.015 1996> -.015 Higher 1981 .049 1950 .033

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

1937 -4.8 SD; 1990 +3.3 SD

1714B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1910 188 141 188 195 128 221 270 161 134 141

1920 171 171 164 135 219 172 133 126 79 103

1930 112 92 96 100 78 109 83 54 103 156

1940 196 236 339 405 258 306 333 322 178 231

1950 119 247 238 223 229 204 216 264 243 209

1960 192 304 119 69 66 119 174 238 223 330

1970 214 210 138 275 125 92 81 96 108 129

1980 193 56 76 96 46 105 84 202 99 110

1990 157 127 104 95 76 119 118 118 150 118

2000 66 75 58 37 52 100 83 101 201 370

2010 264 155 185 307 270 238 252

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1715A 1912 to 2016 105 years Series 15

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

Lower 1925> -.033 2010< -.021 1960> -.015 1934> -.014 1996> -.011 1974> -.009 Higher 1981 .047 2011 .019

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

1925 +3.2 SD

1715A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1912 109 163 112 255 335 325 171 134

1920 169 218 230 177 233 306 177 254 164 238

1930 196 219 270 266 351 308 311 415 446 445

1940 540 479 509 564 353 450 283 203 58 111

1950 98 193 341 241 175 165 207 333 400 317

1960 239 294 225 245 164 217 267 358 142 273

1970 177 232 171 341 274 175 226 149 167 153

1980 226 65 134 206 134 212 175 300 148 100

1990 129 241 173 155 123 143 159 183 232 197

2000 185 156 145 91 147 149 130 186 218 371

2010 164 83 141 216 310 230 189

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1715B 1918 to 2016 99 years Series 16

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

Lower 1925> -.029 1971< -.019 1922< -.018 1973< -.017 1944< -.014 1993< -.011 Higher 2011 .025 1950 .018

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

1925 +3.5 SD; 2007 +3.1 SD

1715B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1918 92 102

1920 121 154 111 125 177 184 126 150 116 184

1930 159 154 156 142 138 213 205 225 239 194

1940 242 246 205 216 127 225 188 175 99 139

1950 105 153 205 210 211 224 151 143 137 155

1960 107 187 162 123 121 169 133 204 113 126

1970 117 40 28 42 58 44 81 84 144 153

1980 139 62 149 254 172 200 163 255 117 66

1990 90 107 117 67 90 150 152 151 158 200

2000 173 132 123 102 128 206 178 424 410 290

2010 289 121 147 205 164 157 182

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1716A 1935 to 2016 82 years Series 17

[B] Entire series, effect on correlation ( .759) is:

Lower 1996> -.021 1938< -.008 1988> -.008 1989> -.008 1944> -.008 1941< -.008 Higher 1981 .035 1960 .010

1716A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1935 473 472 589 415 432

1940 447 319 318 370 402 414 357 332 195 212

1950 172 248 266 234 236 180 156 215 186 151

1960 98 208 135 143 148 172 173 202 108 152

1970 144 156 127 177 121 100 104 149 142 147

1980 152 42 107 167 116 197 176 205 120 91

1990 84 114 177 117 90 171 166 147 154 199

2000 91 90 142 93 135 166 116 141 186 261

2010 208 87 111 145 215 181 174

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1716B 1890 to 2016 127 years Series 18

[B] Entire series, effect on correlation ( .765) is:

Lower 1890> -.025 1925> -.010 1951< -.006 1974> -.006 2003> -.004 2009< -.004 Higher 1981 .021 2006 .006

1716B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1890 34 42 51 37 61 62 103 155 120 65

1900 61 68 92 106 104 103 50 57 55 69

1910 66 48 85 122 113 162 169 135 45 64

1920 62 77 108 72 108 106 114 124 99 112

1930 86 81 76 94 98 137 197 233 354 251

1940 213 254 212 171 179 213 190 158 68 101

1950 84 98 118 138 122 130 81 98 117 88

1960 68 124 78 117 92 124 113 122 72 88

1970 87 92 73 99 94 58 67 74 86 100

1980 93 32 79 85 72 99 62 93 57 39

1990 27 51 64 34 28 47 18 26 47 78

2000 42 41 55 43 46 44 29 47 51 60

2010 79 28 71 81 98 76 72

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

1717A 1938 to 2016 79 years Series 19

[B] Entire series, effect on correlation ( .816) is:

Lower 1950> -.022 1943< -.013 1954< -.007 1949< -.006 1939> -.005 1962> -.005 Higher 1981 .023 2011 .011

1717A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1938 596 573

1940 514 470 519 421 381 467 394 407 285 260

1950 282 432 357 286 249 255 258 334 292 223

1960 188 368 237 279 186 209 192 220 125 202

1970 143 120 104 138 102 72 106 197 143 155

1980 154 77 128 174 178 279 227 218 155 96

1990 96 153 186 131 131 197 116 125 167 185

2000 115 126 147 111 106 122 94 144 186 274

2010 244 133 176 230 229 173 200

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1717B 1882 to 2016 135 years Series 20

[B] Entire series, effect on correlation ( .755) is:

Lower 1925> -.021 1939< -.015 1959< -.007 1923> -.006 1926< -.006 1883> -.005 Higher 2011 .019 1890 .015

1717B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1882 33 48 41 25 35 26 22 46

1890 23 41 52 46 69 73 92 116 120 73

1900 61 39 73 92 90 70 38 42 52 43

1910 47 25 37 54 91 77 83 47 24 35

1920 23 24 27 36 42 49 27 37 29 52

1930 45 46 38 59 43 55 72 138 249 121

1940 93 170 180 236 200 270 253 242 167 197

1950 140 218 297 276 237 198 176 232 163 113

1960 99 158 123 189 128 186 173 193 98 157

1970 137 93 38 65 44 31 26 65 81 93

1980 99 48 107 169 106 165 121 117 91 68

1990 80 145 152 114 88 135 75 107 135 117

2000 89 100 107 89 95 84 60 80 97 154

2010 137 68 100 105 94 72 64

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1718A 1916 to 2016 101 years Series 21

[B] Entire series, effect on correlation ( .595) is:

Lower 1925> -.037 1981> -.015 1936< -.014 1960> -.013 1921< -.013 1934> -.010 Higher 1950 .036 1975 .014

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

1925 +3.6 SD

1718A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1916 290 202 269 189

1920 168 167 300 216 318 438 303 304 292 411

1930 406 387 470 554 491 315 273 761 547 411

1940 427 531 471 629 491 518 419 421 442 320

1950 271 579 615 481 500 444 404 522 442 419

1960 408 498 388 358 338 423 472 477 320 509

1970 354 383 227 389 281 202 222 333 305 244

1980 274 236 253 353 293 360 327 313 255 193

1990 195 205 233 290 257 337 156 173 270 285

2000 233 200 192 119 156 183 174 202 369 432

2010 488 279 358 390 518 347 325

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1718B 1918 to 2016 99 years Series 22

[B] Entire series, effect on correlation ( .665) is:

Lower 1940< -.028 1925> -.027 1981> -.018 2008< -.011 1918> -.008 1993> -.007 Higher 1950 .019 2011 .017

1718B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1918 226 188

1920 172 190 336 193 263 306 198 253 221 348

1930 391 307 321 330 216 175 179 374 448 341

1940 159 308 321 470 444 520 482 406 267 229

1950 169 309 472 364 401 365 275 378 314 365

1960 240 375 235 227 237 294 258 290 183 237

1970 176 137 104 147 114 98 87 101 102 94

1980 104 86 92 126 110 140 106 123 95 63

1990 78 118 121 172 124 201 125 137 184 188

2000 162 162 174 114 131 128 138 186 154 263

2010 220 157 205 250 279 236 228

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1719A 1925 to 2016 92 years Series 23

[B] Entire series, effect on correlation ( .711) is:

Lower 1962> -.025 1942< -.024 1925> -.017 1964< -.009 1972> -.007 1974< -.007 Higher 1950 .024 1960 .017

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

1962 +3.1 SD

1719A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 378 340 373 307 408

1930 420 396 500 560 469 515 740 903 733 443

1940 438 456 253 548 253 515 552 376 309 313

1950 178 480 365 365 313 389 308 305 264 283

1960 196 311 338 288 187 256 261 280 180 267

1970 223 221 218 297 147 138 181 231 203 196

1980 235 131 146 252 188 270 276 272 166 120

1990 131 183 243 206 120 204 114 106 170 213

2000 150 118 181 106 119 132 131 152 251 240

2010 257 135 204 234 218 182 208

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1719B 1926 to 2016 91 years Series 24

[B] Entire series, effect on correlation ( .614) is:

Lower 1948> -.027 1928> -.024 1937< -.021 2009< -.020 1938< -.016 1961< -.014 Higher 1981 .054 2011 .038

1719B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 358 329 353 285

1930 361 388 288 297 297 90 88 94 109 195

1940 145 266 253 243 480 591 516 465 426 345

1950 187 349 289 313 276 292 217 250 200 145

1960 121 145 136 124 118 160 152 177 100 112

1970 102 110 113 165 90 70 83 110 130 100

1980 109 46 75 123 70 116 86 145 92 75

1990 78 89 93 88 85 126 68 75 81 143

2000 96 105 142 85 111 123 81 127 130 106

2010 147 85 127 178 143 118 119

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1720A 1869 to 2016 148 years Series 25

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

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

1869 1918 -1 -.06 -.05 .17 -.16 -.18 -.18 -.17 -.17 -.12 .51\* .26| .20 .41 .08 -.15 -.14 -.04 -.11 -.17 .05 .00

1875 1924 -1 -.05 -.03 .12 -.29 -.14 -.11 -.05 -.12 -.09 .63\* .27| .20 .32 .00 -.14 -.14 -.10 -.05 -.12 .05 .04

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

Lower 1890> -.040 1891< -.027 1872> -.014 1873> -.012 1975> -.011 1972> -.008 Higher 1981 .027 2011 .026

1869 to 1918 segment:

Lower 1890> -.068 1891< -.059 1872> -.022 1873> -.020 1881< -.017 1871< -.016 Higher 1897 .037 1870 .034

1875 to 1924 segment:

Lower 1890> -.098 1891< -.066 1881< -.019 1876> -.012 1879> -.012 1887> -.010 Higher 1897 .040 1915 .031

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

1890 1891 -6.0 SD

[E] Outliers 4 3.0 SD above or -4.5 SD below mean for year

1873 +3.4 SD; 1890 +3.8 SD; 1891 -6.0 SD; 1960 -4.6 SD

1720A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1869 103

1870 42 55 108 136 158 248 205 168 169 256

1880 165 134 228 256 174 172 166 175 105 126

1890 149 43 95 109 160 154 212 309 239 170

1900 144 130 238 200 193 198 139 125 99 72

1910 82 62 127 248 317 470 352 179 112 159

1920 130 91 108 106 135 67 114 140 117 165

1930 143 122 154 136 103 127 127 172 231 174

1940 328 454 299 401 341 326 222 226 181 148

1950 103 212 204 149 177 213 97 170 131 159

1960 49 90 90 95 98 111 121 124 86 87

1970 79 75 84 102 77 76 75 67 54 70

1980 52 34 55 45 44 52 45 58 51 32

1990 36 40 53 37 35 53 38 48 52 60

2000 43 43 46 45 46 46 35 45 55 69

2010 53 33 50 49 67 44 48

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1720B 1877 to 2016 140 years Series 26

[B] Entire series, effect on correlation ( .787) is:

Lower 1975> -.009 1878> -.007 1978< -.007 1885> -.006 2007< -.006 2003> -.005 Higher 1981 .018 1890 .014

1720B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1877 266 317 258

1880 210 197 248 184 192 194 248 177 212 217

1890 20 55 122 125 159 174 285 416 320 192

1900 158 159 342 255 252 297 191 152 111 84

1910 101 65 127 232 164 503 442 482 267 232

1920 308 253 218 120 172 128 174 150 100 182

1930 235 288 304 257 204 199 248 265 331 258

1940 294 308 254 289 297 382 308 258 151 150

1950 102 230 390 273 279 265 187 253 215 218

1960 95 162 117 140 130 164 174 171 106 98

1970 82 82 78 112 67 64 53 55 42 51

1980 55 28 37 40 27 49 41 44 35 23

1990 35 42 68 52 42 64 31 48 56 90

2000 76 72 69 64 64 71 56 53 98 113

2010 95 56 87 79 90 76 88

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1721A 1879 to 2016 138 years Series 27

[B] Entire series, effect on correlation ( .708) is:

Lower 1934< -.020 1981> -.015 1972> -.012 1990> -.008 1980< -.008 1968> -.008 Higher 1890 .029 2011 .024

1721A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1879 217

1880 146 151 120 71 46 28 60 36 45 60

1890 8 45 52 54 70 71 80 99 97 57

1900 47 30 71 62 68 57 38 41 40 42

1910 71 37 87 58 75 120 151 77 37 53

1920 36 57 42 23 51 33 39 49 29 66

1930 74 90 94 108 24 30 77 127 135 126

1940 105 100 174 157 135 195 160 162 71 83

1950 86 165 266 201 224 251 213 271 221 180

1960 140 234 165 176 193 229 212 236 228 247

1970 219 207 247 364 231 160 175 189 229 224

1980 170 146 158 168 172 221 177 218 154 136

1990 195 193 219 191 154 139 93 114 184 200

2000 168 167 179 140 129 159 156 196 242 281

2010 308 161 273 285 268 245 257

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1721B 1879 to 2016 138 years Series 28

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

Lower 1934< -.023 1981> -.019 1960> -.019 1999< -.014 1925> -.011 2003> -.011 Higher 1890 .033 2011 .017

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

1934 -5.0 SD

1721B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1879 114

1880 171 171 155 118 124 96 103 86 91 76

1890 13 59 73 87 156 151 160 200 199 124

1900 100 58 137 145 132 165 106 87 62 76

1910 107 76 150 167 135 146 157 87 92 103

1920 140 139 117 88 141 123 96 106 75 107

1930 97 124 119 134 30 125 76 251 272 250

1940 354 321 380 539 389 498 454 349 335 219

1950 181 404 465 333 373 315 280 467 440 351

1960 351 468 321 272 249 278 278 314 227 301

1970 272 262 211 309 222 165 222 227 189 204

1980 257 239 286 394 279 380 349 354 225 244

1990 336 336 396 479 294 382 221 335 503 334

2000 368 307 292 333 329 317 267 311 358 425

2010 318 202 235 221 308 229 202

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1722A 1899 to 2016 118 years Series 29

[B] Entire series, effect on correlation ( .615) is:

Lower 1996> -.031 1901> -.022 1980< -.016 2016< -.011 1936> -.010 1925> -.008 Higher 1981 .022 1950 .021

[E] Outliers 3 3.0 SD above or -4.5 SD below mean for year

1901 +3.4 SD; 1936 +3.3 SD; 1996 +3.5 SD

1722A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1899 102

1900 57 108 111 83 83 73 51 43 43 43

1910 67 43 87 130 145 124 153 114 84 97

1920 165 137 70 30 76 101 106 125 56 172

1930 158 165 130 178 220 259 462 448 354 301

1940 296 313 403 353 336 419 435 440 262 269

1950 220 364 368 320 403 302 271 291 275 295

1960 243 400 298 320 201 310 257 259 181 266

1970 157 162 157 262 160 134 130 152 143 105

1980 79 56 82 138 109 185 221 324 179 184

1990 140 195 253 249 142 250 358 245 202 347

2000 213 194 161 137 171 284 157 264 304 474

2010 365 230 306 265 323 315 228

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1723A 1950 to 2016 67 years Series 30

[B] Entire series, effect on correlation ( .734) is:

Lower 1968> -.025 1996> -.012 1950> -.010 1955< -.010 1992< -.008 2011> -.007 Higher 1981 .038 1960 .012

1723A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1950 244 765 603 390 289 212 215 283 230 212

1960 130 227 134 182 145 124 109 134 117 112

1970 90 82 56 78 61 33 41 61 57 55

1980 53 28 65 69 71 106 87 129 88 69

1990 94 105 92 90 100 124 118 158 167 172

2000 161 148 111 96 89 77 69 107 129 210

2010 179 101 109 125 144 110 115

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1723B 1935 to 2016 82 years Series 31

[B] Entire series, effect on correlation ( .753) is:

Lower 2011> -.015 1981> -.010 1968> -.008 1970> -.008 1944> -.007 1984> -.006 Higher 1950 .020 2006 .011

1723B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1935 561 723 833 682 555

1940 477 469 595 628 566 560 469 404 344 289

1950 216 391 401 324 285 292 268 336 239 238

1960 137 212 140 184 148 182 146 138 123 126

1970 133 121 97 100 69 46 60 92 85 77

1980 72 52 92 89 108 165 109 125 75 52

1990 69 99 85 79 73 110 59 84 91 89

2000 74 83 75 52 59 61 38 71 87 150

2010 149 94 105 136 180 115 158

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1724A 1926 to 2016 91 years Series 32

[B] Entire series, effect on correlation ( .662) is:

Lower 1981> -.035 1988< -.029 1969< -.016 1975> -.016 1935> -.013 1966< -.009 Higher 1960 .022 1950 .019

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

1981 +3.2 SD

1724A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 159 216 187 210

1930 215 219 168 168 184 435 455 619 483 372

1940 421 311 308 380 379 411 380 358 268 290

1950 213 362 473 378 342 374 303 353 272 308

1960 159 198 169 230 155 177 135 171 91 84

1970 98 131 125 222 149 166 188 240 237 256

1980 257 186 165 195 153 219 183 232 102 90

1990 94 125 120 119 91 151 71 105 86 84

2000 51 63 54 27 37 42 29 47 80 99

2010 112 62 76 148 132 85 106

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1724B 1932 to 2016 85 years Series 33

[B] Entire series, effect on correlation ( .702) is:

Lower 1981> -.048 1975> -.024 1948> -.017 1933< -.011 1969< -.009 1965< -.009 Higher 1950 .027 2011 .022

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

1981 +3.3 SD

1724B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1932 130 37 37 202 240 350 233 150

1940 160 198 183 257 194 225 231 234 218 214

1950 143 272 292 216 195 198 159 168 147 195

1960 105 183 107 123 93 93 88 126 76 82

1970 73 110 76 139 127 151 154 192 195 183

1980 230 173 160 220 185 202 167 224 123 98

1990 112 130 151 115 77 113 76 115 105 140

2000 109 133 103 74 77 93 83 123 144 232

2010 198 81 101 134 135 111 109

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1725A 1946 to 2016 71 years Series 34

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

Lower 1968> -.017 1992< -.010 1986> -.010 1949> -.010 1963< -.009 2003> -.009 Higher 2011 .033 1981 .021

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

1951 +3.2 SD

1725A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1946 202 256 182 284

1950 119 472 291 214 221 211 153 147 123 118

1960 85 134 87 85 79 120 119 207 137 125

1970 101 83 110 175 136 92 108 152 105 102

1980 160 77 123 127 116 182 255 241 173 128

1990 97 106 99 110 112 204 105 115 115 151

2000 98 126 118 107 91 80 68 124 111 159

2010 157 73 122 141 204 120 123

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1725B 1942 to 2016 75 years Series 35

[B] Entire series, effect on correlation ( .710) is:

Lower 1949< -.021 1948> -.020 1985< -.012 1988> -.010 1966< -.008 1962> -.008 Higher 2011 .020 1950 .018

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

1950 -4.5 SD

1725B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 768 786 684 803 578 475 498 318

1950 229 420 408 323 317 313 255 320 268 346

1960 199 299 248 326 232 237 165 246 163 211

1970 179 150 85 124 89 60 74 113 115 125

1980 124 47 80 79 57 82 135 260 165 98

1990 92 111 110 131 91 117 95 149 124 122

2000 136 160 126 92 108 112 100 137 142 181

2010 202 114 171 175 172 131 143

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1722B 1899 to 2016 118 years Series 36

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

Lower 1951< -.013 1943< -.013 1901> -.012 1982< -.011 1899> -.009 1905< -.008 Higher 1981 .028 2011 .015

1722B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1899 95

1900 58 68 77 72 57 36 26 16 17 16

1910 23 21 25 35 55 73 95 46 28 38

1920 28 28 39 22 23 27 21 22 9 37

1930 47 41 43 79 81 70 94 154 294 117

1940 97 75 164 89 64 119 157 186 86 118

1950 72 74 140 120 111 138 106 154 160 107

1960 79 132 100 136 103 109 113 141 115 136

1970 95 109 89 130 102 79 101 134 131 123

1980 154 86 86 208 168 238 185 216 188 139

1990 155 192 229 177 145 217 154 180 271 277

2000 199 186 194 178 171 188 147 278 241 357

2010 297 132 177 139 158 136 141

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PART 7: DESCRIPTIVE STATISTICS: MGF\_TSCA\_original-50 13:43 Mon 20 Nov 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 1708A 1891 2016 126 5 4 .124 .79 2.60 .580 .852 .283 2.65 .522 -.007 1

2 1708B 1891 2016 126 5 2 .551 1.69 5.10 1.099 .803 .240 2.65 .455 -.051 1

3 1709A 1911 2016 106 4 0 .739 1.91 7.38 1.298 .872 .263 2.62 .452 -.056 1

4 1709B 1939 2016 78 3 0 .779 1.98 4.89 1.080 .847 .256 2.55 .523 -.030 1

5 1710A 1851 2016 166 6 0 .644 .85 1.85 .426 .725 .308 2.55 .412 -.077 1

6 1710B 1916 2016 101 4 0 .740 1.57 3.82 .516 .630 .233 2.67 .399 -.045 1

7 1711A 1917 2016 100 4 0 .648 1.30 2.76 .501 .573 .286 2.58 .371 -.005 1

8 1711B 1913 2016 104 4 0 .649 1.75 3.50 .684 .613 .281 2.52 .478 -.035 1

9 1712A 1913 2016 104 4 0 .620 1.96 3.91 .638 .738 .198 2.59 .520 -.010 1

10 1712B 1913 2016 104 4 0 .507 1.53 4.47 .667 .733 .255 2.74 .403 -.022 1

11 1713A 1891 2016 126 5 0 .474 1.61 3.16 .589 .524 .287 2.51 .364 -.019 1

12 1713B 1891 2016 126 5 0 .591 1.24 2.77 .536 .710 .268 2.46 .280 -.043 1

13 1714A 1918 2016 99 4 0 .726 1.75 3.70 .703 .706 .260 2.79 .514 -.006 1

14 1714B 1910 2016 107 4 0 .602 1.64 4.05 .806 .679 .302 2.78 .508 -.023 1

15 1715A 1912 2016 105 4 0 .661 2.29 5.64 1.034 .668 .325 2.69 .433 -.019 1

16 1715B 1918 2016 99 4 0 .574 1.57 4.24 .655 .640 .265 2.76 .509 -.051 1

17 1716A 1935 2016 82 3 0 .759 1.95 5.89 1.072 .856 .260 2.55 .416 -.030 5

18 1716B 1890 2016 127 5 0 .765 .93 3.54 .529 .818 .281 2.53 .347 -.073 1

19 1717A 1938 2016 79 3 0 .816 2.24 5.96 1.214 .870 .242 2.87 .620 .051 1

20 1717B 1882 2016 135 5 0 .755 .99 2.97 .637 .826 .308 2.73 .497 -.049 1

21 1718A 1916 2016 101 4 0 .595 3.48 7.61 1.250 .643 .221 2.78 .488 .088 1

22 1718B 1918 2016 99 4 0 .665 2.26 5.20 1.085 .781 .238 2.66 .516 .069 1

23 1719A 1925 2016 92 3 0 .711 2.84 9.03 1.493 .773 .258 2.66 .539 -.072 1

24 1719B 1926 2016 91 3 0 .614 1.77 5.91 1.158 .866 .256 2.67 .516 .013 1

25 1720A 1869 2016 148 6 2 .541 1.30 4.70 .869 .821 .263 2.51 .359 -.031 1

26 1720B 1877 2016 140 5 0 .787 1.65 5.03 1.056 .812 .274 2.56 .381 -.008 1

27 1721A 1879 2016 138 5 0 .708 1.37 3.64 .779 .856 .284 2.77 .425 -.060 2

28 1721B 1879 2016 138 5 0 .619 2.31 5.39 1.204 .824 .259 2.59 .398 .002 1

29 1722A 1899 2016 118 5 0 .615 2.10 4.74 1.106 .795 .279 2.75 .543 -.017 1

30 1723A 1950 2016 67 2 0 .734 1.42 7.65 1.173 .761 .243 2.55 .402 .001 1

31 1723B 1935 2016 82 3 0 .753 2.08 8.33 1.862 .955 .228 2.63 .426 -.020 1

32 1724A 1926 2016 91 3 0 .662 2.02 6.19 1.240 .872 .245 2.63 .512 -.062 1

33 1724B 1932 2016 85 3 0 .702 1.52 3.50 .604 .649 .258 2.74 .530 -.097 1

34 1725A 1946 2016 71 3 0 .737 1.43 4.72 .647 .436 .283 2.92 .519 -.062 1

35 1725B 1942 2016 75 3 0 .710 2.16 8.03 1.697 .919 .252 2.77 .437 .046 1

36 1722B 1899 2016 118 5 0 .749 1.17 3.57 .712 .780 .288 2.98 .503 -.022 1

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Total or mean: 3854 147 8 .648 1.69 9.03 .890 .758 .267 2.98 .452 -.025

- = [ COFECHA MGF COF ] = -