[] Dendrochronology Program Library Run FAGR Program COF 14:28 Tue 24 Oct 2017 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 30249

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: FAGR\_WILL\_CORR2-50

File of DATED series: FAGR\_WILL\_CORR2

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 1865 to 2016 152 years

Continuous time span is 1865 to 2016 152 years

Portion with two or more series is 1867 to 2016 150 years

>> 1412A 1933 absent in 1 of 26 series, but is not usually narrow: master index is -.389

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

\*C\* Number of dated series 32 \*C\*

\*O\* Master series 1865 2016 152 yrs \*O\*

\*F\* Total rings in all series 3596 \*F\*

\*E\* Total dated rings checked 3594 \*E\*

\*C\* Series intercorrelation .532 \*C\*

\*H\* Average mean sensitivity .261 \*H\*

\*A\* Segments, possible problems 12 \*A\*

\*\*\* Mean length of series 112.4 \*\*\*

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

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

1409B 1 absent rings: 1936

1412A 2 absent rings: 1933 1936

1412B 2 absent rings: 1936 1938

1849A 1 absent rings: 1936

1849B 1 absent rings: 1936

1852A 2 absent rings: 1936 1940

1852B 2 absent rings: 1936 1940

1853A 1 absent rings: 1936

1853B 1 absent rings: 1936

13 absent rings .362%

1900 -.367 17 1950 .921 27 2000 -.154 31

1901 -.156 17 1951 1.069 28 2001 -.477 31

1902 1.926 17 1952 .018 28 2002 -.330 31

1903 1.514 17 1953 -.241 28 2003 -2.336 31

1904 .595 17 1954 .896 28 2004 1.044 31

1905 -.772 17 1955 .223 28 2005 .749 31

1906 -.496 18 1956 -.369 28 2006 -1.377 31

1907 -1.613 19 1957 -1.834 28 2007 -.511 31

1908 -.240 19 1958 1.177 27 2008 .319 31

1909 -.273 19 1959 .423 28 2009 .918 31

1910 .296 19 1960 .251 31 2010 .409 31

1911 -.830 20 1961 .776 31 2011 .031 31

1912 .242 20 1962 -.681 31 2012 .357 31

1913 2.099 20 1963 -.197 31 2013 -.632 31

1914 .574 21 1964 -.557 31 2014 .903 31

1865 1.703 1 1915 2.071 21 1965 -.245 31 2015 .827 31

1866 -.088 1 1916 .468 21 1966 -2.996 31 2016 -.370 31

1867 -.601 2 1917 -1.327 21 1967 -.470 31

1868 -1.727 2 1918 -.221 21 1968 -.733 31

1869 -.637 2 1919 -1.159 21 1969 .170 31

1870 -.637 4 1920 .931 21 1970 -.485 31

1871 .644 5 1921 .952 24 1971 .715 31

1872 -.629 6 1922 1.784 24 1972 1.096 31

1873 .940 8 1923 .567 24 1973 -.726 31

1874 .860 9 1924 1.136 24 1974 .105 31

1875 1.382 10 1925 .366 24 1975 -.601 31

1876 .591 10 1926 -.366 24 1976 -.882 31

1877 1.177 10 1927 -.234 24 1977 .299 31

1878 .215 10 1928 -.296 24 1978 1.204 31

1879 .512 11 1929 -.633 24 1979 .023 31

1880 .528 12 1930 -.416 24 1980 1.272 31

1881 .514 13 1931 .510 25 1981 -.408 31

1882 -1.284 14 1932 .591 25 1982 .493 31

1883 -2.532 15 1933 -.389 26 1<< 1983 .052 31

1884 -1.143 15 1934 -.275 26 1984 .478 31

1885 -.171 16 1935 -.668 26 1985 -.312 31

1886 .182 16 1936 -5.629 27 9 1986 -.535 31

1887 -.388 16 1937 -1.374 27 1987 .285 31

1888 -.998 16 1938 -.982 27 1 1988 -.079 31

1889 .171 16 1939 -.007 27 1989 .046 31

1890 .338 16 1940 -1.168 27 2 1990 1.200 31

1891 -.791 16 1941 -.904 27 1991 .500 31

1892 .145 16 1942 .714 27 1992 .900 31

1893 -.994 16 1943 1.414 27 1993 -.479 31

1894 .737 16 1944 1.239 27 1994 -.163 31

1895 .223 16 1945 .957 27 1995 -1.098 31

1896 .936 16 1946 .566 27 1996 -.956 31

1897 .373 16 1947 .969 27 1997 -.244 31

1898 -.518 17 1948 .426 27 1998 .894 31

1899 -1.464 17 1949 .010 27 1999 .746 31

PART 5: CORRELATION OF SERIES BY SEGMENTS: FAGR\_WILL\_CORR2-50 14:28 Tue 24 Oct 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 1409A 1911 2016 .50 .36 .28B .33

2 1409B 1906 2016 .53 .30B .24B .31A

3 1410A 1921 2016 .34 .33 .33 .45

4 1410B 1921 2016 .38 .38 .06B .34

5 1411A 1872 2016 .49 .61 .73 .74 .59 .61

6 1411B 1874 2016 .66 .66 .77 .72 .51 .43

7 1412A 1870 2016 .48 .58 .77 .49 .41 .33A

8 1412B 1873 2016 .61 .54 .64 .63 .63 .36

9 1413A 1879 2016 .53 .67 .42 .28B .51

10 1413B 1875 2016 .48 .59 .54 .56 .54

11 1844A 1871 2016 .66 .67 .87 .73 .41 .52

12 1844B 1873 2016 .36 .39 .72 .65 .40 .55

13 1845A 1960 2016 .32B .35

14 1845B 1960 2016 .35 .48

15 1846A 1936 2016 .55 .27B .39

16 1846B 1933 2016 .74 .59 .45

17 1846C 1931 2016 .66 .36 .33

18 1847A 1959 2016 .38 .37

19 1847B 1951 2016 .52 .71

20 1848A1 1960 2016 .64 .59

21 1848A2 1898 1957 .73 .77 .75

22 1848B 1907 2016 .86 .70 .40 .34

23 1849A 1882 2016 .43 .61 .35 .37B .33A

24 1849B 1885 2016 .80 .81 .54 .51 .27B

25 1850A 1867 2016 .39 .49 .65 .74 .50 .51

26 1850B 1870 2016 .59 .60 .73 .77 .56 .56

27 1851A 1921 2016 .55 .61 .77 .56

28 1851B 1914 2016 .54 .60 .55 .48

29 1852A 1865 2016 .52 .69 .53 .57 .72 .59

30 1852B 1880 2016 .62 .55 .48 .58 .42

31 1853A 1883 2016 .53 .72 .66 .62 .59

32 1853B 1881 2016 .48 .67 .70 .57 .54

Av segment correlation .53 .58 .65 .58 .46 .46

PART 6: POTENTIAL PROBLEMS: FAGR\_WILL\_CORR2-50 14:28 Tue 24 Oct 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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1409A 1911 to 2016 106 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

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1950 1999 9 -.12 .06 .17 -.10 -.13 -.01 .18 -.27 .14 .03 .28|-.18 -.03 -.08 -.17 .04 .02 -.04 -.04 .38\*-.04

[B] Entire series, effect on correlation ( .415) is:

Lower 1966> -.025 1977< -.020 1957< -.015 1980< -.014 1936> -.012 2002> -.011 Higher 2006 .029 1915 .014

1950 to 1999 segment:

Lower 1966> -.068 1977< -.035 1980< -.030 1978< -.022 1973> -.020 1990< -.018 Higher 1957 .102 1958 .037

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

1957 -6.9 SD

1409A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 43 52 62 40 61 35 27 29 30

1920 49 66 61 38 41 35 32 30 22 14

1930 22 29 31 32 74 16 6 76 154 297

1940 235 238 308 276 220 232 205 193 183 163

1950 221 239 228 245 223 182 161 77 202 195

1960 195 190 133 145 144 112 118 118 94 109

1970 94 136 137 110 57 65 75 37 43 44

1980 46 53 71 76 104 114 118 119 134 153

1990 127 163 175 128 163 157 187 148 178 196

2000 181 162 244 188 206 225 158 160 209 202

2010 181 206 191 195 282 353 253

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

1409B 1906 to 2016 111 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

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

1925 1974 9 -.08 -.05 .05 -.22 -.20 -.05 -.04 -.24 -.03 .12 .30|-.09 .00 -.03 .03 .14 .03 .14 .10 .40\*-.09

1950 1999 9 -.09 .12 .15 -.21 -.17 .05 .09 -.29 .11 .11 .24|-.22 -.01 -.14 -.05 -.05 .00 -.02 -.02 .39\* .01

1967 2016 0 .13 -.06 .09 .00 -.17 -.07 .10 -.16 .06 -.07 .31\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .383) is:

Lower 1957< -.038 1974< -.020 1973> -.017 1990< -.012 1995> -.010 1966> -.008 Higher 2006 .022 1936 .012

1925 to 1974 segment:

Lower 1957< -.045 1974< -.032 1973> -.028 1966> -.016 1958< -.008 1931< -.006 Higher 1936 .019 1972 .011

1950 to 1999 segment:

Lower 1973> -.037 1974< -.028 1966> -.026 1990< -.022 1995> -.022 1976> -.017 Higher 1957 .122 1975 .017

1967 to 2016 segment:

Lower 1974< -.063 1973> -.051 1990< -.038 1995> -.030 1976> -.022 1978< -.020 Higher 2006 .091 2003 .050

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

1956 1957 -4.9 SD

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

1936 -5.629 27 9

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

1957 -7.9 SD

1409B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1906 60 43 65 60

1910 46 32 51 59 50 66 46 28 43 44

1920 47 71 48 39 31 30 36 26 15 17

1930 18 27 30 30 79 50 0 104 179 303

1940 216 247 270 271 262 243 234 217 188 195

1950 209 217 201 178 211 184 169 31 105 172

1960 179 198 123 146 126 114 96 93 94 97

1970 111 140 147 139 31 12 76 66 61 64

1980 69 62 101 85 92 77 94 109 132 136

1990 121 162 167 151 197 207 214 171 202 205

2000 198 229 259 199 257 249 185 220 204 267

2010 228 245 236 193 209 220 214

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1410A 1921 to 2016 96 years Series 3

[B] Entire series, effect on correlation ( .368) is:

Lower 1936> -.028 1972< -.009 2003> -.009 1966> -.009 1995> -.008 1978< -.008 Higher 2006 .048 1957 .013

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

1936 1937 -4.3 SD

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

1981 -4.8 SD; 2006 -5.1 SD

1410A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 30 71 86 64 53 25 7 31 31

1930 33 26 28 28 25 31 23 17 11 68

1940 78 112 128 109 107 93 173 212 196 180

1950 228 237 181 186 184 162 138 70 128 83

1960 64 82 55 54 67 55 55 73 124 185

1970 199 196 131 111 140 134 141 159 134 103

1980 151 50 142 121 256 250 302 258 289 396

1990 343 431 417 358 358 378 312 248 345 296

2000 282 269 308 279 317 372 134 243 200 289

2010 271 295 306 236 239 247 191

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1410B 1921 to 2016 96 years Series 4

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

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1950 1999 -8 -.22 .06 .27\*-.10 .13 .01 -.05 -.17 -.03 -.03 .06| .03 -.18 .25 .00 .11 .03 -.05 -.10 .01 .14

[B] Entire series, effect on correlation ( .336) is:

Lower 1966> -.038 2014< -.018 1945< -.018 1990< -.017 1978< -.017 2013> -.016 Higher 2006 .067 1936 .045

1950 to 1999 segment:

Lower 1966> -.069 1990< -.051 1978< -.049 1982< -.023 1970> -.016 1961< -.014 Higher 1957 .086 1998 .046

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

2005 2006 -4.8 SD

1410B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 34 73 93 63 52 29 38 28 20

1930 30 46 37 37 28 24 8 41 48 64

1940 53 81 107 131 156 83 183 168 209 250

1950 293 267 211 203 157 146 154 80 116 101

1960 85 70 55 43 90 63 96 134 134 153

1970 166 142 147 134 122 120 117 114 82 109

1980 133 74 78 133 248 266 312 315 396 389

1990 269 328 278 298 303 307 268 220 349 344

2000 311 315 277 229 340 337 135 212 201 213

2010 239 248 239 264 189 193 132

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1411A 1872 to 2016 145 years Series 5

[B] Entire series, effect on correlation ( .632) is:

Lower 1872> -.024 1956> -.012 1938> -.009 1874< -.008 2006> -.008 1942< -.008 Higher 1936 .114 2003 .009

1411A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1872 110 104 59 52 49 47 42 47

1880 32 33 15 14 14 18 19 14 15 31

1890 25 13 37 18 35 29 35 30 12 13

1900 27 9 41 46 34 17 31 20 40 46

1910 67 65 75 114 109 106 76 34 22 18

1920 42 37 69 45 56 52 49 48 36 37

1930 47 69 100 86 118 114 14 145 201 172

1940 138 147 139 186 175 164 164 220 245 223

1950 274 288 229 212 238 218 275 216 272 200

1960 200 212 167 186 195 179 151 162 152 195

1970 141 141 188 107 153 162 123 142 200 180

1980 210 176 181 232 224 192 118 173 151 165

1990 214 174 148 146 135 133 122 164 178 163

2000 165 147 151 118 211 200 158 122 158 178

2010 198 166 157 157 202 198 153

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1411B 1874 to 2016 143 years Series 6

[B] Entire series, effect on correlation ( .654) is:

Lower 2006> -.036 1969< -.017 1942< -.010 1968> -.006 1911> -.006 1914> -.006 Higher 1936 .117 2003 .012

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

1936 -4.8 SD

1411B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1874 85 87 65 64 60 61

1880 47 69 30 22 28 28 33 20 21 43

1890 46 29 44 24 61 47 50 35 20 21

1900 23 19 48 44 30 23 25 17 38 25

1910 55 78 102 149 135 155 102 55 44 21

1920 62 47 73 44 68 49 44 65 61 42

1930 68 86 80 84 130 129 20 168 166 234

1940 157 190 164 224 253 230 221 249 272 223

1950 311 253 228 228 244 244 242 184 225 199

1960 211 206 190 229 200 199 167 190 213 144

1970 196 222 189 138 135 132 132 182 191 225

1980 261 196 244 238 268 180 164 167 173 174

1990 197 163 167 176 198 147 178 189 230 250

2000 158 119 155 93 198 213 225 151 157 171

2010 148 132 148 167 261 240 137

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1412A 1870 to 2016 147 years Series 7

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

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1967 2016 0 .02 -.09 -.12 .03 .17 .01 .03 .00 .12 -.22 .33\* - - - - - - - - - -

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

Lower 2003> -.017 1894< -.015 1872> -.014 1933< -.011 1996< -.011 1893> -.010 Higher 1936 .026 1902 .016

1967 to 2016 segment:

Lower 2003> -.062 1977< -.024 1986> -.020 1972< -.016 2001> -.013 1996< -.012 Higher 2004 .025 1995 .023

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

1933 -.389 26 1 >> WARNING: Ring is not usually narrow

1936 -5.629 27 9

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

1996 -5.4 SD

1412A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1870 137 142 187 180 190 163 185 186 71 110

1880 100 60 22 16 18 11 8 12 9 10

1890 33 21 9 18 8 22 18 25 19 15

1900 21 19 71 58 37 19 21 17 33 34

1910 42 35 56 87 53 77 33 9 22 24

1920 46 48 60 43 49 27 31 36 34 33

1930 35 34 38 0 27 36 0 33 16 16

1940 12 19 147 189 226 289 268 210 232 203

1950 246 249 232 223 276 246 214 184 275 313

1960 303 317 234 248 245 216 189 206 162 155

1970 144 161 146 145 189 164 140 118 133 114

1980 135 99 128 112 121 120 139 152 128 131

1990 113 98 95 101 114 83 58 105 113 107

2000 120 160 149 158 197 274 175 140 166 181

2010 175 118 103 89 157 161 147

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1412B 1873 to 2016 144 years Series 8

[B] Entire series, effect on correlation ( .538) is:

Lower 2003> -.033 2009< -.019 2004< -.014 1891> -.012 1992< -.011 1973< -.011 Higher 1936 .050 1966 .029

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

1936 -5.629 27 9

1938 -.982 27 1

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

1973 -5.4 SD

1412B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1873 187 164 164 122 96 46 48

1880 50 33 11 7 8 9 9 11 8 10

1890 22 21 10 14 9 24 23 31 17 15

1900 20 19 53 62 41 24 25 15 32 29

1910 28 29 51 97 65 127 53 14 30 30

1920 25 40 51 66 34 44 18 30 31 33

1930 24 30 49 49 42 55 0 62 0 18

1940 16 34 213 257 292 325 250 262 277 292

1950 336 307 275 265 326 279 227 224 299 280

1960 339 314 274 279 249 250 165 184 159 169

1970 150 181 184 110 168 173 158 203 224 192

1980 242 174 183 160 157 169 158 150 145 124

1990 166 128 98 93 90 77 73 100 98 75

2000 77 56 57 79 62 67 47 100 81 53

2010 70 48 77 69 109 121 81

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1413A 1879 to 2016 138 years Series 9

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

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1950 1999 -5 .00 .06 .01 .15 -.03 .32\*-.12 -.15 .13 -.18 .28|-.19 .28 -.21 .13 -.15 .04 -.07 .09 -.25 .13

[B] Entire series, effect on correlation ( .512) is:

Lower 1971< -.035 1957> -.021 1882> -.015 1892< -.013 1951< -.012 1902< -.009 Higher 1936 .026 1883 .018

1950 to 1999 segment:

Lower 1971< -.104 1957> -.064 1951< -.036 1976> -.011 1950< -.010 1999< -.009 Higher 1966 .047 1993 .028

1413A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1879 112

1880 127 113 110 48 38 49 78 68 39 29

1890 37 32 18 30 31 52 48 41 30 22

1900 37 37 35 45 44 25 14 13 14 65

1910 73 57 77 121 84 133 88 38 85 40

1920 59 52 71 49 59 77 49 63 42 39

1930 29 49 47 35 57 46 10 36 51 90

1940 79 88 199 349 370 341 311 276 278 239

1950 218 169 212 190 210 247 240 280 275 287

1960 240 270 200 267 232 253 181 159 102 183

1970 142 78 106 82 116 106 124 211 230 176

1980 174 111 130 83 80 84 95 92 111 123

1990 133 133 116 71 68 56 40 74 76 62

2000 51 45 58 52 117 147 83 104 124 141

2010 109 75 75 62 102 73 60

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1413B 1875 to 2016 142 years Series 10

[B] Entire series, effect on correlation ( .524) is:

Lower 1902< -.045 1958< -.014 1884> -.010 1957> -.010 1990< -.009 2016> -.008 Higher 1966 .047 2006 .013

1413B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1875 174 185 175 170 153

1880 166 91 74 52 127 95 66 64 43 34

1890 25 15 42 35 58 48 46 30 38 15

1900 26 34 21 43 39 39 47 26 62 52

1910 65 55 87 105 62 90 45 19 44 35

1920 86 86 116 68 114 103 100 72 69 57

1930 50 94 73 46 57 43 10 61 48 72

1940 74 59 138 243 301 316 288 335 266 235

1950 289 286 279 318 299 255 202 251 233 257

1960 261 242 238 245 240 263 171 211 179 250

1970 215 198 175 159 200 161 146 182 222 145

1980 198 198 226 179 181 181 179 160 127 157

1990 120 118 140 85 101 91 83 100 138 110

2000 114 92 62 52 79 86 49 76 137 142

2010 69 73 128 96 133 144 171

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1844A 1871 to 2016 146 years Series 11

[B] Entire series, effect on correlation ( .646) is:

Lower 1966> -.034 1907> -.014 1976> -.011 2016> -.010 1888> -.008 1988> -.008 Higher 1936 .061 2006 .013

1844A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1871 71 43 53 57 66 51 42 29 30

1880 24 23 12 6 13 9 14 7 8 9

1890 8 4 6 7 16 9 9 5 5 6

1900 13 17 44 49 28 26 26 52 54 52

1910 65 52 89 123 100 116 73 49 65 35

1920 80 71 97 79 93 64 47 52 52 56

1930 53 71 71 66 82 81 16 76 101 188

1940 111 132 229 326 362 302 237 242 187 209

1950 201 216 154 174 240 187 163 111 136 108

1960 117 123 61 75 68 89 103 133 136 150

1970 148 144 137 58 83 43 103 101 116 85

1980 106 88 102 82 78 96 98 118 164 123

1990 147 126 176 115 164 162 200 118 146 214

2000 149 135 152 65 123 129 40 26 39 50

2010 34 35 35 34 54 87 94

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1844B 1873 to 2016 144 years Series 12

[B] Entire series, effect on correlation ( .514) is:

Lower 1892< -.023 1964< -.014 1904< -.014 1891> -.013 1897< -.012 1873< -.011 Higher 1936 .055 2006 .027

1844B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1873 39 52 54 70 54 45 26

1880 29 22 15 12 15 12 11 12 7 8

1890 7 9 5 4 8 9 9 6 11 11

1900 25 38 44 53 26 34 34 52 56 67

1910 95 65 104 140 102 188 141 91 110 74

1920 121 107 113 69 90 70 40 52 59 71

1930 61 73 90 65 78 62 9 43 65 134

1940 75 101 242 357 397 248 269 240 162 205

1950 188 180 126 138 209 149 183 156 155 120

1960 104 115 107 118 74 71 66 112 96 105

1970 104 154 194 130 204 133 183 175 201 151

1980 200 132 102 94 145 203 203 172 153 107

1990 102 95 164 90 105 107 120 76 85 135

2000 68 102 168 84 195 219 58 89 67 39

2010 41 93 200 128 196 218 167

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1845A 1960 to 2016 57 years Series 13

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

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1960 2009 -9 -.08 .36\*-.11 -.11 -.05 .07 -.33 -.07 .28 -.09 .32| .14 .01 -.19 .03 -.09 -.13 -.09 - - -

[B] Entire series, effect on correlation ( .336) is:

Lower 1966> -.023 1973> -.021 1984< -.020 1968< -.017 1982< -.016 1996> -.011 Higher 2006 .035 1980 .023

1960 to 2009 segment:

Lower 1984< -.023 1973> -.022 1966> -.021 1968< -.021 1982< -.018 1996> -.012 Higher 2006 .042 1980 .027

1845A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1960 207 198 151 153 123 112 119 146 105 149

1970 183 177 203 203 240 169 163 227 200 203

1980 242 210 171 235 174 141 114 125 151 144

1990 173 144 123 90 111 118 190 185 223 267

2000 247 203 110 88 110 108 59 83 138 196

2010 248 245 197 102 137 143 135

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1845B 1960 to 2016 57 years Series 14

[B] Entire series, effect on correlation ( .387) is:

Lower 1961< -.131 2004< -.022 1984< -.018 2003> -.017 1968> -.015 1962> -.010 Higher 2006 .081 1966 .074

1845B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1960 98 76 112 148 177 254 190 253 319 398

1970 291 235 217 175 208 172 175 304 323 282

1980 227 178 151 152 120 107 105 120 164 155

1990 130 129 138 118 94 58 45 95 107 104

2000 89 81 74 80 88 94 59 140 216 261

2010 298 309 347 241 270 275 251

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1846A 1936 to 2016 81 years Series 15

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

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1950 1999 7 .03 -.08 .00 .07 -.26 -.09 -.09 .03 -.09 -.10 .27|-.13 .06 -.02 -.20 -.06 .03 .34\*-.09 .09 .23

[B] Entire series, effect on correlation ( .469) is:

Lower 1986< -.073 2003> -.017 1960< -.015 1959< -.012 1942< -.011 1973> -.010 Higher 1936 .086 2006 .049

1950 to 1999 segment:

Lower 1986< -.082 1973> -.020 1960< -.019 1975> -.018 1957> -.016 1959< -.016 Higher 1966 .018 1951 .015

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

1986 -4.8 SD

1846A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1936 36 125 134 201

1940 143 133 138 233 204 214 232 283 272 225

1950 221 285 269 239 283 269 225 247 293 210

1960 169 276 255 264 245 285 256 436 386 418

1970 389 465 468 413 311 375 365 433 337 279

1980 311 269 254 239 218 184 103 128 143 164

1990 164 166 173 130 124 99 82 94 99 119

2000 75 68 63 66 79 76 37 55 79 64

2010 71 79 83 60 64 52 58

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1846B 1933 to 2016 84 years Series 16

[B] Entire series, effect on correlation ( .664) is:

Lower 2014< -.017 1973> -.016 2003> -.014 1933> -.011 2015< -.011 1986< -.011 Higher 1936 .131 1966 .039

1846B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1933 120 68 135 22 103 116 156

1940 125 150 180 255 218 232 234 243 228 157

1950 173 222 161 187 236 213 207 212 257 255

1960 215 228 207 229 199 242 174 288 229 287

1970 306 356 387 384 386 387 387 470 497 306

1980 328 304 279 231 214 203 129 157 168 212

1990 239 204 193 153 122 121 97 96 117 122

2000 83 79 78 69 85 109 39 44 76 87

2010 84 83 107 88 55 38 64

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1846C 1931 to 2016 86 years Series 17

[B] Entire series, effect on correlation ( .530) is:

Lower 1953< -.022 2013< -.021 2003> -.021 1960< -.019 2016> -.017 1976> -.014 Higher 1936 .154 2006 .022

1846C Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1931 214 215 128 83 146 30 81 100 125

1940 105 103 121 178 115 122 116 114 116 113

1950 153 144 109 77 96 152 126 105 146 135

1960 102 129 106 180 149 166 150 208 177 184

1970 178 236 244 185 222 218 285 313 277 227

1980 266 182 185 208 110 38 16 22 22 26

1990 33 33 49 46 51 60 57 75 81 117

2000 50 64 76 57 53 39 20 30 49 59

2010 60 63 96 34 80 68 102

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1847A 1959 to 2016 58 years Series 18

[B] Entire series, effect on correlation ( .375) is:

Lower 2008< -.048 2003> -.042 2005< -.041 1973> -.034 1978< -.025 1977< -.021 Higher 2006 .116 1966 .026

1847A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1959 205

1960 252 221 200 199 186 165 129 148 118 124

1970 144 249 239 249 243 188 179 126 113 120

1980 140 118 155 138 178 175 175 203 163 197

1990 218 204 219 153 149 154 154 144 184 197

2000 152 154 143 143 169 118 77 121 86 98

2010 118 106 110 139 183 194 172

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1847B 1951 to 2016 66 years Series 19

[B] Entire series, effect on correlation ( .540) is:

Lower 1952< -.047 1957> -.038 2006> -.029 1963< -.029 2015< -.015 1956> -.008 Higher 2003 .036 1973 .017

1847B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1951 304 245 270 271 262 258 252 255 206

1960 215 217 184 132 144 126 116 126 131 140

1970 134 180 219 148 219 166 140 164 208 202

1980 248 188 238 209 193 177 175 174 139 147

1990 191 178 166 107 96 83 79 108 133 154

2000 103 99 89 78 141 177 169 206 202 278

2010 228 255 274 242 306 264 242

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1848A1 1960 to 2016 57 years Series 20

[B] Entire series, effect on correlation ( .634) is:

Lower 1976< -.055 2007< -.018 1995> -.011 1970> -.010 1977< -.009 1993> -.009 Higher 2006 .061 1966 .048

1848A1 Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1960 426 423 326 276 286 317 225 254 281 276

1970 292 323 321 257 230 233 165 189 255 209

1980 272 213 211 255 223 205 190 239 209 240

1990 265 217 234 216 217 215 188 266 283 283

2000 193 150 141 112 210 191 71 64 117 179

2010 197 162 193 198 270 315 274

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1848A2 1898 to 1957 60 years Series 21

[B] Entire series, effect on correlation ( .719) is:

Lower 1899> -.027 1914< -.023 1933< -.022 1898> -.014 1955< -.009 1939< -.008 Higher 1936 .126 1902 .013

1848A2 Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1898 68 64

1900 43 38 79 87 70 33 28 17 33 34

1910 31 36 51 90 51 63 32 18 33 47

1920 100 136 175 158 157 122 106 101 96 71

1930 94 111 173 105 141 115 29 97 174 180

1940 170 235 395 445 450 470 454 509 441 457

1950 515 482 426 463 523 465 411 396

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1848B 1907 to 2016 110 years Series 22

[B] Entire series, effect on correlation ( .611) is:

Lower 1976< -.036 1973> -.032 2009< -.028 2003> -.014 2007< -.012 1956< -.010 Higher 1936 .085 2006 .020

1848B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1907 17 43 35

1910 40 41 62 132 75 131 65 23 36 39

1920 93 96 167 101 85 60 62 74 79 68

1930 86 109 157 81 128 115 25 108 117 134

1940 135 197 385 388 383 376 326 372 310 344

1950 369 371 354 369 414 343 254 297 442 405

1960 316 333 279 228 243 244 210 222 205 214

1970 199 211 214 233 190 192 143 166 195 159

1980 151 146 130 131 112 100 120 114 110 96

1990 140 128 133 86 65 57 55 78 84 97

2000 84 59 61 60 91 121 49 25 51 30

2010 92 102 125 100 149 157 156

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

1849A 1882 to 2016 135 years Series 23

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

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

1950 1999 -7 .14 .03 .16 .40\*-.17 .03 .17 -.15 -.01 -.08 .37|-.12 .12 .09 -.25 -.15 .00 -.06 .02 -.01 -.05

1967 2016 0 .28 -.19 .08 .29 -.07 -.04 -.03 -.09 .03 -.08 .33\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .404) is:

Lower 2006> -.038 1926> -.014 1882> -.014 1967< -.012 1957> -.010 1962> -.010 Higher 1936 .021 1902 .020

1950 to 1999 segment:

Lower 1957> -.037 1962> -.032 1967< -.028 1998< -.022 1999< -.018 1976> -.013 Higher 1973 .046 1966 .036

1967 to 2016 segment:

Lower 2006> -.126 1967< -.023 1998< -.018 2000> -.015 2011> -.015 1999< -.015 Higher 1973 .060 2004 .023

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

1936 -5.629 27 9

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

1973 -4.6 SD

1849A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1882 81 62 56 86 79 33 52 77

1890 33 22 22 15 32 21 27 19 7 24

1900 20 15 105 55 40 24 74 52 57 40

1910 39 15 15 75 42 57 24 8 25 15

1920 32 19 49 16 30 31 52 37 24 17

1930 15 14 36 29 37 27 0 18 22 68

1940 52 86 229 269 272 312 222 211 171 134

1950 188 226 225 229 240 253 302 302 370 377

1960 328 294 315 292 245 271 199 165 214 211

1970 143 185 199 107 107 125 137 159 139 120

1980 129 89 117 71 89 78 70 98 71 88

1990 97 109 98 67 53 47 49 54 54 51

2000 79 67 82 71 104 91 123 114 108 121

2010 137 171 142 122 139 193 121

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

1849B 1885 to 2016 132 years Series 24

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

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

1967 2016 -2 -.03 .12 -.06 -.03 -.01 -.01 .21 -.12 .32\*-.44 .27| - - - - - - - - - -

[B] Entire series, effect on correlation ( .568) is:

Lower 2005< -.039 1970< -.023 1957> -.015 2006> -.015 1992< -.012 1976> -.010 Higher 1966 .045 1936 .042

1967 to 2016 segment:

Lower 2005< -.088 1992< -.031 2006> -.026 1976> -.025 2013> -.020 1990< -.017 Higher 2014 .036 1980 .031

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

1936 -5.629 27 9

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

1970 -6.0 SD

1849B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1885 76 54 22 37 71

1890 53 23 28 13 32 32 59 37 17 30

1900 23 34 93 69 46 32 24 18 37 30

1910 46 25 41 103 56 87 35 14 38 22

1920 53 58 99 56 42 21 29 33 34 25

1930 27 32 40 32 43 43 0 35 54 73

1940 61 117 255 195 209 270 182 201 132 174

1950 211 243 230 228 233 191 252 249 259 186

1960 236 248 197 187 224 274 139 190 168 160

1970 111 167 187 170 170 141 172 154 172 135

1980 181 140 143 115 146 129 117 152 86 78

1990 69 58 46 41 64 43 58 80 101 83

2000 86 87 85 86 122 83 108 144 144 154

2010 155 157 168 184 218 203 211

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1850A 1867 to 2016 150 years Series 25

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

Lower 1869< -.025 1913< -.014 1918< -.014 2012< -.011 2006> -.011 1870> -.010 Higher 1936 .079 2003 .022

1850A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1867 191 150 145

1870 198 233 198 244 198 254 177 261 183 222

1880 197 185 151 135 132 179 164 184 173 193

1890 183 189 230 178 216 164 192 187 178 134

1900 138 149 194 171 184 130 141 117 119 141

1910 115 92 80 89 81 136 125 102 68 70

1920 116 120 120 95 142 146 118 95 139 152

1930 157 209 208 140 128 108 37 121 191 304

1940 191 209 284 297 270 215 191 231 191 234

1950 291 378 347 310 312 247 214 228 335 345

1960 351 355 307 288 266 247 220 256 235 247

1970 234 249 277 259 233 259 199 243 333 284

1980 315 256 220 254 230 218 249 245 204 194

1990 266 205 232 193 219 166 189 169 161 149

2000 122 125 140 94 180 162 152 154 175 213

2010 200 163 133 168 170 169 154

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1850B 1870 to 2016 147 years Series 26

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

Lower 1872< -.024 1922< -.019 2006> -.015 1903< -.009 2014< -.008 1962> -.006 Higher 1936 .112 2003 .012

1850B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1870 216 239 127 193 212 244 202 226 206 209

1880 204 230 130 105 119 184 186 184 138 165

1890 168 156 177 122 171 163 191 169 143 120

1900 115 123 135 108 122 98 103 83 83 96

1910 95 86 82 103 81 106 101 84 98 64

1920 108 136 85 61 81 99 94 80 93 113

1930 110 141 148 146 135 162 43 150 156 153

1940 146 122 186 246 254 297 260 295 285 265

1950 296 298 314 280 313 265 245 236 348 346

1960 339 372 342 334 309 363 269 262 274 268

1970 277 269 269 211 188 206 138 187 245 234

1980 306 233 192 199 170 153 131 191 170 189

1990 232 176 185 152 124 109 102 148 150 148

2000 122 151 129 87 167 183 155 160 197 202

2010 166 122 152 130 128 140 135

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1851A 1921 to 2016 96 years Series 27

[B] Entire series, effect on correlation ( .550) is:

Lower 1936> -.091 2006> -.051 1923> -.014 1988< -.013 1924< -.013 1994< -.005 Higher 1966 .061 2003 .029

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

1936 1937 -4.1 SD

1851A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 57 54 76 43 45 23 36 25 42

1930 56 57 55 49 39 40 35 24 37 90

1940 51 71 255 243 276 242 215 245 200 174

1950 213 203 196 214 240 214 217 170 259 222

1960 200 188 168 153 139 126 90 107 113 137

1970 124 152 167 138 143 143 141 164 211 177

1980 197 171 208 166 176 144 140 145 108 120

1990 139 115 120 93 78 58 66 58 67 55

2000 65 43 52 25 63 58 90 71 107 109

2010 88 84 63 58 69 88 57

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1851B 1914 to 2016 103 years Series 28

[B] Entire series, effect on correlation ( .523) is:

Lower 2006> -.035 1915< -.018 1989< -.016 1957> -.013 1917> -.012 1962> -.009 Higher 1966 .061 2003 .023

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

1966 -4.6 SD

1851B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1914 46 43 39 48 46 40

1920 62 66 113 66 73 47 62 48 53 61

1930 68 71 94 66 70 54 3 33 36 72

1940 66 78 369 265 344 317 278 334 303 244

1950 234 240 231 210 306 324 330 331 381 368

1960 308 366 336 306 256 309 185 237 263 278

1970 274 296 280 238 299 242 199 235 273 199

1980 229 215 244 199 214 145 162 159 145 108

1990 187 128 151 137 158 122 138 110 131 116

2000 116 130 132 56 144 112 160 160 165 207

2010 113 131 128 156 184 240 161

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1852A 1865 to 2016 152 years Series 29

[\*] Early part of series cannot be checked from 1865 to 1866 -- not matched by another series

[B] Entire series, effect on correlation ( .559) is:

Lower 2006> -.031 1869> -.025 1868> -.010 1944< -.008 1878> -.008 1943< -.008 Higher 2003 .020 1966 .019

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

1936 -5.629 27 9

1940 -1.168 27 2

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

1869 +3.4 SD; 1966 -6.6 SD

1852A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1865 114 84 65 66 94

1870 55 61 56 80 69 67 37 51 62 39

1880 28 27 17 10 15 14 22 19 10 22

1890 20 8 15 8 13 14 20 22 19 19

1900 24 31 63 47 43 28 25 16 21 26

1910 26 16 24 51 44 40 27 10 14 18

1920 18 22 33 20 24 21 10 11 13 11

1930 9 13 11 8 14 15 0 12 9 17

1940 0 14 25 33 25 77 98 156 154 174

1950 244 251 219 200 286 269 265 213 278 247

1960 266 286 282 247 222 256 145 222 257 279

1970 224 219 208 205 244 200 196 224 275 226

1980 242 203 245 190 198 159 158 161 152 141

1990 205 167 180 131 131 110 152 117 142 112

2000 95 89 100 47 124 106 128 104 137 130

2010 110 96 88 79 94 95 79

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1852B 1880 to 2016 137 years Series 30

[B] Entire series, effect on correlation ( .535) is:

Lower 2006> -.030 1891< -.029 1943< -.014 1942< -.008 1977< -.008 1973> -.007 Higher 1966 .042 2003 .018

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

1936 -5.629 27 9

1940 -1.168 27 2

1852B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1880 31 28 21 12 15 23 34 23 14 24

1890 25 5 22 17 24 24 45 47 30 30

1900 44 52 85 76 66 44 45 27 37 33

1910 30 18 25 59 30 36 28 10 19 13

1920 20 23 33 14 30 7 10 8 15 10

1930 16 30 22 17 19 25 0 11 13 23

1940 0 20 22 16 27 89 102 170 178 176

1950 222 267 194 144 249 260 225 210 290 307

1960 282 296 285 220 186 209 146 246 273 317

1970 252 258 237 236 268 186 186 176 199 171

1980 218 191 226 195 230 175 188 174 144 138

1990 164 129 134 133 125 106 90 114 105 87

2000 106 88 69 50 135 103 115 79 112 120

2010 78 63 91 90 133 100 65

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1853A 1883 to 2016 134 years Series 31

[B] Entire series, effect on correlation ( .573) is:

Lower 2006> -.031 2015< -.014 1891> -.014 1889< -.011 1895< -.009 1884> -.008 Higher 2003 .019 1902 .012

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

1936 -5.629 27 9

1853A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1883 54 95 83 91 84 67 55

1890 67 102 140 102 97 63 79 104 89 63

1900 93 98 136 106 96 81 77 67 82 61

1910 76 55 64 99 62 110 93 61 85 57

1920 85 69 50 47 55 30 27 24 27 22

1930 30 59 59 47 51 29 0 20 42 63

1940 47 51 175 289 305 226 169 170 189 214

1950 264 233 181 169 199 187 148 116 157 106

1960 89 96 67 99 90 84 73 100 110 95

1970 89 102 118 77 92 89 89 115 130 115

1980 128 94 136 135 180 160 177 158 146 106

1990 145 112 128 110 107 92 116 112 133 148

2000 121 154 137 85 198 183 195 182 187 256

2010 190 186 202 166 206 166 176

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1853B 1881 to 2016 136 years Series 32

[B] Entire series, effect on correlation ( .611) is:

Lower 2006> -.029 1883> -.025 1886< -.013 1882> -.011 1964> -.008 1993> -.007 Higher 1936 .055 1966 .023

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

1936 -5.629 27 9

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

1883 +3.1 SD

1853B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1881 35 30 33 21 30 15 18 22 30

1890 39 42 60 39 80 57 74 82 85 54

1900 77 84 112 89 71 68 74 53 63 43

1910 86 46 52 64 46 72 55 44 65 38

1920 59 41 43 28 42 25 20 34 29 18

1930 32 75 68 65 76 53 0 34 80 133

1940 67 78 180 266 311 204 156 233 200 181

1950 247 232 184 161 160 126 116 143 187 154

1960 133 156 114 128 166 120 86 105 104 105

1970 117 147 194 139 147 133 162 190 188 174

1980 175 171 194 182 203 154 139 160 153 137

1990 175 166 177 182 177 148 196 191 249 184

2000 163 159 160 99 248 221 259 318 287 325

2010 231 217 245 235 313 363 270

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PART 7: DESCRIPTIVE STATISTICS: FAGR\_WILL\_CORR2-50 14:28 Tue 24 Oct 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 1409A 1911 2016 106 4 1 .415 1.33 3.53 .800 .887 .236 2.51 .312 -.035 1

2 1409B 1906 2016 111 4 3 .383 1.31 3.03 .803 .899 .262 2.34 .267 .021 1

3 1410A 1921 2016 96 4 0 .368 1.68 4.31 1.115 .899 .266 2.27 .276 -.064 2

4 1410B 1921 2016 96 4 1 .336 1.61 3.96 1.022 .899 .250 2.36 .286 -.082 1

5 1411A 1872 2016 145 6 0 .632 1.19 2.88 .750 .909 .257 2.44 .297 -.045 1

6 1411B 1874 2016 143 6 0 .654 1.34 3.11 .796 .890 .256 2.45 .273 -.063 1

7 1412A 1870 2016 147 6 1 .470 1.11 3.17 .833 .931 .312 2.84 .440 -.015 1

8 1412B 1873 2016 144 6 0 .538 1.10 3.39 .949 .940 .319 2.65 .384 -.052 1

9 1413A 1879 2016 138 5 1 .512 1.09 3.70 .816 .913 .283 2.66 .500 -.023 1

10 1413B 1875 2016 142 5 0 .524 1.27 3.35 .824 .919 .281 2.46 .348 -.059 1

11 1844A 1871 2016 146 6 0 .646 .91 3.62 .685 .882 .292 2.61 .455 -.063 1

12 1844B 1873 2016 144 6 0 .514 1.03 3.97 .719 .815 .313 2.81 .523 -.042 1

13 1845A 1960 2016 57 2 1 .336 1.63 2.66 .498 .693 .203 2.66 .554 .000 1

14 1845B 1960 2016 57 2 0 .387 1.77 3.98 .866 .864 .204 2.66 .516 -.035 2

15 1846A 1936 2016 81 3 1 .469 2.02 4.68 1.145 .919 .180 2.41 .410 .047 1

16 1846B 1933 2016 84 3 0 .664 1.90 4.97 1.023 .905 .214 2.41 .418 -.102 1

17 1846C 1931 2016 86 3 0 .530 1.18 3.13 .699 .854 .274 2.63 .458 -.054 1

18 1847A 1959 2016 58 2 0 .375 1.64 2.52 .428 .739 .153 2.64 .501 .020 1

19 1847B 1951 2016 66 2 0 .540 1.84 3.06 .597 .829 .153 2.60 .512 -.037 1

20 1848A1 1960 2016 57 2 0 .634 2.32 4.26 .689 .759 .176 2.48 .486 .073 1

21 1848A2 1898 1957 60 3 0 .719 1.87 5.23 1.715 .969 .284 2.59 .478 .002 2

22 1848B 1907 2016 110 4 0 .611 1.60 4.42 1.101 .926 .250 2.65 .431 .012 1

23 1849A 1882 2016 135 5 2 .404 1.06 3.77 .896 .935 .348 2.75 .384 -.017 1

24 1849B 1885 2016 132 5 1 .568 1.08 2.74 .746 .894 .325 2.60 .374 -.047 1

25 1850A 1867 2016 150 6 0 .541 1.94 3.78 .667 .821 .174 2.66 .438 .020 1

26 1850B 1870 2016 147 6 0 .649 1.78 3.72 .742 .878 .171 2.39 .285 -.030 1

27 1851A 1921 2016 96 4 0 .550 1.21 2.76 .685 .897 .214 2.75 .442 -.010 3

28 1851B 1914 2016 103 4 0 .523 1.76 3.81 1.000 .875 .235 2.66 .358 -.009 2

29 1852A 1865 2016 152 6 0 .559 1.00 2.86 .886 .953 .300 2.50 .267 -.067 1

30 1852B 1880 2016 137 5 0 .535 1.03 3.17 .895 .944 .343 2.60 .413 -.022 1

31 1853A 1883 2016 134 5 0 .573 1.12 3.05 .584 .851 .254 2.60 .394 -.064 1

32 1853B 1881 2016 136 5 0 .611 1.26 3.63 .803 .895 .271 2.58 .428 .004 1

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Total or mean: 3596 139 12 .532 1.36 5.23 .829 .889 .261 2.84 .392 -.030

- = [ COFECHA FAGR COF ] = -