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[] P R O G R A M C O F E C H A Version 6.06P 30714

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: TSCA\_GG\_ORIGINAL-50

File of DATED series: TSCA\_GG.RWL

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 1776 to 2012 237 years

Continuous time span is 1776 to 2012 237 years

Portion with two or more series is 1846 to 2012 167 years

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

\*C\* Number of dated series 48 \*C\*

\*O\* Master series 1776 2012 237 yrs \*O\*

\*F\* Total rings in all series 4764 \*F\*

\*E\* Total dated rings checked 4694 \*E\*

\*C\* Series intercorrelation .622 \*C\*

\*H\* Average mean sensitivity .258 \*H\*

\*A\* Segments, possible problems 4 \*A\*

\*\*\* Mean length of series 99.3 \*\*\*

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

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

No ring measurements of zero value

1800 -.086 1 1850 -.342 2 1900 .034 14 1950 -.825 43 2000 -.637 45

1801 .542 1 1851 .229 2 1901 .385 14 1951 .316 43 2001 .364 45

1802 -2.129 1 1852 -.954 2 1902 .931 18 1952 .272 43 2002 -.962 45

1803 -1.666 1 1853 -.330 2 1903 1.184 19 1953 -.471 44 2003 -1.172 45

1804 -.653 1 1854 -1.285 2 1904 1.297 21 1954 .012 44 2004 -.275 45

1805 -2.225 1 1855 -.539 2 1905 1.085 22 1955 .822 44 2005 .771 45

1806 -1.585 1 1856 -.265 2 1906 .908 23 1956 -.158 44 2006 -1.156 45

1807 -.387 1 1857 .665 2 1907 -.462 24 1957 1.391 45 2007 .756 45

1808 .614 1 1858 2.024 2 1908 -1.155 24 1958 1.161 45 2008 -.189 45

1809 .686 1 1859 -.122 2 1909 -.701 26 1959 -.864 45 2009 .439 45

1810 1.709 1 1860 .116 2 1910 .271 27 1960 -1.539 45 2010 .752 45

1811 2.224 1 1861 .736 2 1911 -.907 27 1961 1.412 45 2011 -1.207 45

1812 .595 1 1862 -1.972 2 1912 .070 27 1962 -.695 45 2012 .979 45

1813 1.271 1 1863 -1.034 2 1913 .417 27 1963 .239 45

1814 .674 1 1864 -1.476 2 1914 -.556 27 1964 -.440 45

1815 .478 1 1865 -1.038 2 1915 -.409 27 1965 -.469 45

1816 -1.353 1 1866 -.363 2 1916 -.460 27 1966 .324 45

1817 1.356 1 1867 .814 2 1917 -1.436 27 1967 1.132 45

1818 -.546 1 1868 .994 2 1918 -3.362 27 1968 .244 45

1819 .484 1 1869 .950 2 1919 -1.037 27 1969 -.266 45

1820 1.169 1 1870 1.031 4 1920 -.638 28 1970 -.342 45

1821 1.446 1 1871 2.288 4 1921 .084 30 1971 .626 44

1822 .534 1 1872 -.030 4 1922 .873 30 1972 -.573 44

1823 -.898 1 1873 .215 4 1923 .790 30 1973 1.179 44

1824 -.629 1 1874 .049 4 1924 .953 33 1974 .092 45

1825 -.030 1 1875 -.320 4 1925 .224 36 1975 -.345 45

1776 1.030 1 1826 .544 1 1876 -.347 4 1926 .612 36 1976 -.335 45

1777 .950 1 1827 .929 1 1877 -.117 4 1927 .469 36 1977 -.203 45

1778 .680 1 1828 -.564 1 1878 .193 4 1928 .630 36 1978 .334 45

1779 1.308 1 1829 -2.190 1 1879 -.334 4 1929 .345 39 1979 .677 45

1780 -3.081 1 1830 -1.979 1 1880 .943 4 1930 .622 39 1980 .478 45

1781 -1.138 1 1831 -1.044 1 1881 .075 5 1931 .367 39 1981 -.908 45

1782 -1.064 1 1832 .416 1 1882 1.002 5 1932 .537 40 1982 -.404 45

1783 -1.302 1 1833 -1.187 1 1883 .221 5 1933 -.816 41 1983 .370 45

1784 -.645 1 1834 -1.544 1 1884 .837 5 1934 -.580 42 1984 -1.084 45

1785 -.786 1 1835 1.265 1 1885 -.361 5 1935 -.319 42 1985 .391 45

1786 .188 1 1836 2.143 1 1886 .346 5 1936 .259 42 1986 .099 45

1787 .286 1 1837 -.550 1 1887 -1.217 6 1937 .597 42 1987 .737 45

1788 .397 1 1838 1.266 1 1888 -.772 6 1938 .603 41 1988 -.606 45

1789 .480 1 1839 1.044 1 1889 -1.610 6 1939 -.001 41 1989 -2.244 45

1790 1.415 1 1840 1.118 1 1890 -1.994 6 1940 -.066 41 1990 -.764 45

1791 2.019 1 1841 -.221 1 1891 -2.304 7 1941 -.681 42 1991 .061 45

1792 1.766 1 1842 1.476 1 1892 -.932 7 1942 -.134 43 1992 .991 45

1793 1.781 1 1843 .494 1 1893 -.655 7 1943 -.135 44 1993 .982 45

1794 .547 1 1844 -.159 1 1894 .105 7 1944 -1.719 44 1994 -.096 45

1795 -.564 1 1845 -1.029 1 1895 -.284 7 1945 -.554 44 1995 .743 45

1796 -2.170 1 1846 1.671 2 1896 .522 8 1946 .833 44 1996 .114 45

1797 -.209 1 1847 .878 2 1897 .741 9 1947 .535 43 1997 .521 45

1798 -.740 1 1848 .587 2 1898 1.401 12 1948 -3.116 43 1998 .628 45

1799 -.005 1 1849 -.417 2 1899 -.167 13 1949 .260 43 1999 .873 45

PART 5: CORRELATION OF SERIES BY SEGMENTS: TSCA\_GG\_ORIGINAL-50 11:23 Fri 01 Feb 2019 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 1825 1850 1875 1900 1925 1950 1975

1874 1899 1924 1949 1974 1999 2024

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

1 01B 1902 2012 .63 .67 .59 .55

2 01B1 1905 2012 .61 .52 .60 .64

3 02A 1932 2012 .52 .56 .45

4 02B 1904 2012 .60 .68 .69 .35

5 03A 1929 2012 .82 .79 .82

6 03B 1904 2012 .79 .80 .64 .75

7 04A 1910 2012 .67 .60 .63 .64

8 04B 1902 2012 .64 .54 .63 .51

9 05A 1846 2012 .60 .61 .75 .76 .73 .71 .65

10 05B 1906 2012 .73 .67 .58 .64

11 06A 1870 2012 .80 .79 .89 .81 .74 .70

12 06B 1870 2012 .77 .73 .79 .79 .60 .53

13 07A 1887 2012 .70 .66 .57 .71 .77

14 07B 1898 2012 .59 .54 .38 .29A .38

15 08A 1902 2012 .71 .74 .60 .54

16 08A2S1 1974 2012 .63

17 08A2S2 1957 1970 .80

18 08A2S3 1902 1946 .53

19 08B 1898 2012 .72 .65 .70 .60 .58

20 09A 1924 2012 .55 .54 .61 .61

21 09B 1924 2012 .70 .69 .73 .76

22 10A 1925 2012 .82 .71 .66

23 11A 1953 2012 .59 .60

24 12A 1933 2012 .69 .73 .73

25 13A 1941 2012 .56 .41B .37

26 13B 1925 2012 .56 .54 .63

27 14A 1903 2012 .52 .44 .40 .48

28 14B 1899 2012 .82 .82 .72 .59 .64

29 15B 1776 2012 .46 .47 .55 .68 .69 .68 .70

30 16A 1909 2012 .42 .45 .49 .38

31 16B 1909 2012 .74 .70 .57 .29A

32 17A 1891 2012 .51 .74 .75 .56 .59

33 17B 1921 2012 .45 .66 .70 .72

34 18A 1929 2012 .58 .63 .64

35 18B 1925 2012 .66 .66 .71

36 19A 1921 2012 .51 .50 .41 .32A

37 19B 1881 2012 .63 .58 .60 .57 .54

38 20A 1942 2012 .57 .42 .42

39 20B 1934 2012 .71 .66 .51

40 21A 1924 2012 .47 .50 .59 .76

41 21B 1896 2012 .51 .66 .63 .61 .59

42 22AS1 1943 2012 .76 .66 .70

43 22AS2 1900 1937 .46

44 22B 1897 2012 .63 .77 .69 .55 .59

45 23A 1898 2012 .64 .77 .76 .54 .60

46 23B 1929 2012 .56 .56 .48

47 24A 1907 2012 .50 .51 .46 .48

48 24B 1920 2012 .50 .52 .68 .73

Av segment correlation .53 .66 .66 .64 .64 .60 .59

PART 6: POTENTIAL PROBLEMS: TSCA\_GG\_ORIGINAL-50 11:23 Fri 01 Feb 2019 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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01B 1902 to 2012 111 years Series 1

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

Lower 1935< -.038 1976< -.034 2011> -.019 1985< -.016 1942< -.015 1941> -.008 Higher 1948 .067 2006 .012

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

1935 -5.5 SD; 1976 -5.4 SD; 1983 +3.0 SD; 1984 +3.0 SD

01B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1902 177 140 155 206 189 114 99 108

1910 130 93 132 103 87 69 84 75 41 85

1920 53 147 241 228 210 83 226 260 366 388

1930 405 379 322 175 205 48 209 199 198 182

1940 122 192 96 196 143 176 231 174 63 123

1950 120 132 114 100 175 196 180 177 188 115

1960 83 232 147 156 170 188 218 237 177 194

1970 191 240 214 254 250 242 180 219 301 327

1980 282 282 291 411 341 264 285 388 301 250

1990 348 399 386 374 329 327 347 349 344 364

2000 291 309 229 203 256 348 248 295 321 319

2010 372 361 425

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01B1 1905 to 2012 108 years Series 2

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

Lower 1948> -.037 1956< -.034 1998< -.014 1941> -.010 1975> -.007 1932< -.007 Higher 1989 .017 2011 .017

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

1941 +3.2 SD; 1948 +3.0 SD; 1978 +3.6 SD; 2007 +3.1 SD

01B1 Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1905 225 174 132 102 83

1910 119 97 140 163 151 173 173 105 88 149

1920 105 186 205 251 278 261 269 290 273 227

1930 219 171 138 79 77 123 179 216 252 241

1940 218 242 244 197 174 178 180 189 163 215

1950 149 184 209 188 200 223 127 227 215 154

1960 133 234 149 152 103 112 95 130 127 114

1970 115 138 79 134 205 268 242 298 423 358

1980 323 243 209 256 147 188 193 200 154 120

1990 151 147 148 146 120 133 131 158 131 157

2000 156 211 160 156 181 227 191 280 248 233

2010 223 171 222

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02A 1932 to 2012 81 years Series 3

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

Lower 1948> -.049 1979< -.044 2002> -.016 1937< -.011 1994> -.009 2012< -.009 Higher 1944 .026 1989 .025

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

1946 +3.4 SD; 1948 +3.7 SD; 2004 +3.5 SD

02A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1932 128 74 69 76 96 59 64 68

1940 71 48 51 47 19 21 93 43 35 43

1950 28 42 41 35 58 64 56 114 130 88

1960 80 132 58 154 170 166 226 275 248 164

1970 181 223 194 260 265 207 224 172 190 102

1980 131 88 99 122 125 142 128 118 99 84

1990 85 116 165 177 200 195 192 175 184 201

2000 211 256 284 288 361 363 295 352 305 397

2010 378 251 289

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02B 1904 to 2012 109 years Series 4

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

Lower 2006> -.039 1995< -.017 2011> -.017 2003> -.013 2012< -.012 1906< -.011 Higher 1944 .020 1962 .017

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

2006 +5.1 SD

02B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1904 262 250 142 115 98 123

1910 136 45 88 107 86 89 103 79 37 95

1920 142 223 253 260 283 226 216 225 141 124

1930 112 87 135 114 94 81 120 98 110 96

1940 67 36 42 39 16 19 44 31 20 28

1950 15 20 33 33 37 52 47 87 98 74

1960 42 115 42 123 157 213 318 395 355 299

1970 231 257 196 245 231 155 217 225 261 314

1980 288 193 229 251 202 248 256 258 167 145

1990 160 196 266 258 230 177 181 180 180 213

2000 232 238 227 313 315 378 477 479 436 532

2010 451 476 460

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03A 1929 to 2012 84 years Series 5

[B] Entire series, effect on correlation ( .823) is:

Lower 1962> -.017 2009< -.010 1990< -.008 1991< -.008 1960> -.007 1976< -.006 Higher 1948 .058 1989 .012

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

2001 +3.0 SD

03A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 401

1930 427 428 475 321 310 255 241 328 313 270

1940 211 190 158 182 104 131 155 121 19 92

1950 76 95 120 106 132 183 145 221 162 69

1960 76 142 106 93 66 77 105 127 98 80

1970 92 109 75 110 103 81 76 95 111 120

1980 129 110 118 166 121 186 190 280 178 110

1990 133 176 381 336 295 392 351 392 453 440

2000 357 576 334 301 421 463 272 364 269 249

2010 326 211 302

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03B 1904 to 2012 109 years Series 6

[B] Entire series, effect on correlation ( .762) is:

Lower 1978< -.017 1954< -.017 1932< -.008 1976< -.007 1972> -.007 1975> -.007 Higher 1948 .059 1961 .009

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

1954 -4.5 SD

03B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1904 676 500 409 233 171 215

1910 256 197 205 170 146 158 213 179 107 251

1920 252 495 436 465 595 371 223 165 312 242

1930 221 184 114 62 74 77 118 152 153 145

1940 93 114 121 129 39 51 116 127 26 150

1950 117 107 145 118 83 162 177 292 276 215

1960 201 418 235 296 251 247 329 348 256 244

1970 240 321 269 320 232 248 142 164 112 122

1980 146 85 110 129 108 134 148 158 129 77

1990 82 107 121 204 156 211 181 196 176 247

2000 120 178 123 99 164 246 157 271 237 238

2010 257 154 279

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04A 1910 to 2012 103 years Series 7

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

Lower 1948> -.020 1960< -.014 1989> -.012 1964> -.011 1930< -.010 1950> -.008 Higher 1918 .026 1962 .009

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

1949 +3.2 SD; 1950 +3.5 SD; 1964 +3.0 SD

04A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1910 184 148 214 274 207 156 158 123 64 175

1920 192 177 209 336 335 212 343 295 295 259

1930 190 239 210 171 166 179 173 145 139 114

1940 90 70 68 87 63 55 65 84 57 115

1950 94 85 79 66 75 83 72 94 83 66

1960 38 80 58 73 90 76 98 90 82 66

1970 64 82 81 110 103 88 106 104 115 123

1980 115 93 105 116 96 121 131 136 144 146

1990 169 247 269 257 251 209 245 223 191 226

2000 159 135 100 101 118 127 100 125 102 97

2010 105 69 125

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04B 1902 to 2012 111 years Series 8

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

Lower 2003< -.047 1948> -.035 1959> -.015 1971< -.013 2006> -.009 1978< -.008 Higher 1918 .019 1944 .013

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

2003 -6.8 SD

04B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1902 352 347 459 393 274 185 145 168

1910 223 163 240 245 181 161 166 149 91 165

1920 252 306 380 383 387 296 410 343 386 330

1930 318 240 344 278 285 274 262 253 255 218

1940 126 96 106 114 52 35 54 66 51 104

1950 82 77 76 57 65 65 50 74 59 59

1960 27 54 41 58 68 60 76 86 66 58

1970 58 50 50 78 77 62 67 78 70 89

1980 84 71 84 94 91 121 146 151 130 108

1990 136 170 175 194 189 164 154 169 145 129

2000 129 140 97 38 58 79 77 70 79 63

2010 80 49 73

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05A 1846 to 2012 167 years Series 9

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

Lower 2007< -.012 1950< -.009 1848< -.009 2003> -.008 1854> -.008 1857> -.006 Higher 1871 .010 2006 .007

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

1857 +3.2 SD; 1950 -7.8 SD; 1983 -4.6 SD; 2003 +3.1 SD

05A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1846 12 9 8 9

1850 10 13 9 11 13 15 20 45 58 31

1860 35 50 8 20 14 18 28 35 41 30

1870 26 49 16 18 16 17 16 21 19 16

1880 22 18 39 26 27 13 27 7 16 11

1890 13 7 6 7 15 14 38 62 117 92

1900 142 152 168 155 123 168 106 85 54 84

1910 105 59 110 120 89 68 71 58 28 104

1920 161 302 322 364 444 398 388 377 344 323

1930 254 233 293 200 178 198 253 275 259 215

1940 164 130 169 117 99 110 127 119 88 111

1950 61 102 95 120 144 155 133 199 163 131

1960 87 188 100 127 138 142 241 251 186 164

1970 145 201 150 217 191 216 195 142 181 212

1980 171 119 108 87 72 118 141 191 178 125

1990 173 231 267 255 221 271 232 246 192 174

2000 120 205 181 286 255 406 226 224 183 320

2010 407 311 544

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05B 1906 to 2012 107 years Series 10

[B] Entire series, effect on correlation ( .671) is:

Lower 1974< -.037 1983< -.029 1994> -.012 1959> -.012 1985< -.005 1907> -.004 Higher 2011 .011 1961 .009

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

1974 -5.0 SD; 1984 -4.5 SD; 1994 +3.6 SD

05B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1906 169 110 85 110

1910 138 68 105 124 89 90 91 83 44 122

1920 86 134 373 433 428 354 323 345 286 307

1930 260 210 279 136 118 140 156 135 151 121

1940 89 48 72 69 66 145 177 128 66 156

1950 97 128 123 116 151 157 147 216 196 156

1960 102 216 108 113 121 149 168 155 109 110

1970 101 135 86 121 56 75 83 74 95 120

1980 126 95 134 75 58 93 116 172 147 120

1990 185 200 221 289 315 306 235 231 228 271

2000 187 219 194 185 221 302 149 231 222 267

2010 344 153 258

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06A 1870 to 2012 143 years Series 11

[B] Entire series, effect on correlation ( .777) is:

Lower 2009< -.021 1978< -.015 1943< -.010 1953> -.007 1968< -.005 1892> -.004 Higher 1948 .034 1989 .009

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

2009 -4.5 SD

06A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1870 43 53 16 13 9 8 10 14 16 8

1880 20 10 20 12 23 14 26 10 12 10

1890 8 16 94 127 159 135 176 201 210 140

1900 200 237 277 299 321 239 213 130 106 145

1910 149 124 160 164 112 115 97 72 27 83

1920 75 109 169 211 221 188 177 200 223 201

1930 186 157 167 128 115 112 125 121 113 99

1940 105 72 107 60 43 77 95 99 27 94

1950 75 143 175 202 225 201 174 246 206 142

1960 88 170 97 139 144 158 146 151 115 111

1970 140 148 131 174 160 154 148 127 107 138

1980 127 104 120 134 97 147 157 152 122 97

1990 131 135 195 233 169 216 179 183 220 244

2000 192 218 176 171 200 211 132 178 130 97

2010 131 98 141

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06B 1870 to 2012 143 years Series 12

[B] Entire series, effect on correlation ( .699) is:

Lower 1978< -.023 2011> -.016 1933> -.015 1984> -.009 1975< -.008 1962> -.007 Higher 1948 .053 1918 .012

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

1978 -6.4 SD

06B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1870 40 55 17 16 14 9 10 12 17 16

1880 23 16 18 22 27 16 25 10 18 13

1890 10 26 72 74 79 116 122 193 243 183

1900 219 199 199 150 175 125 152 103 72 95

1910 139 107 137 119 101 111 108 64 25 83

1920 108 98 217 215 229 285 250 226 253 197

1930 174 167 157 183 125 136 143 129 120 93

1940 72 67 73 73 62 73 92 86 31 103

1950 75 122 122 79 129 172 123 182 157 74

1960 81 143 123 152 132 131 128 157 131 104

1970 123 113 93 137 113 88 127 106 90 133

1980 129 107 132 163 175 203 189 202 177 168

1990 195 253 298 252 262 288 249 311 242 241

2000 177 213 165 141 223 249 192 267 227 200

2010 178 219 338

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07A 1887 to 2012 126 years Series 13

[B] Entire series, effect on correlation ( .673) is:

Lower 1887> -.015 1948> -.014 2006> -.014 1954< -.008 1960> -.007 1996< -.006 Higher 1918 .027 1989 .007

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

1942 +3.4 SD

07A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1887 45 62 41

1890 50 10 48 133 296 256 467 420 396 255

1900 282 433 381 381 500 371 273 156 102 118

1910 192 172 190 179 111 156 138 72 15 62

1920 54 52 65 80 57 67 73 86 84 40

1930 24 23 27 29 16 32 52 57 60 77

1940 160 149 276 235 87 140 308 148 59 171

1950 152 135 128 59 50 122 113 177 191 61

1960 95 124 100 187 145 133 158 192 126 125

1970 125 177 138 203 164 110 118 146 167 201

1980 180 124 157 190 159 237 194 232 183 148

1990 202 226 281 309 204 235 171 215 263 273

2000 202 259 191 174 225 273 256 324 223 243

2010 271 234 271

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07B 1898 to 2012 115 years Series 14

[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 0 .07 -.03 -.12 .20 .09 -.20 .01 -.03 -.06 -.04 .29\*-.29 -.13 .02 -.08 .07 .12 -.06 .14 .16 .00

[B] Entire series, effect on correlation ( .429) is:

Lower 2005< -.014 1994> -.013 2011> -.013 1948> -.013 1912< -.013 1955< -.013 Higher 1918 .038 1944 .020

1950 to 1999 segment:

Lower 1994> -.030 1955< -.027 1984> -.022 1954< -.019 1989> -.018 1950> -.015 Higher 1981 .044 1972 .027

[E] Outliers 5 3.0 SD above or -4.5 SD below mean for year

1942 +3.1 SD; 1955 -4.8 SD; 1989 +3.2 SD; 1994 +3.1 SD; 2011 +3.0 SD

07B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1898 394 279

1900 308 381 413 420 467 368 256 146 76 103

1910 136 105 54 175 127 111 122 76 21 52

1920 96 68 98 80 46 79 128 101 95 51

1930 53 39 38 37 19 38 56 62 51 50

1940 102 93 135 62 18 121 168 85 58 127

1950 118 117 122 91 52 58 71 93 166 118

1960 104 139 125 152 133 156 142 193 195 159

1970 172 197 124 148 170 129 155 156 177 216

1980 186 137 174 206 208 266 264 252 201 184

1990 180 152 160 155 272 235 163 187 181 227

2000 158 282 192 248 255 221 214 413 282 367

2010 422 397 394

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08A 1902 to 2012 111 years Series 15

[B] Entire series, effect on correlation ( .652) is:

Lower 1936< -.026 1981> -.013 2001< -.012 1999< -.008 1993< -.008 2003> -.008 Higher 1948 .091 2006 .011

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

1936 -4.8 SD; 1975 -4.8 SD

08A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1902 447 510 500 357 487 340 301 225

1910 231 203 203 181 129 133 102 68 36 68

1920 58 171 328 447 432 551 509 468 476 355

1930 343 308 326 228 255 270 151 190 209 229

1940 246 142 199 255 191 205 245 266 116 261

1950 190 230 259 241 286 309 216 374 298 223

1960 195 260 199 298 188 202 185 258 215 196

1970 171 229 220 256 188 151 230 244 274 319

1980 252 257 233 311 232 232 276 305 187 150

1990 162 178 187 159 155 186 181 199 179 150

2000 119 126 143 183 193 228 154 198 247 265

2010 248 225 351

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08A2S1 1974 to 2012 39 years Series 16

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

Lower 1981> -.048 2003< -.036 1990< -.025 1974> -.012 1975< -.011 1984> -.011 Higher 2006 .019 2002 .018

08A2S1 Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1974 242 132 153 182 220 299

1980 219 227 198 239 185 204 176 227 163 144

1990 126 162 249 199 135 152 143 165 198 179

2000 134 150 107 82 150 190 112 173 123 150

2010 187 128 197

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08A2S2 1957 to 1970 14 years Series 17

[B] Entire series, effect on correlation ( .803) is:

Lower 1962< -.070 1961< -.038 1959> -.016 1968> -.003 1965> -.003 1970> -.002 Higher 1967 .020 1960 .009

08A2S2 Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1957 189 187 101

1960 79 187 126 199 186 176 222 282 215 169

1970 203

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08A2S3 1902 to 1946 45 years Series 18

[B] Entire series, effect on correlation ( .534) is:

Lower 1941< -.088 1934> -.023 1926< -.014 1935> -.012 1923< -.009 1938< -.007 Higher 1933 .029 1946 .024

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

1941 -4.7 SD

08A2S3 Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1902 404 347 347 259 190 115 80 81

1910 79 55 55 58 48 55 55 56 30 56

1920 58 91 262 218 228 250 207 215 324 437

1930 451 393 393 243 367 411 342 354 294 245

1940 265 177 218 246 215 232 261

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08B 1898 to 2012 115 years Series 19

[B] Entire series, effect on correlation ( .642) is:

Lower 1986< -.065 1948> -.036 1979< -.010 1943< -.008 1976> -.007 1984> -.004 Higher 2011 .015 2006 .010

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

1948 +3.7 SD; 1963 +3.2 SD; 1986 -5.6 SD

08B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1898 462 285

1900 296 349 324 300 361 351 292 203 184 111

1910 150 104 121 117 84 72 61 50 42 63

1920 101 216 385 388 397 361 367 419 405 344

1930 402 363 347 206 225 240 231 223 196 172

1940 176 152 161 131 126 153 198 192 148 191

1950 151 190 189 159 167 171 155 197 220 136

1960 91 208 151 231 154 155 148 174 161 135

1970 184 219 152 226 149 139 199 186 167 138

1980 155 153 160 261 201 227 96 187 167 145

1990 164 228 372 359 301 321 282 311 334 275

2000 182 195 195 152 173 307 160 250 224 219

2010 244 126 175

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09A 1924 to 2012 89 years Series 20

[B] Entire series, effect on correlation ( .562) is:

Lower 1938< -.043 1986< -.033 1984> -.014 1950> -.013 1981> -.013 1954< -.008 Higher 1989 .024 1960 .016

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

1935 +3.5 SD; 1950 +3.3 SD; 1986 -4.6 SD

09A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1924 320 165 185 153 143 140

1930 191 216 311 219 232 291 231 223 89 86

1940 105 108 130 145 90 100 160 174 101 223

1950 222 240 210 157 110 130 149 269 289 190

1960 114 263 177 239 175 167 183 216 148 115

1970 118 161 95 157 114 84 108 115 160 173

1980 156 144 124 148 147 125 79 132 115 81

1990 93 145 211 232 154 181 190 243 211 234

2000 168 140 104 112 147 172 128 183 221 251

2010 181 153 248

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09B 1924 to 2012 89 years Series 21

[B] Entire series, effect on correlation ( .712) is:

Lower 1945> -.016 1953< -.016 1932< -.015 1928< -.009 2005< -.008 1941> -.007 Higher 1948 .021 2011 .014

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

1945 +5.3 SD

09B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1924 280 299 315 292 196 204

1930 210 177 130 111 117 146 142 166 344 194

1940 174 199 176 195 107 398 278 290 90 175

1950 141 143 145 68 99 147 119 135 137 90

1960 62 162 93 136 114 102 150 153 109 83

1970 88 108 91 154 110 100 102 96 115 114

1980 103 48 56 70 67 77 74 92 86 58

1990 91 84 182 209 167 193 136 127 162 180

2000 133 157 121 113 150 137 125 180 149 185

2010 170 121 186

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10A 1925 to 2012 88 years Series 22

[B] Entire series, effect on correlation ( .762) is:

Lower 1926< -.028 2011> -.017 1989> -.015 1973< -.009 2001< -.007 1959> -.006 Higher 1948 .082 1944 .008

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

1948 -4.6 SD

10A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 320 237 269 275 290

1930 333 275 271 195 190 243 303 275 218 212

1940 194 183 233 222 132 171 254 246 57 188

1950 185 221 193 175 227 259 243 374 285 227

1960 189 351 194 307 256 264 293 374 314 287

1970 230 287 194 222 193 188 180 164 197 239

1980 241 141 161 225 188 222 260 345 239 206

1990 189 211 322 256 254 243 296 375 291 289

2000 174 199 178 161 246 314 193 301 282 330

2010 282 279 312

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11A 1953 to 2012 60 years Series 23

[B] Entire series, effect on correlation ( .635) is:

Lower 1981> -.037 1984> -.019 1961< -.015 1996< -.015 2000> -.014 1993< -.012 Higher 2011 .028 1989 .024

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

1981 +3.4 SD

11A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1953 152 181 186 136 202 190 91

1960 103 185 163 192 168 198 278 256 232 203

1970 196 245 226 287 252 221 237 289 315 228

1980 240 297 245 314 246 298 221 277 154 170

1990 217 206 256 185 158 237 159 204 205 215

2000 205 196 190 201 218 212 158 300 202 227

2010 241 104 242

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12A 1933 to 2012 80 years Series 24

[B] Entire series, effect on correlation ( .722) is:

Lower 1933> -.031 1960> -.016 1994< -.015 1935< -.010 1941> -.010 1975> -.009 Higher 1948 .078 1989 .019

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

1933 +4.0 SD; 1942 +3.8 SD; 1979 +3.6 SD

12A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1933 519 448 377 365 405 446 388

1940 392 400 458 408 331 285 299 360 196 261

1950 187 262 245 224 276 274 239 330 262 153

1960 184 263 151 152 149 148 147 206 203 165

1970 194 201 155 232 215 264 275 244 309 351

1980 260 169 184 218 187 181 171 180 144 108

1990 117 134 151 143 97 115 108 114 117 126

2000 109 107 81 66 73 98 65 94 98 105

2010 118 87 159

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13A 1941 to 2012 72 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

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

1950 1999 10 -.05 -.06 .04 -.12 .09 .04 -.06 -.09 -.02 -.16 .41|-.15 -.04 .01 .05 .08 .09 -.18 -.12 -.08 .47\*

[B] Entire series, effect on correlation ( .584) is:

Lower 1979< -.076 1978< -.041 1962> -.021 1967< -.017 1988> -.013 2003> -.013 Higher 1948 .119 1989 .024

1950 to 1999 segment:

Lower 1979< -.113 1978< -.057 1962> -.035 1967< -.027 1988> -.022 1960> -.019 Higher 1989 .071 1959 .067

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

1978 -5.2 SD; 1979 -7.6 SD; 2003 +3.1 SD

13A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1941 262 338 215 110 149 259 321 91 269

1950 234 377 347 310 326 407 349 461 344 164

1960 307 628 399 442 279 258 259 235 284 307

1970 243 307 240 280 222 283 212 206 121 91

1980 199 206 295 422 286 353 377 378 415 204

1990 230 462 452 556 378 509 341 448 369 476

2000 353 439 385 451 483 478 304 391 304 288

2010 426 297 425

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13B 1925 to 2012 88 years Series 26

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

Lower 1958< -.033 2006> -.020 1997< -.016 1944> -.013 1962> -.012 1960> -.011 Higher 1948 .048 1989 .035

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

1934 +3.0 SD

13B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 338 396 347 389 287

1930 312 258 257 212 291 251 235 281 237 239

1940 206 168 236 232 211 164 230 250 132 200

1950 175 279 291 262 334 376 295 444 144 100

1960 215 393 262 278 215 178 210 230 266 264

1970 270 282 223 459 369 441 412 477 530 460

1980 421 356 319 419 261 388 356 290 224 179

1990 266 233 290 261 248 346 248 200 204 254

2000 218 287 211 214 255 313 303 414 285 369

2010 367 267 389

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14A 1903 to 2012 110 years Series 27

[B] Entire series, effect on correlation ( .494) is:

Lower 1947< -.070 1960> -.041 1904< -.028 2003> -.017 1925< -.012 1980< -.011 Higher 1948 .046 1918 .030

[E] Outliers 5 3.0 SD above or -4.5 SD below mean for year

1947 -6.2 SD; 1960 +5.3 SD; 1980 -4.9 SD; 1981 -5.8 SD; 2003 +3.8 SD

14A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1903 77 39 52 49 37 41 63

1910 72 52 96 122 79 84 69 47 19 74

1920 64 153 134 157 195 83 126 154 182 198

1930 163 143 149 122 108 160 177 170 143 153

1940 147 102 116 113 96 131 177 50 22 109

1950 130 223 312 233 300 345 248 387 552 251

1960 608 566 414 463 292 354 419 478 495 475

1970 406 414 393 426 252 280 244 273 283 213

1980 161 116 185 341 321 287 353 452 362 302

1990 316 320 342 359 419 405 449 430 461 429

2000 390 405 347 484 486 496 296 322 274 390

2010 441 304 470

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14B 1899 to 2012 114 years Series 28

[B] Entire series, effect on correlation ( .718) is:

Lower 1960> -.021 1967< -.015 1972> -.012 1922< -.011 1962> -.010 1957< -.008 Higher 1948 .073 1918 .025

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

1918 -5.2 SD; 1920 +3.6 SD; 1948 -4.6 SD; 1960 +3.2 SD

14B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1899 94

1900 71 103 259 174 191 160 139 123 121 143

1910 113 81 121 119 92 113 127 104 54 122

1920 181 156 122 152 173 107 161 167 201 209

1930 200 199 194 151 126 152 138 200 157 170

1940 169 144 198 176 98 178 183 247 61 191

1950 174 249 290 188 238 263 175 225 310 139

1960 300 463 299 363 257 214 214 196 183 256

1970 307 505 474 595 378 401 389 373 420 375

1980 333 187 261 329 184 224 262 321 216 156

1990 289 442 482 480 322 416 445 280 365 445

2000 265 298 248 288 270 287 194 337 186 225

2010 291 223 284

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15B 1776 to 2012 237 years Series 29

[\*] Early part of series cannot be checked from 1776 to 1845 -- not matched by another series

[B] Entire series, effect on correlation ( .578) is:

Lower 1862> -.034 1959< -.011 1872> -.009 1877< -.008 1857< -.008 1994< -.007 Higher 1948 .029 1989 .011

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

1848 +3.2 SD; 1927 -4.6 SD; 1944 -5.1 SD; 1959 -8.8 SD

15B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1776 142 128 106 124

1780 7 36 35 29 37 32 45 44 43 42

1790 56 65 56 53 32 19 8 19 15 19

1800 18 22 6 8 14 6 10 18 28 30

1810 45 55 32 41 34 32 18 40 23 30

1820 35 37 27 17 18 20 23 24 14 7

1830 7 10 17 8 7 22 29 10 21 19

1840 19 11 20 14 11 8 17 17 18 11

1850 11 14 10 14 8 12 14 15 37 14

1860 18 23 9 12 11 17 21 65 63 98

1870 94 152 78 106 103 71 47 19 21 26

1880 40 36 49 30 45 47 48 36 39 32

1890 29 18 36 43 66 33 49 58 99 51

1900 50 34 48 64 53 58 53 27 23 28

1910 44 34 35 50 42 48 49 35 29 36

1920 25 91 94 96 223 89 57 38 326 406

1930 337 369 331 248 243 335 351 385 379 370

1940 316 296 263 234 53 100 158 172 59 159

1950 109 175 208 141 140 215 153 207 180 44

1960 89 244 161 205 185 244 326 316 342 383

1970 385 461 285 352 264 280 245 300 423 465

1980 453 370 279 355 189 283 326 288 271 169

1990 324 378 329 316 170 343 295 287 299 316

2000 188 345 259 269 250 415 290 461 492 675

2010 725 449 587

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16A 1909 to 2012 104 years Series 30

[B] Entire series, effect on correlation ( .413) is:

Lower 1924< -.032 1960> -.029 1944> -.022 1932< -.014 1945< -.014 1987< -.012 Higher 1948 .029 1962 .025

[E] Outliers 8 3.0 SD above or -4.5 SD below mean for year

1916 +3.2 SD; 1924 -4.6 SD; 1944 +4.6 SD; 1948 +4.5 SD; 1960 +4.7 SD; 1988 -4.7 SD; 1999 +3.4 SD;

2003 +3.7 SD

16A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1909 35

1910 54 45 52 87 57 108 117 88 60 98

1920 113 116 152 104 58 64 118 111 137 117

1930 95 92 65 53 58 69 95 91 101 83

1940 118 104 111 134 139 85 133 196 112 159

1950 111 149 161 115 86 80 57 175 229 162

1960 271 352 147 175 127 131 185 219 262 294

1970 313 366 327 391 233 331 375 430 501 521

1980 497 338 312 327 172 272 157 120 73 107

1990 148 154 188 201 145 145 157 204 276 413

2000 225 201 182 230 107 99 128 106 84 134

2010 164 101 252

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16B 1909 to 2012 104 years Series 31

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

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

1963 2012 0 .04 -.23 .14 .11 .03 .09 .22 -.25 .21 -.09 .29\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .526) is:

Lower 2010< -.103 1995< -.022 1960> -.019 2006> -.016 1944> -.013 2000> -.011 Higher 1948 .085 1989 .028

1963 to 2012 segment:

Lower 2010< -.177 1995< -.039 2006> -.031 2000> -.023 2003> -.023 2007< -.009 Higher 1989 .106 2012 .032

[E] Outliers 6 3.0 SD above or -4.5 SD below mean for year

1944 +3.0 SD; 1960 +3.3 SD; 1995 -4.7 SD; 2000 +3.2 SD; 2003 +3.3 SD; 2010 -5.4 SD

16B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1909 88

1910 130 114 156 182 160 202 134 84 52 94

1920 135 173 260 204 268 270 243 201 191 168

1930 192 178 195 151 146 149 143 158 166 142

1940 144 117 124 124 121 133 142 144 79 105

1950 101 106 106 89 125 133 99 173 329 228

1960 297 494 313 308 229 225 276 364 449 458

1970 481 570 425 537 423 443 382 416 435 375

1980 324 304 350 307 256 396 381 412 241 108

1990 94 151 236 329 245 167 324 392 411 453

2000 453 479 370 430 368 368 402 383 418 465

2010 308 332 504

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17A 1891 to 2012 122 years Series 32

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

Lower 1983< -.022 1975> -.014 1963< -.012 1904< -.009 1950> -.008 1923< -.007 Higher 1948 .071 1944 .012

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

1945 -5.9 SD; 1963 -5.0 SD; 1975 +3.1 SD

17A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1891 25 54 53 113 225 341 401 389 262

1900 292 280 292 233 158 155 138 139 92 105

1910 113 55 52 71 46 59 47 34 25 78

1920 113 106 107 71 210 274 362 349 278 255

1930 250 223 225 213 167 121 147 184 201 215

1940 187 148 149 151 65 56 165 167 36 164

1950 194 304 259 210 213 318 170 243 205 166

1960 141 302 85 64 102 162 201 238 304 277

1970 234 267 186 207 193 325 250 208 285 285

1980 291 226 252 154 123 264 328 304 230 141

1990 259 282 317 247 164 318 205 239 186 297

2000 130 180 120 102 112 194 157 272 292 241

2010 241 121 261

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17B 1921 to 2012 92 years Series 33

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

Lower 1923< -.117 2003> -.013 1926< -.013 1972> -.011 1956> -.009 1975> -.006 Higher 1948 .044 1989 .025

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

1923 -7.3 SD

17B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 122 158 94 186 167 141 159 163 183

1930 213 231 284 235 226 263 298 330 396 288

1940 275 168 212 256 161 122 205 185 59 179

1950 201 187 177 164 272 350 416 484 417 228

1960 219 496 276 257 182 228 282 258 247 247

1970 206 243 276 379 287 277 255 215 194 224

1980 204 120 153 204 136 168 161 237 177 117

1990 243 267 336 329 256 308 346 390 300 376

2000 268 254 203 293 229 264 212 312 272 255

2010 277 133 267

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18A 1929 to 2012 84 years Series 34

[B] Entire series, effect on correlation ( .601) is:

Lower 1935< -.062 1981> -.014 1989> -.014 1976< -.009 1953> -.009 1943< -.008 Higher 1959 .016 2006 .016

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

1935 -4.7 SD; 1953 +3.0 SD; 1986 +3.3 SD

18A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 322

1930 454 453 458 269 317 162 346 358 287 278

1940 256 224 204 144 132 151 202 188 120 173

1950 206 281 353 323 322 314 271 306 261 139

1960 129 319 228 262 220 194 261 315 234 238

1970 236 278 243 302 274 225 198 216 234 253

1980 271 277 236 271 203 341 357 325 260 245

1990 273 299 324 326 213 254 192 217 195 185

2000 167 189 167 182 227 294 168 196 154 188

2010 199 166 282

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18B 1925 to 2012 88 years Series 35

[B] Entire series, effect on correlation ( .705) is:

Lower 1960> -.021 1925< -.014 1972> -.012 1944> -.010 1996< -.010 1949< -.009 Higher 1948 .097 1989 .015

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

1987 +3.5 SD

18B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 210 408 381 295 313

1930 354 396 418 291 340 316 262 242 215 223

1940 259 190 241 193 183 202 265 239 59 138

1950 151 180 150 112 165 213 222 345 382 199

1960 257 400 247 289 213 175 232 276 272 282

1970 253 282 274 257 218 208 206 218 260 260

1980 266 231 214 243 178 260 247 355 197 160

1990 229 243 285 247 196 236 169 217 243 234

2000 196 204 165 152 199 232 153 179 128 124

2010 111 77 116

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19A 1921 to 2012 92 years Series 36

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

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

1963 2012 0 .08 -.05 -.06 -.26 -.03 .23 -.13 -.05 -.05 -.09 .32\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .433) is:

Lower 1999< -.040 1942< -.039 1944> -.031 1973< -.018 1921< -.017 1984> -.016 Higher 1948 .138 1960 .020

1963 to 2012 segment:

Lower 1999< -.100 1973< -.042 1984> -.034 1985< -.028 1975> -.016 2002> -.015 Higher 1989 .041 2006 .040

[E] Outliers 7 3.0 SD above or -4.5 SD below mean for year

1934 +3.4 SD; 1936 +3.1 SD; 1942 -5.0 SD; 1944 +4.6 SD; 1973 -4.7 SD; 1984 +3.4 SD; 1999 -4.8 SD

19A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1921 95 143 209 274 197 228 198 171 184

1930 209 301 443 319 422 234 490 434 300 316

1940 301 296 140 292 342 283 300 203 76 142

1950 173 194 227 239 208 320 296 291 246 165

1960 84 231 119 118 129 135 191 208 182 176

1970 142 140 113 120 176 208 179 162 242 275

1980 200 147 182 233 239 174 155 165 192 155

1990 188 235 278 263 256 265 240 306 229 111

2000 130 140 160 135 178 182 107 134 65 83

2010 142 93 124

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19B 1881 to 2012 132 years Series 37

[B] Entire series, effect on correlation ( .590) is:

Lower 1963< -.029 1921< -.013 1987< -.012 1947< -.012 1942< -.009 1989> -.009 Higher 1944 .013 1961 .012

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

1944 -4.7 SD; 1963 -5.5 SD; 1987 -5.3 SD

19B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1881 58 66 73 92 64 73 36 54 36

1890 16 21 33 29 59 48 144 210 205 200

1900 201 174 224 240 209 185 132 117 90 103

1910 99 51 55 71 55 60 67 49 20 69

1920 96 30 83 108 163 216 296 378 427 479

1930 540 413 418 297 256 220 224 212 267 253

1940 238 208 147 168 102 214 180 125 92 177

1950 132 184 191 147 149 192 177 167 175 124

1960 76 190 69 35 44 71 89 110 111 84

1970 83 94 68 75 80 61 72 67 65 82

1980 63 45 40 61 40 57 51 42 56 65

1990 104 128 169 162 177 290 296 298 271 252

2000 258 194 155 130 201 252 173 235 183 255

2010 259 144 210

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20A 1942 to 2012 71 years Series 38

[B] Entire series, effect on correlation ( .508) is:

Lower 1983< -.036 1952< -.035 1959> -.021 2005< -.018 1960> -.017 2009< -.016 Higher 1948 .163 1989 .029

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

1960 +3.5 SD; 1983 -5.4 SD; 2003 +3.9 SD

20A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 334 316 206 215 212 240 57 165

1950 219 243 90 111 162 155 94 224 301 278

1960 276 436 298 321 231 232 254 312 213 261

1970 214 344 209 303 162 126 179 181 194 142

1980 134 130 160 88 135 159 140 250 148 116

1990 229 211 334 416 326 362 330 351 296 394

2000 314 424 309 345 202 183 165 265 167 128

2010 146 112 102

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20B 1934 to 2012 79 years Series 39

[B] Entire series, effect on correlation ( .672) is:

Lower 1946< -.017 2005< -.017 2002> -.015 2003> -.014 1955< -.014 1972> -.013 Higher 1948 .130 1989 .016

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

1948 -7.5 SD; 2003 +3.4 SD

20B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1934 260 253 387 296 369 279

1940 253 240 257 227 153 200 153 158 38 162

1950 170 205 156 145 169 150 126 302 255 208

1960 214 454 159 230 333 296 415 447 366 355

1970 329 376 367 405 233 144 130 149 158 163

1980 184 200 229 229 196 277 193 269 178 122

1990 205 272 339 414 289 332 243 324 382 323

2000 245 353 315 316 181 174 204 264 182 169

2010 188 146 202

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21A 1924 to 2012 89 years Series 40

[B] Entire series, effect on correlation ( .590) is:

Lower 1962> -.041 1933> -.025 1924< -.019 1925> -.011 1944> -.011 1945> -.008 Higher 1948 .052 1989 .031

[E] Outliers 5 3.0 SD above or -4.5 SD below mean for year

1933 +3.3 SD; 1945 +3.7 SD; 1959 -5.3 SD; 1962 +3.4 SD; 1963 +3.7 SD

21A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1924 75 253 177 103 111 66

1930 115 155 124 216 193 224 209 221 141 45

1940 51 61 62 52 67 165 138 90 20 118

1950 81 103 73 47 59 96 68 116 101 33

1960 58 126 216 310 179 154 195 252 224 239

1970 193 255 196 241 181 174 137 121 131 147

1980 168 185 300 303 181 303 316 322 211 118

1990 183 205 260 247 209 337 247 286 364 294

2000 230 299 230 206 209 375 215 352 314 290

2010 320 178 231

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21B 1896 to 2012 117 years Series 41

[B] Entire series, effect on correlation ( .627) is:

Lower 1981> -.038 2011> -.017 1938< -.014 2012< -.013 1933> -.013 1922< -.013 Higher 1948 .052 1989 .024

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

1933 +3.3 SD; 1963 +3.0 SD; 1981 +5.3 SD; 1989 -4.7 SD

21B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1896 74 106 130 75

1900 63 56 111 113 80 71 65 46 31 34

1910 63 44 41 58 39 38 38 34 17 43

1920 54 89 58 111 125 91 30 47 91 429

1930 423 460 475 410 276 128 254 342 79 18

1940 52 43 146 47 40 119 147 87 9 90

1950 58 83 112 88 165 209 180 307 268 152

1960 125 162 140 311 166 166 208 261 182 197

1970 200 191 154 219 232 236 229 307 342 294

1980 369 509 386 388 269 357 362 377 245 150

1990 266 248 273 237 204 300 226 313 311 331

2000 215 319 223 206 256 457 287 457 559 584

2010 508 505 421

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22AS1 1943 to 2012 70 years Series 42

[B] Entire series, effect on correlation ( .775) is:

Lower 1992< -.019 1975> -.013 1970< -.012 1959> -.010 1971< -.008 1961< -.007 Higher 1948 .079 1989 .017

22AS1 Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1943 212 149 170 191 195 64 148

1950 121 208 228 191 183 298 213 269 258 170

1960 89 162 137 144 151 120 118 137 101 92

1970 76 93 82 123 99 121 101 91 107 113

1980 128 82 83 88 78 106 99 108 84 54

1990 70 80 72 87 71 89 79 90 130 136

2000 109 142 92 81 102 160 81 136 112 131

2010 151 118 156

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22AS2 1900 to 1937 38 years Series 43

[B] Entire series, effect on correlation ( .464) is:

Lower 1902< -.055 1901< -.053 1936< -.034 1935> -.032 1937< -.023 1934> -.020 Higher 1918 .221 1933 .030

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

1902 -4.6 SD; 1906 +3.1 SD; 1935 +3.9 SD

22AS2 Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1900 63 37 34 69 67 73 155 81 74 101

1910 126 90 113 120 101 61 77 74 35 99

1920 165 219 252 295 253 228 250 226 183 230

1930 243 230 202 177 263 360 236 213

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22B 1897 to 2012 116 years Series 44

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

Lower 1897< -.030 1997< -.027 1934< -.012 1959> -.011 1971< -.011 1981> -.009 Higher 1948 .050 1918 .022

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

1897 -4.8 SD; 1947 +3.0 SD; 1980 +3.3 SD; 1997 -5.1 SD

22B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1897 65 112 82

1900 96 109 122 147 164 142 172 93 103 127

1910 217 161 228 238 179 255 269 148 57 140

1920 90 286 336 291 290 240 248 220 235 266

1930 292 215 250 170 126 166 217 262 226 149

1940 182 195 165 170 142 156 194 233 98 138

1950 97 154 110 93 94 142 128 174 172 125

1960 70 132 100 100 110 101 85 123 86 83

1970 76 76 72 91 99 105 107 102 135 134

1980 145 118 99 108 92 116 107 107 100 77

1990 91 90 96 100 100 99 79 63 68 76

2000 68 88 76 58 76 86 51 67 75 105

2010 98 53 93

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23A 1898 to 2012 115 years Series 45

[B] Entire series, effect on correlation ( .685) is:

Lower 1900< -.028 1987< -.022 1986< -.021 1959> -.006 2000> -.006 1960< -.005 Higher 1948 .054 1918 .011

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

1900 -5.7 SD; 1987 -6.0 SD; 1998 +3.7 SD

23A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1898 211 141

1900 42 216 255 297 349 316 280 192 184 155

1910 189 158 221 193 165 195 183 155 91 148

1920 291 282 377 503 458 304 343 304 314 262

1930 238 218 209 149 142 175 163 193 227 145

1940 144 142 117 150 115 172 246 261 107 185

1950 128 163 170 150 149 242 185 187 171 145

1960 79 147 130 138 120 106 138 186 128 132

1970 121 157 157 244 189 175 154 144 165 214

1980 177 114 140 152 123 158 81 65 80 83

1990 103 162 150 132 129 138 142 130 239 170

2000 157 180 133 114 133 153 123 174 165 185

2010 197 147 206

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23B 1929 to 2012 84 years Series 46

[B] Entire series, effect on correlation ( .531) is:

Lower 1932< -.031 1981> -.023 1984> -.014 1988> -.014 1959> -.011 2001< -.010 Higher 1989 .017 1961 .015

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

1948 +3.3 SD; 1981 +3.9 SD; 1984 +3.4 SD

23B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 306

1930 356 283 167 151 288 276 232 295 288 230

1940 180 194 173 183 169 225 343 301 177 295

1950 170 209 193 175 198 305 219 234 247 190

1960 120 252 70 90 107 94 118 158 111 101

1970 127 155 116 159 172 188 143 149 200 233

1980 249 263 228 277 255 275 272 237 252 173

1990 161 222 196 191 142 187 178 167 192 190

2000 86 93 101 84 112 123 109 153 128 198

2010 182 152 204

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24A 1907 to 2012 106 years Series 47

[B] Entire series, effect on correlation ( .516) is:

Lower 1948> -.034 1978< -.015 1981> -.012 1972> -.011 1988> -.011 1984< -.010 Higher 1918 .019 2006 .013

[E] Outliers 5 3.0 SD above or -4.5 SD below mean for year

1912 +4.4 SD; 1948 +3.8 SD; 1955 +3.1 SD; 1984 -5.2 SD; 1988 +3.2 SD

24A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1907 106 104 123

1910 153 167 316 206 194 171 190 176 134 252

1920 351 388 423 474 392 301 361 340 291 252

1930 334 357 353 217 307 322 309 272 313 251

1940 229 220 158 140 142 159 232 217 165 231

1950 121 146 170 216 240 343 154 246 216 162

1960 115 223 128 140 131 136 142 186 159 124

1970 146 142 203 308 228 220 193 134 103 162

1980 182 194 215 177 84 145 170 222 217 160

1990 177 182 160 224 123 134 185 180 205 168

2000 139 162 110 88 97 129 92 121 130 130

2010 142 97 131

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24B 1920 to 2012 93 years Series 48

[B] Entire series, effect on correlation ( .603) is:

Lower 1948> -.073 1959> -.016 1962> -.013 1972> -.011 1941> -.011 1924< -.009 Higher 1944 .018 2006 .017

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

1935 +3.1 SD; 1948 +4.3 SD; 1973 +4.0 SD; 1981 -4.7 SD

24B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 535 612 718 450 386 314 345 365 391 346

1930 393 386 340 253 248 331 280 260 239 168

1940 193 224 179 136 82 121 187 206 153 202

1950 105 155 168 162 191 233 166 216 208 195

1960 128 281 201 203 181 147 176 230 195 160

1970 154 176 199 346 135 123 132 182 146 139

1980 132 60 98 93 71 98 93 96 76 63

1990 69 72 84 88 72 77 80 79 86 98

2000 71 79 67 65 75 79 55 69 65 81

2010 82 58 74

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PART 7: DESCRIPTIVE STATISTICS: TSCA\_GG\_ORIGINAL-50 11:23 Fri 01 Feb 2019 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 ()

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1 01B 1902 2012 111 4 0 .626 2.21 4.25 .985 .812 .254 2.61 .488 .016 1

2 01B1 1905 2012 108 4 0 .616 1.82 4.23 .623 .752 .201 2.71 .490 -.022 2

3 02A 1932 2012 81 3 0 .512 1.52 3.97 .957 .912 .234 2.89 .480 .006 1

4 02B 1904 2012 109 4 0 .541 1.79 5.32 1.200 .931 .257 2.60 .469 -.036 1

5 03A 1929 2012 84 3 0 .823 2.11 5.76 1.268 .841 .269 2.53 .385 .028 1

6 03B 1904 2012 109 4 0 .762 2.02 6.76 1.123 .752 .298 2.67 .386 -.063 1

7 04A 1910 2012 103 4 0 .659 1.39 3.42 .708 .862 .199 2.64 .399 -.024 1

8 04B 1902 2012 111 4 0 .574 1.51 4.59 1.062 .928 .211 2.43 .364 .027 1

9 05A 1846 2012 167 7 0 .670 1.34 5.44 1.089 .902 .297 2.70 .402 -.027 3

10 05B 1906 2012 107 4 0 .671 1.64 4.33 .856 .781 .275 2.63 .484 -.096 1

11 06A 1870 2012 143 6 0 .777 1.29 3.21 .688 .873 .278 2.62 .440 -.023 2

12 06B 1870 2012 143 6 0 .699 1.32 3.38 .764 .886 .255 2.53 .391 -.029 1

13 07A 1887 2012 126 5 0 .673 1.67 5.00 1.020 .810 .326 2.60 .436 .040 1

14 07B 1898 2012 115 5 1 .429 1.64 4.67 1.028 .867 .293 2.62 .447 -.008 1

15 08A 1902 2012 111 4 0 .652 2.42 5.51 1.005 .795 .217 2.55 .357 -.052 1

16 08A2S1 1974 2012 39 1 0 .632 1.74 2.99 .450 .377 .253 2.64 .546 .087 1

17 08A2S2 1957 1970 14 1 0 .803 1.80 2.82 .513 .373 .291 2.61 .644 -.185 2

18 08A2S3 1902 1946 45 1 0 .534 2.17 4.51 1.274 .892 .209 2.64 .423 -.054 1

19 08B 1898 2012 115 5 0 .642 2.12 4.62 .914 .798 .215 2.58 .441 -.043 1

20 09A 1924 2012 89 4 0 .562 1.68 3.20 .566 .523 .252 2.65 .584 -.009 1

21 09B 1924 2012 89 4 0 .712 1.47 3.98 .665 .592 .254 2.87 .567 -.028 1

22 10A 1925 2012 88 3 0 .762 2.42 3.75 .595 .394 .216 2.42 .329 -.031 1

23 11A 1953 2012 60 2 0 .635 2.13 3.15 .502 .335 .218 2.59 .565 .124 1

24 12A 1933 2012 80 3 0 .722 2.16 5.19 1.083 .897 .175 2.56 .456 -.032 1

25 13A 1941 2012 72 3 1 .584 3.24 6.28 1.099 .485 .295 2.75 .478 .050 1

26 13B 1925 2012 88 3 0 .595 2.86 5.30 .857 .566 .221 2.64 .542 .023 1

27 14A 1903 2012 110 4 0 .494 2.52 6.08 1.513 .859 .264 2.57 .431 .039 1

28 14B 1899 2012 114 5 0 .718 2.34 5.95 1.108 .737 .273 2.43 .349 -.047 1

29 15B 1776 2012 237 7 0 .578 1.30 7.25 1.450 .914 .336 2.63 .354 -.048 1

30 16A 1909 2012 104 4 0 .413 1.70 5.21 1.082 .836 .277 2.82 .540 -.051 1

31 16B 1909 2012 104 4 1 .526 2.59 5.70 1.328 .866 .204 2.60 .420 .049 1

32 17A 1891 2012 122 5 0 .674 1.93 4.01 .885 .685 .306 2.48 .395 -.013 1

33 17B 1921 2012 92 4 0 .573 2.41 4.96 .817 .588 .249 2.60 .430 -.108 1

34 18A 1929 2012 84 3 0 .601 2.50 4.58 .720 .604 .195 2.62 .487 -.046 1

35 18B 1925 2012 88 3 0 .705 2.33 4.18 .733 .624 .210 2.60 .379 .001 1

36 19A 1921 2012 92 4 1 .433 2.08 4.90 .839 .653 .255 2.63 .467 .021 1

37 19B 1881 2012 132 5 0 .590 1.47 5.40 1.006 .902 .274 2.58 .339 -.013 2

38 20A 1942 2012 71 3 0 .508 2.26 4.36 .907 .623 .290 2.57 .434 .016 2

39 20B 1934 2012 79 3 0 .672 2.46 4.54 .889 .597 .255 2.43 .324 -.011 1

40 21A 1924 2012 89 4 0 .590 1.82 3.75 .887 .707 .331 2.68 .490 .023 1

41 21B 1896 2012 117 5 0 .627 1.99 5.84 1.419 .841 .357 2.75 .493 -.007 1

42 22AS1 1943 2012 70 3 0 .775 1.27 2.98 .513 .664 .240 2.49 .412 -.042 1

43 22AS2 1900 1937 38 1 0 .464 1.55 3.60 .857 .856 .275 2.94 .592 .127 1

44 22B 1897 2012 116 5 0 .670 1.37 3.36 .648 .779 .225 2.56 .519 -.023 1

45 23A 1898 2012 115 5 0 .685 1.80 5.03 .739 .748 .230 2.78 .436 -.048 1

46 23B 1929 2012 84 3 0 .531 1.92 3.56 .658 .632 .221 2.53 .441 -.001 1

47 24A 1907 2012 106 4 0 .516 2.00 4.74 .822 .762 .222 2.66 .404 -.002 1

48 24B 1920 2012 93 4 0 .603 1.84 7.18 1.262 .895 .203 2.84 .450 .037 1

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Total or mean: 4764 185 4 .622 1.89 7.25 .952 .766 .258 2.94 .437 -.013

- = [ COFECHA TSCA COF ] = -