[] Dendrochronology Program Library Run 1130 Program COF 15:37 Mon 16 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 30241

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: VMC1130\_TSCA\_corr2-50

File of DATED series: VMC1130\_TSCA\_corr2.txt

CONTENTS:

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

Part 2: Histogram of time spans

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

Part 4: Bar plot of Master Dating Series

Part 5: Correlation by segment of each series with Master

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

Part 7: Descriptive statistics

RUN CONTROL OPTIONS SELECTED VALUE

1 Cubic smoothing spline 50% wavelength cutoff for filtering

32 years

2 Segments examined are 50 years lagged successively by 25 years

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

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

5 CORRELATION is Pearson (parametric, quantitative)

Critical correlation, 99% confidence level .3281

6 Master dating series saved N

7 Ring measurements listed Y

8 Parts printed 1234567

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

Time span of Master dating series is 1861 to 2015 155 years

Continuous time span is 1861 to 2015 155 years

Portion with two or more series is 1863 to 2015 153 years

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

\*C\* Number of dated series 28 \*C\*

\*O\* Master series 1861 2015 155 yrs \*O\*

\*F\* Total rings in all series 2924 \*F\*

\*E\* Total dated rings checked 2922 \*E\*

\*C\* Series intercorrelation .587 \*C\*

\*H\* Average mean sensitivity .217 \*H\*

\*A\* Segments, possible problems 2 \*A\*

\*\*\* Mean length of series 104.4 \*\*\*

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

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

No ring measurements of zero value

PART 2: TIME PLOT OF TREE-RING SERIES: VMC1130\_TSCA\_corr2-50 15:37 Mon 16 Oct 2017 Page 2

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

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

. . . . . . . . . . . . . . . . .<==============> . 105A 1 1861 2015 155

. . . . . . . . . . . . . . . . .<==============> . 105B 2 1866 2015 150

. . . . . . . . . . . . . . . . . <==========> . 165A 3 1909 2015 107

. . . . . . . . . . . . . . . . . <==========> . 165B 4 1900 2015 116

. . . . . . . . . . . . . . . . . . .<====> . 323A 5 1961 2015 55

. . . . . . . . . . . . . . . . . . <======> . 323B 6 1942 2015 74

. . . . . . . . . . . . . . . . . . <=======> . 1055A 7 1935 2015 81

. . . . . . . . . . . . . . . . . . <=====> . 1055B 8 1951 2015 65

. . . . . . . . . . . . . . . . . .<=========> . 1184A 9 1918 2015 98

. . . . . . . . . . . . . . . . . .<=========> . 1184B 10 1917 2015 99

. . . . . . . . . . . . . . . . . . <======> . 1185A 11 1945 2015 71

. . . . . . . . . . . . . . . . . . <======> . 1185B 12 1943 2015 73

. . . . . . . . . . . . . . . . . <=============> . 1186A 13 1878 2015 138

. . . . . . . . . . . . . . . . . <==========> . 1186B 14 1902 2015 114

. . . . . . . . . . . . . . . . . <===========> . 1187A 15 1893 2015 123

. . . . . . . . . . . . . . . . . <=============> . 1187B 16 1872 2015 144

. . . . . . . . . . . . . . . . . . <========> . 1188A 17 1929 2015 87

. . . . . . . . . . . . . . . . . <==========> . 1188B 18 1903 2015 113

. . . . . . . . . . . . . . . . . . <========> . 1189A 19 1926 2015 90

. . . . . . . . . . . . . . . . . . <========> . 1189B 20 1926 2015 90

. . . . . . . . . . . . . . . . . <===========> . 1192A 21 1892 2015 124

. . . . . . . . . . . . . . . . . <===========> . 1192B 22 1893 2015 123

. . . . . . . . . . . . . . . . . . <=======> . 1193A 23 1934 2015 82

. . . . . . . . . . . . . . . . . . <======> . 1193B 24 1948 2015 68

. . . . . . . . . . . . . . . . . <==========> . 1194A 25 1901 2015 115

. . . . . . . . . . . . . . . . . . <========> . 1194B 26 1926 2015 90

. . . . . . . . . . . . . . . . . <===========> . 1199A 27 1890 2015 126

. . . . . . . . . . . . . . . . .<==============> . 1199B 28 1863 2015 153

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

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

PART 3: Master Dating Series: VMC1130\_TSCA\_corr2-50 15:37 Mon 16 Oct 2017 Page 3

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

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1900 1.281 10 1950 -1.093 26 2000 -.201 28

1901 .874 11 1951 1.363 27 2001 .429 28

1902 1.166 12 1952 1.223 27 2002 1.780 28

1903 .758 13 1953 .718 27 2003 -1.052 28

1904 .213 13 1954 .649 27 2004 -.904 28

1905 -.528 13 1955 .899 27 2005 .308 28

1906 -1.085 13 1956 -.195 27 2006 -1.663 28

1907 -.835 13 1957 .298 27 2007 .725 28

1908 -.672 13 1958 .122 27 2008 .086 28

1909 -.832 14 1959 .733 27 2009 .377 28

1910 .447 14 1960 -.948 27 2010 1.764 28

1861 -.363 1 1911 -2.175 14 1961 1.253 28 2011 -1.048 28

1862 -3.133 1 1912 -.629 14 1962 -.503 28 2012 .863 28

1863 -2.177 2 1913 -.388 14 1963 -.139 28 2013 1.038 28

1864 .233 2 1914 -.909 14 1964 -1.114 28 2014 .504 28

1865 1.372 2 1915 -1.573 14 1965 -.702 28 2015 -1.907 28

1866 .912 3 1916 .369 14 1966 -.238 28

1867 .675 3 1917 1.358 15 1967 .844 28

1868 .982 3 1918 -1.864 16 1968 -.075 28

1869 .778 3 1919 -.358 16 1969 .344 28

1870 1.215 3 1920 -.679 16 1970 .120 28

1871 1.616 3 1921 .672 16 1971 .925 28

1872 1.343 4 1922 1.305 16 1972 -.985 28

1873 .143 4 1923 .320 16 1973 1.364 28

1874 1.287 4 1924 .743 16 1974 -.344 28

1875 .604 4 1925 .858 16 1975 .100 28

1876 -.571 4 1926 .137 19 1976 -.552 28

1877 -.966 4 1927 .991 19 1977 1.105 28

1878 -.242 5 1928 1.116 19 1978 .116 28

1879 -.759 5 1929 .043 20 1979 .011 28

1880 -.109 5 1930 -.402 20 1980 -.594 28

1881 -.992 5 1931 -.532 20 1981 -2.204 28

1882 1.068 5 1932 .870 20 1982 -1.453 28

1883 -1.328 5 1933 .852 20 1983 .464 28

1884 -.141 5 1934 -.051 21 1984 -.612 28

1885 -2.110 5 1935 1.278 22 1985 .589 28

1886 -.980 5 1936 .093 22 1986 1.093 28

1887 -2.064 5 1937 .615 22 1987 .890 28

1888 -2.357 5 1938 .959 22 1988 -.363 28

1889 -1.155 5 1939 .396 22 1989 .424 28

1890 -1.015 6 1940 -.401 22 1990 .894 28

1891 .423 6 1941 -.764 22 1991 -.078 28

1892 .027 7 1942 -.118 23 1992 1.439 28

1893 -.104 9 1943 -.553 24 1993 .147 28

1894 -.198 9 1944 -1.005 24 1994 -.358 28

1895 -.487 9 1945 -.916 25 1995 .477 28

1896 .756 9 1946 -.460 25 1996 -.407 28

1897 2.574 9 1947 .047 25 1997 -.716 28

1898 2.045 9 1948 -1.547 26 1998 -1.387 28

1899 .461 9 1949 -.584 26 1999 .195 28

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PART 4: Master Bar Plot: VMC1130\_TSCA\_corr2-50 15:37 Mon 16 Oct 2017 Page 4

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

1900----------E 1950-d 2000----a

1901--------C 1951----------E 2001------B

1902---------E 1952---------E 2002----------G

1903--------C 1953-------C 2003-d

1904-----A 1954-------C 2004-d

1905---b 1955--------D 2005------A

1906-d 1956----a 2006g

1907--c 1957------A 2007-------C

1908--c 1958-----@ 2008-----@

1909--c 1959-------C 2009------B

1910------B 1960-d 2010----------G

1861---a 1911i 1961----------E 2011-d

1862m 1912--c 1962---b 2012--------C

1863i 1913---b 1963----a 2013---------D

1864------A 1914-d 1964-d 2014-------B

1865----------E 1915f 1965--c 2015h

1866--------D 1916------A 1966----a

1867-------C 1917----------E 1967--------C

1868--------D 1918g 1968----@

1869--------C 1919---a 1969------A

1870---------E 1920--c 1970-----@

1871----------F 1921-------C 1971--------D

1872----------E 1922----------E 1972-d

1873-----A 1923------A 1973----------E

1874----------E 1924--------C 1974---a

1875-------B 1925--------C 1975-----@

1876---b 1926-----A 1976---b

1877-d 1927---------D 1977---------D

1878----a 1928---------D 1978-----@

1879--c 1929-----@ 1979-----@

1880----@ 1930---b 1980---b

1881-d 1931---b 1981i

1882---------D 1932--------C 1982-f

1883-e 1933--------C 1983------B

1884----a 1934-----@ 1984--b

1885h 1935----------E 1985-------B

1886-d 1936-----@ 1986---------D

1887h 1937-------B 1987--------D

1888i 1938--------D 1988---a

1889-e 1939------B 1989------B

1890-d 1940---b 1990--------D

1891------B 1941--c 1991----@

1892-----@ 1942----@ 1992----------F

1893----@ 1943---b 1993-----A

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

1895---b 1945-d 1995------B

1896--------C 1946---b 1996---b

1897----------J 1947-----@ 1997--c

1898----------H 1948f 1998-f

1899------B 1949---b 1999-----A

PART 5: CORRELATION OF SERIES BY SEGMENTS: VMC1130\_TSCA\_corr2-50 15:37 Mon 16 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 105A 1861 2015 .54 .54 .50 .76 .85 .89

2 105B 1866 2015 .70 .78 .63 .58 .68 .80

3 165A 1909 2015 .52 .58 .64 .72

4 165B 1900 2015 .58 .58 .55 .63

5 323A 1961 2015 .50 .51

6 323B 1942 2015 .38 .39 .48

7 1055A 1935 2015 .45 .41 .46

8 1055B 1951 2015 .42 .38

9 1184A 1918 2015 .54 .58 .42 .57

10 1184B 1917 2015 .41 .56 .47 .51

11 1185A 1945 2015 .37 .38 .43

12 1185B 1943 2015 .31A .35 .52

13 1186A 1878 2015 .68 .64 .56 .62 .75

14 1186B 1902 2015 .57 .47 .51 .60

15 1187A 1893 2015 .70 .69 .54 .60 .69

16 1187B 1872 2015 .66 .69 .61 .58 .65 .66

17 1188A 1929 2015 .56 .64 .76

18 1188B 1903 2015 .69 .46 .60 .72

19 1189A 1926 2015 .54 .34 .42

20 1189B 1926 2015 .43 .44 .46

21 1192A 1892 2015 .65 .66 .57 .70 .73

22 1192B 1893 2015 .65 .53 .51 .64 .77

23 1193A 1934 2015 .43 .49 .61

24 1193B 1948 2015 .33 .35 .42

25 1194A 1901 2015 .65 .68 .69 .65

26 1194B 1926 2015 .75 .72 .63

27 1199A 1890 2015 .55 .51 .64 .70 .80

28 1199B 1863 2015 .56 .57 .30A .41 .68 .82

Av segment correlation .61 .65 .57 .52 .55 .62

PART 6: POTENTIAL PROBLEMS: VMC1130\_TSCA\_corr2-50 15:37 Mon 16 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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105A 1861 to 2015 155 years Series 1

[\*] Early part of series cannot be checked from 1861 to 1862 -- not matched by another series

[B] Entire series, effect on correlation ( .667) is:

Lower 1863> -.040 1915< -.026 1909< -.013 1918> -.005 1867> -.005 1913> -.005 Higher 1981 .011 2011 .009

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

1915 -4.8 SD

105A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1861 281 136 231 342 381 347 426 436 358

1870 358 307 265 237 242 208 148 116 102 89

1880 77 54 105 59 77 36 70 38 38 75

1890 95 182 234 233 240 237 295 419 321 210

1900 296 227 261 241 241 222 195 214 201 135

1910 189 156 177 219 133 79 114 136 110 141

1920 114 147 144 124 125 123 93 101 107 86

1930 83 57 63 63 53 72 66 53 68 66

1940 40 40 36 55 40 34 54 49 31 75

1950 72 140 164 178 185 181 148 183 185 168

1960 77 145 148 165 131 120 143 217 167 144

1970 160 171 106 159 123 135 128 168 154 145

1980 127 101 109 144 131 151 153 151 134 140

1990 147 143 152 140 132 141 129 131 124 148

2000 161 180 205 143 152 161 120 194 181 172

2010 261 125 184 186 205 130

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105B 1866 to 2015 150 years Series 2

[B] Entire series, effect on correlation ( .686) is:

Lower 1867< -.036 1918> -.017 1962> -.016 1935< -.016 1930> -.005 1939> -.005 Higher 1911 .013 2011 .012

105B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1866 192 132 137 148

1870 150 189 158 128 137 113 85 81 72 75

1880 75 57 102 48 69 34 48 32 32 48

1890 69 111 119 155 135 158 215 231 222 159

1900 204 197 211 170 153 134 105 92 94 89

1910 115 73 103 114 83 63 75 101 84 85

1920 86 94 106 93 96 97 92 124 94 62

1930 76 70 74 77 44 35 40 49 52 70

1940 42 37 32 37 31 22 28 36 9 34

1950 24 57 76 103 118 113 100 130 135 150

1960 79 143 182 155 114 87 88 111 118 139

1970 141 175 111 153 96 152 128 170 158 144

1980 125 109 121 135 100 114 146 167 111 121

1990 147 114 165 146 109 119 106 104 89 122

2000 97 122 162 99 94 116 65 108 101 111

2010 136 77 89 107 106 77

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165A 1909 to 2015 107 years Series 3

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

Lower 1930< -.020 2003> -.018 1940> -.013 1962> -.011 1918> -.008 1965< -.007 Higher 2011 .020 2006 .015

165A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1909 58

1910 75 27 42 52 59 50 175 205 77 47

1920 58 111 102 93 115 119 164 201 171 132

1930 94 118 263 239 236 336 252 273 296 284

1940 349 305 362 279 241 293 244 262 237 270

1950 217 346 284 303 383 329 266 297 259 289

1960 251 346 313 308 200 166 206 291 278 240

1970 239 222 141 195 151 218 170 249 211 159

1980 158 131 158 186 186 211 185 187 171 196

1990 200 137 137 107 115 133 125 152 103 129

2000 114 129 166 132 117 161 87 166 156 161

2010 164 86 131 134 116 87

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165B 1900 to 2015 116 years Series 4

[B] Entire series, effect on correlation ( .624) is:

Lower 1948> -.026 1982> -.016 2004> -.015 1981> -.014 1918> -.013 1990< -.012 Higher 1911 .022 2011 .020

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

1982 +3.2 SD

165B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1900 116 134 154 102 51 52 41 32 48 55

1910 76 13 45 45 58 63 239 236 117 114

1920 124 164 208 187 171 183 181 233 225 179

1930 163 173 199 207 271 493 306 462 404 373

1940 310 245 351 252 279 337 306 367 408 362

1950 316 445 432 415 437 396 241 263 193 251

1960 175 269 229 225 161 165 195 305 287 315

1970 285 255 205 288 211 276 251 464 280 257

1980 238 248 307 291 237 272 248 262 200 189

1990 186 190 250 245 203 224 172 205 172 168

2000 155 206 225 143 222 190 90 159 119 147

2010 205 93 151 146 141 95

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323A 1961 to 2015 55 years Series 5

[B] Entire series, effect on correlation ( .533) is:

Lower 1989< -.037 1973< -.026 1994> -.021 2011> -.013 1972> -.012 1984> -.012 Higher 2003 .052 2015 .037

323A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1961 375 272 271 248 309 296 296 268 253

1970 274 311 271 248 244 228 242 239 223 267

1980 268 217 241 278 271 251 254 235 192 171

1990 218 229 285 280 297 289 232 262 232 247

2000 236 270 282 170 236 275 242 280 306 394

2010 436 346 440 432 396 218

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323B 1942 to 2015 74 years Series 6

[B] Entire series, effect on correlation ( .463) is:

Lower 1993< -.045 1972> -.027 1970< -.026 1948> -.016 1988> -.015 1950> -.013 Higher 1981 .038 2015 .030

323B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1942 90 133 133 74 348 349 294 266

1950 339 371 423 366 300 306 301 300 322 318

1960 283 356 307 265 254 236 242 260 278 254

1970 213 269 255 236 234 224 189 232 252 198

1980 175 156 203 241 262 274 266 284 290 273

1990 267 226 295 195 227 270 264 273 246 274

2000 253 256 288 215 204 221 212 230 216 312

2010 292 228 305 269 273 178

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1055A 1935 to 2015 81 years Series 7

[B] Entire series, effect on correlation ( .442) is:

Lower 2011> -.039 1944> -.020 1999< -.016 1994> -.013 1953< -.012 1975< -.010 Higher 2003 .048 2015 .021

1055A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1935 677 411 408 399 385

1940 367 366 390 328 364 347 313 243 135 168

1950 179 236 239 194 175 207 201 206 215 258

1960 240 263 227 215 201 237 273 277 254 220

1970 199 200 187 205 170 128 120 133 119 122

1980 133 122 108 137 153 159 145 132 129 133

1990 138 135 134 98 104 100 86 60 68 55

2000 66 63 83 47 60 82 72 79 84 132

2010 185 257 305 366 319 163

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1055B 1951 to 2015 65 years Series 8

[B] Entire series, effect on correlation ( .411) is:

Lower 2011> -.037 1974> -.020 1975< -.018 1972> -.018 1957< -.016 1994> -.014 Higher 1960 .029 2003 .028

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

1974 +3.2 SD

1055B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1951 412 450 348 313 348 288 229 221 213

1960 163 201 153 133 140 169 158 154 153 132

1970 116 131 126 157 149 118 118 124 115 106

1980 110 104 87 107 111 112 126 116 113 118

1990 158 135 129 105 118 120 116 91 61 62

2000 88 64 75 44 39 50 48 75 77 85

2010 200 217 293 259 199 156

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1184A 1918 to 2015 98 years Series 9

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

Lower 1997< -.037 1918> -.010 1991> -.009 1970> -.008 1972> -.008 1924< -.008 Higher 2003 .036 1948 .018

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

1970 +3.1 SD

1184A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1918 425 580

1920 543 528 476 348 321 377 323 326 346 260

1930 241 260 357 292 236 310 211 253 299 235

1940 186 206 196 192 171 165 191 154 95 143

1950 115 238 271 242 176 222 227 232 233 200

1960 150 185 146 138 128 102 124 128 104 334

1970 454 313 179 175 100 96 94 96 74 85

1980 90 77 67 88 75 82 79 70 62 76

1990 66 71 65 63 64 78 68 53 61 78

2000 69 81 103 63 62 115 101 132 147 156

2010 227 130 169 179 135 81

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1184B 1917 to 2015 99 years Series 10

[B] Entire series, effect on correlation ( .451) is:

Lower 1918> -.035 1924< -.031 1975< -.016 1994> -.013 1979> -.009 1974> -.009 Higher 2003 .024 1981 .019

1184B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 247 225 241

1920 212 249 232 201 197 246 249 278 315 248

1930 198 272 322 307 282 359 265 300 298 266

1940 254 260 283 289 246 273 286 269 250 239

1950 221 266 246 267 281 243 230 254 249 210

1960 144 235 185 162 157 138 155 150 188 168

1970 143 150 121 157 149 103 131 138 125 146

1980 119 99 96 114 107 131 124 111 115 117

1990 129 116 118 127 134 139 129 116 105 112

2000 118 106 144 93 86 152 118 103 88 100

2010 137 86 132 158 131 71

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1185A 1945 to 2015 71 years Series 11

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

Lower 2003> -.032 1971< -.018 1994> -.018 1992< -.017 1988> -.014 1960> -.014 Higher 1981 .040 2006 .027

1185A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1945 236 361 524 452 471

1950 327 513 383 300 323 383 343 348 397 387

1960 342 350 242 263 282 317 280 303 220 165

1970 146 145 157 171 152 109 106 120 101 109

1980 94 53 79 89 98 89 82 74 80 80

1990 64 61 57 52 86 90 79 62 51 71

2000 99 95 94 72 51 66 48 65 72 71

2010 76 53 83 90 64 39

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

1185B 1943 to 2015 73 years Series 12

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

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

1943 1992 0 -.10 .00 .06 -.22 .06 -.16 -.05 -.20 .20 -.16 .31\* .09 .06 -.04 .18 -.09 .11 .00 -.03 -.31 .21

[B] Entire series, effect on correlation ( .410) is:

Lower 1962< -.039 1972> -.037 1948> -.020 1960> -.017 2015> -.017 2014< -.016 Higher 2003 .049 1981 .018

1943 to 1992 segment:

Lower 1972> -.056 1948> -.030 1960> -.025 1988> -.011 1965> -.010 1945> -.008 Higher 1981 .037 1973 .022

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

1948 +3.5 SD

1185B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1943 161 114 256 332 553 432 249

1950 243 304 296 253 275 330 226 215 221 231

1960 246 261 164 204 196 233 255 239 235 199

1970 177 176 200 217 169 117 98 117 112 121

1980 65 55 80 104 114 145 133 156 141 131

1990 120 127 144 85 86 81 68 59 64 65

2000 82 87 92 47 47 56 42 65 51 54

2010 79 64 93 110 63 64

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1186A 1878 to 2015 138 years Series 13

[B] Entire series, effect on correlation ( .676) is:

Lower 1994< -.021 1962> -.013 1930> -.011 1902< -.010 1925< -.008 1910< -.007 Higher 1918 .015 1911 .011

1186A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1878 220 166

1880 197 137 205 118 154 95 123 90 81 91

1890 100 139 136 157 175 117 218 424 464 384

1900 485 335 263 288 311 227 230 249 208 180

1910 172 134 197 200 166 125 164 218 120 131

1920 93 103 145 111 106 83 88 129 122 112

1930 125 79 83 91 71 74 51 39 43 41

1940 25 16 17 23 21 14 21 35 22 63

1950 72 143 163 150 138 128 124 147 188 215

1960 135 267 272 312 271 308 222 279 209 240

1970 244 293 216 335 243 302 234 309 213 194

1980 226 164 164 201 144 202 236 197 166 225

1990 228 180 219 182 137 192 158 143 154 183

2000 154 155 193 127 120 137 120 174 186 176

2010 241 126 230 197 186 101

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

1186B 1902 to 2015 114 years Series 14

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

Lower 2003> -.021 1986< -.018 1903< -.013 1974> -.011 1930> -.009 1991> -.009 Higher 2011 .020 1981 .018

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

1918 -7.3 SD

1186B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1902 360 287 320 267 268 284 298 265

1910 282 200 205 180 169 159 180 184 52 98

1920 111 117 119 86 102 92 81 104 85 70

1930 78 58 52 57 45 43 42 55 38 38

1940 18 20 12 22 26 8 24 34 27 64

1950 91 178 193 209 189 187 178 183 183 193

1960 139 185 173 172 181 201 174 162 154 140

1970 168 177 155 202 191 177 144 159 129 134

1980 112 90 102 133 137 151 123 138 133 143

1990 161 186 187 152 158 173 144 143 165 179

2000 204 183 227 195 191 169 131 166 160 144

2010 218 110 148 176 148 93

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1187A 1893 to 2015 123 years Series 15

[B] Entire series, effect on correlation ( .695) is:

Lower 1934< -.020 1974> -.011 1935< -.010 2003> -.007 1972> -.007 1930> -.007 Higher 1918 .024 2015 .016

1187A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1893 264 268 181 398 647 597 380

1900 420 435 422 408 328 282 240 252 228 182

1910 204 124 167 137 148 114 149 222 56 226

1920 134 239 234 177 268 229 247 237 272 215

1930 252 187 213 230 131 169 180 302 275 221

1940 188 177 249 221 201 209 242 250 72 188

1950 213 421 427 403 403 376 235 243 212 257

1960 128 216 165 168 135 170 141 174 110 117

1970 120 136 127 186 180 207 158 210 161 140

1980 128 105 103 111 97 144 135 107 78 83

1990 85 80 97 82 65 108 73 95 66 97

2000 93 112 124 91 87 88 61 109 98 91

2010 139 81 101 106 92 42

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

1187B 1872 to 2015 144 years Series 16

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

Lower 2003> -.038 1917< -.008 1965> -.008 1953< -.008 1948> -.008 1895< -.007 Higher 2015 .017 2011 .015

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

2003 +3.3 SD

1187B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1872 267 131 185 189 154 128 146 102

1880 150 135 181 102 134 90 126 104 84 144

1890 116 211 220 178 153 91 152 325 294 226

1900 302 224 251 235 185 162 128 159 153 130

1910 129 65 72 68 47 39 63 60 35 63

1920 71 108 168 158 183 211 199 201 205 178

1930 170 162 176 155 128 185 142 169 206 172

1940 127 128 122 139 121 148 163 191 178 218

1950 195 279 228 183 271 288 172 248 193 245

1960 136 226 198 234 193 271 228 271 190 175

1970 155 175 109 184 140 157 124 161 125 114

1980 137 112 104 111 90 124 125 127 99 128

1990 114 99 126 115 98 102 93 87 70 103

2000 108 125 195 166 115 131 83 135 125 105

2010 113 52 69 78 83 36

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

1188A 1929 to 2015 87 years Series 17

[B] Entire series, effect on correlation ( .653) is:

Lower 1948< -.028 1962> -.023 2003> -.019 1992< -.012 1936> -.011 1947< -.009 Higher 2006 .017 2015 .013

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

1948 -5.4 SD

1188A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1929 103

1930 97 110 122 134 113 114 134 117 120 104

1940 82 93 115 108 100 89 93 76 13 86

1950 118 196 193 254 198 205 156 236 254 258

1960 200 318 312 304 240 275 229 298 203 234

1970 221 296 192 317 216 287 173 237 228 203

1980 187 149 132 201 200 210 280 189 155 216

1990 189 200 169 156 128 168 141 136 130 177

2000 170 183 302 179 214 214 102 329 180 200

2010 278 122 210 170 176 92

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1188B 1903 to 2015 113 years Series 18

[B] Entire series, effect on correlation ( .651) is:

Lower 1960> -.026 1915> -.014 1930> -.013 1991> -.012 1931> -.010 1962> -.010 Higher 1918 .032 1911 .024

1188B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1903 331 201 172 160 170 164 190

1910 226 126 147 140 119 144 155 157 96 138

1920 128 151 154 107 144 128 75 89 79 70

1930 114 109 114 105 67 61 66 74 109 76

1940 62 63 48 52 55 21 31 65 12 107

1950 117 322 333 405 324 267 196 263 180 215

1960 357 358 327 337 266 280 303 267 191 226

1970 212 270 168 262 227 187 152 222 166 179

1980 157 133 136 223 198 212 264 237 208 216

1990 234 304 329 264 212 238 217 219 178 248

2000 190 178 250 176 136 148 132 228 151 152

2010 259 134 213 143 182 102

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1189A 1926 to 2015 90 years Series 19

[B] Entire series, effect on correlation ( .450) is:

Lower 1998> -.025 1976> -.024 2008< -.024 2000< -.022 1979< -.017 1956> -.017 Higher 2015 .020 2006 .019

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

1976 +3.3 SD

1189A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 11 10 16 15

1930 11 7 20 19 11 14 11 10 12 10

1940 13 14 9 16 7 8 7 4 3 4

1950 32 47 158 146 212 203 296 290 226 220

1960 165 225 155 194 143 150 160 179 208 308

1970 262 306 298 394 308 336 595 488 369 333

1980 296 224 174 176 138 149 186 220 158 342

1990 227 154 248 215 169 171 165 158 218 204

2000 142 184 237 158 164 188 120 202 142 127

2010 164 103 105 157 112 81

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1189B 1926 to 2015 90 years Series 20

[B] Entire series, effect on correlation ( .438) is:

Lower 2006> -.037 1977< -.021 1936> -.016 2010< -.015 2011> -.013 2004> -.013 Higher 2003 .062 2015 .058

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

2015 -5.2 SD

1189B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 16 22 29 12

1930 7 11 10 14 9 6 10 9 9 7

1940 13 10 7 8 12 7 8 10 14 6

1950 72 258 249 217 147 114 84 158 233 294

1960 275 335 295 325 266 316 301 393 331 827

1970 788 728 527 546 437 446 426 298 282 239

1980 264 249 212 210 214 227 312 264 188 202

1990 223 244 284 194 188 172 157 161 187 268

2000 258 274 389 228 326 280 350 331 319 315

2010 302 307 407 332 360 156

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1192A 1892 to 2015 124 years Series 21

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

Lower 1892< -.027 1948> -.011 1939< -.010 1915> -.010 1976< -.009 1899> -.007 Higher 1918 .030 1911 .017

1192A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1892 148 219 268 255 326 426 326 292

1900 271 271 223 201 159 126 89 94 109 127

1910 136 75 101 87 86 92 134 130 58 68

1920 71 112 130 109 120 108 80 130 117 126

1930 90 105 94 109 104 135 94 106 131 84

1940 98 108 117 140 145 190 317 594 426 410

1950 406 552 561 423 364 414 331 296 270 298

1960 227 289 250 256 212 243 267 296 310 321

1970 348 332 199 314 285 338 196 303 259 230

1980 181 125 151 175 137 129 136 134 115 121

1990 133 98 141 131 91 108 87 106 85 133

2000 110 143 137 89 74 86 95 161 162 149

2010 196 113 217 233 212 113

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1192B 1893 to 2015 123 years Series 22

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

Lower 1948> -.029 1919< -.015 1981> -.010 1960> -.007 1937< -.006 1953< -.006 Higher 2011 .017 2003 .015

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

1948 +3.5 SD

1192B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1893 218 179 255 328 474 338 288

1900 284 256 254 236 208 162 146 125 130 111

1910 169 100 117 104 107 100 138 158 90 75

1920 98 115 130 142 166 137 150 130 197 152

1930 121 139 140 139 142 175 137 115 129 107

1940 68 81 95 101 110 158 329 520 510 378

1950 306 505 536 324 363 431 371 416 401 605

1960 434 586 422 384 356 307 277 336 287 342

1970 300 337 197 312 154 173 166 179 162 126

1980 114 121 115 157 102 110 115 139 124 116

1990 146 112 167 127 123 130 122 97 97 134

2000 127 128 136 76 114 148 94 126 125 133

2010 200 86 144 154 145 91

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1193A 1934 to 2015 82 years Series 23

[B] Entire series, effect on correlation ( .521) is:

Lower 1962< -.032 1948> -.025 1934> -.014 1946> -.009 1990< -.009 1950> -.008 Higher 2003 .051 1981 .031

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

1948 +3.1 SD; 1962 -5.9 SD

1193A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1934 101 102 76 65 52 60

1940 75 72 78 96 87 141 430 575 460 265

1950 332 502 470 335 263 293 205 260 260 283

1960 189 229 127 189 181 187 195 203 142 143

1970 129 198 152 184 165 192 169 143 174 181

1980 103 56 95 139 107 106 85 102 62 56

1990 52 46 53 52 51 44 47 42 34 35

2000 47 41 51 25 28 49 40 69 69 83

2010 93 68 76 81 78 71

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1193B 1948 to 2015 68 years Series 24

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

Lower 1968< -.067 1954< -.031 2003> -.025 1972> -.022 2006> -.021 1991< -.017 Higher 1981 .037 2015 .026

1193B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1948 341 261

1950 477 567 543 359 202 284 350 324 356 379

1960 339 385 295 336 281 246 303 284 195 260

1970 243 250 259 306 221 228 221 287 269 250

1980 194 142 173 179 172 203 184 191 176 173

1990 171 99 150 124 126 99 94 104 94 115

2000 95 116 131 127 92 121 135 173 137 173

2010 228 141 178 154 134 90

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1194A 1901 to 2015 115 years Series 25

[B] Entire series, effect on correlation ( .653) is:

Lower 2003> -.036 1919< -.020 1994< -.015 1960> -.009 1915> -.009 1940> -.009 Higher 1918 .034 2015 .014

1194A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1901 279 299 210 162 147 98 52 47 52

1910 76 30 50 81 58 62 95 86 30 25

1920 46 84 162 145 148 122 98 154 157 185

1930 192 192 348 318 271 456 334 419 405 387

1940 421 316 399 282 315 342 289 307 256 286

1950 279 467 374 324 366 372 312 313 257 347

1960 283 367 246 210 162 159 202 305 309 303

1970 276 263 177 317 184 295 230 305 250 217

1980 211 190 177 232 165 190 196 189 188 191

1990 212 176 257 172 131 139 137 133 109 150

2000 135 135 197 185 140 212 126 191 217 203

2010 221 152 217 212 144 92

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1194B 1926 to 2015 90 years Series 26

[B] Entire series, effect on correlation ( .660) is:

Lower 2003> -.026 1981> -.023 2012< -.018 2004> -.011 1928< -.009 1985< -.008 Higher 2011 .017 1948 .015

1194B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1926 140 163 143 144

1930 117 123 320 266 233 309 262 334 377 403

1940 371 341 458 307 284 284 280 312 216 347

1950 267 478 454 398 424 456 313 387 304 342

1960 288 430 246 292 192 206 257 300 213 239

1970 247 243 118 207 134 162 189 204 153 155

1980 131 147 141 185 99 123 205 190 119 153

1990 179 132 159 139 123 120 120 114 106 124

2000 131 157 211 138 168 175 111 168 148 131

2010 165 78 91 123 143 80

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1199A 1890 to 2015 126 years Series 27

[B] Entire series, effect on correlation ( .684) is:

Lower 1918> -.018 1916< -.014 1974< -.010 1950< -.009 1927< -.007 1919> -.005 Higher 2003 .012 2006 .012

1199A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1890 44 58 54 47 53 69 96 169 177 69

1900 85 68 76 56 51 33 33 35 27 29

1910 37 15 13 19 18 13 10 27 17 51

1920 42 43 67 73 75 95 52 45 44 45

1930 36 33 39 48 57 86 62 66 71 71

1940 69 63 107 68 73 73 75 115 97 118

1950 85 161 167 191 261 266 246 245 265 269

1960 225 304 224 242 174 168 227 300 268 259

1970 214 201 147 237 137 172 144 180 158 184

1980 161 131 159 190 165 210 253 198 165 178

1990 210 148 196 136 165 175 172 157 133 155

2000 118 140 189 118 130 178 104 150 119 124

2010 164 95 139 164 162 98

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1199B 1863 to 2015 153 years Series 28

[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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1900 1949 0 -.27 -.30 .00 -.07 .03 .14 -.15 -.16 .15 .17 .30\*-.25 .04 .12 .04 .04 -.14 .13 .03 .09 .20

[B] Entire series, effect on correlation ( .564) is:

Lower 1918> -.027 1931< -.019 1863< -.014 1950< -.012 1946< -.010 1867> -.008 Higher 2011 .018 2003 .016

1900 to 1949 segment:

Lower 1918> -.070 1931< -.024 1943> -.019 1946< -.018 1944> -.015 1945> -.014 Higher 1911 .050 1922 .023

1199B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1863 315 383 456 376 434 402 326

1870 344 306 250 243 281 167 114 96 81 82

1880 60 44 71 42 55 30 36 29 37 65

1890 89 145 164 164 173 163 138 227 197 73

1900 106 81 94 94 61 45 26 22 18 9

1910 14 1 7 3 11 13 20 38 36 30

1920 25 54 67 68 76 123 52 63 96 69

1930 52 30 60 57 49 69 58 59 79 88

1940 90 83 137 146 143 166 128 148 146 171

1950 113 180 163 203 219 273 213 242 222 263

1960 198 279 170 151 149 134 173 264 245 261

1970 260 220 164 195 133 148 135 175 132 125

1980 110 86 92 121 88 100 140 121 88 97

1990 114 90 127 114 79 99 102 83 76 98

2000 92 114 139 91 102 128 91 132 102 105

2010 143 74 124 130 96 73

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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 105A 1861 2015 155 6 0 .667 1.55 4.36 .824 .868 .214 2.58 .413 -.029 1

2 105B 1866 2015 150 6 0 .686 1.06 2.31 .453 .810 .231 2.64 .456 -.077 1

3 165A 1909 2015 107 4 0 .626 1.88 3.83 .838 .824 .226 2.69 .572 -.014 1

4 165B 1900 2015 116 4 0 .624 2.19 4.93 1.037 .797 .237 2.97 .453 -.053 1

5 323A 1961 2015 55 2 0 .533 2.73 4.40 .594 .664 .126 2.45 .396 .008 1

6 323B 1942 2015 74 3 0 .463 2.57 4.23 .607 .623 .144 2.63 .474 .041 1

7 1055A 1935 2015 81 3 0 .442 1.99 6.77 1.116 .915 .145 2.56 .344 .032 2

8 1055B 1951 2015 65 2 0 .411 1.51 4.50 .856 .927 .154 2.83 .506 .009 1

9 1184A 1918 2015 98 4 0 .562 1.83 5.80 1.189 .894 .197 2.67 .472 .047 1

10 1184B 1917 2015 99 4 0 .451 1.85 3.59 .716 .897 .146 2.69 .521 .018 2

11 1185A 1945 2015 71 3 0 .429 1.75 5.24 1.351 .930 .183 2.45 .342 -.021 3

12 1185B 1943 2015 73 3 1 .410 1.58 5.53 .977 .864 .193 2.52 .381 -.007 1

13 1186A 1878 2015 138 5 0 .676 1.69 4.85 .878 .826 .236 2.78 .516 -.048 2

14 1186B 1902 2015 114 4 0 .565 1.44 3.60 .707 .903 .193 2.35 .266 -.046 1

15 1187A 1893 2015 123 5 0 .695 1.93 6.47 1.093 .818 .245 2.54 .390 -.073 3

16 1187B 1872 2015 144 6 0 .620 1.51 3.25 .596 .717 .233 2.72 .468 -.059 2

17 1188A 1929 2015 87 3 0 .653 1.82 3.29 .684 .574 .256 2.55 .368 .065 2

18 1188B 1903 2015 113 4 0 .651 1.78 4.05 .834 .789 .251 2.67 .559 -.068 1

19 1189A 1926 2015 90 3 0 .450 1.56 5.95 1.198 .881 .278 2.94 .602 -.092 4

20 1189B 1926 2015 90 3 0 .438 2.20 8.27 1.751 .896 .260 2.64 .344 -.137 1

21 1192A 1892 2015 124 5 0 .673 1.92 5.94 1.126 .875 .206 2.67 .504 -.096 1

22 1192B 1893 2015 123 5 0 .665 2.02 6.05 1.241 .859 .209 2.62 .416 -.001 2

23 1193A 1934 2015 82 3 0 .521 1.43 5.75 1.168 .869 .219 2.47 .422 -.028 1

24 1193B 1948 2015 68 3 0 .387 2.22 5.67 1.060 .850 .186 2.55 .430 -.047 1

25 1194A 1901 2015 115 4 0 .653 2.14 4.67 1.022 .827 .232 2.82 .504 .112 2

26 1194B 1926 2015 90 3 0 .660 2.21 4.78 1.033 .790 .224 2.58 .446 -.003 1

27 1199A 1890 2015 126 5 0 .684 1.23 3.04 .750 .885 .231 2.82 .580 -.110 2

28 1199B 1863 2015 153 6 1 .564 1.28 4.56 .899 .917 .268 2.62 .475 -.050 5

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Total or mean: 2924 111 2 .587 1.76 8.27 .933 .835 .217 2.97 .456 -.031

- = [ COFECHA 1130 COF ] = -