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[] P R O G R A M C O F E C H A Version 6.06P 29766

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: HHSG19A05\_ACSA\_Corr2-50

File of DATED series: HHSG19A05\_ACSA\_Corr2

CONTENTS:

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

Part 2: Histogram of time spans

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

Part 4: Bar plot of Master Dating Series

Part 5: Correlation by segment of each series with Master

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

Part 7: Descriptive statistics

RUN CONTROL OPTIONS SELECTED VALUE

1 Cubic smoothing spline 50% wavelength cutoff for filtering

32 years

2 Segments examined are 50 years lagged successively by 25 years

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

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

5 CORRELATION is Pearson (parametric, quantitative)

Critical correlation, 99% confidence level .3281

6 Master dating series saved N

7 Ring measurements listed Y

8 Parts printed 1234567

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

Time span of Master dating series is 1889 to 2015 127 years

Continuous time span is 1889 to 2015 127 years

Portion with two or more series is 1906 to 2015 110 years

>> 339A 2002 absent in 2 of 39 series, but is not usually narrow: master index is .019

>> 339A 2003 absent in 1 of 39 series, but is not usually narrow: master index is .233

>> 338A 2002 absent in 2 of 39 series, but is not usually narrow: master index is .019

>> 135B 1990 absent in 3 of 39 series, but is not usually narrow: master index is -.326

>> 134A 1990 absent in 3 of 39 series, but is not usually narrow: master index is -.326

>> 134B 1990 absent in 3 of 39 series, but is not usually narrow: master index is -.326

>> 127A 2013 absent in 1 of 39 series, but is not usually narrow: master index is .264

>> 127A 2014 absent in 2 of 39 series, but is not usually narrow: master index is .932

>> 127B 2014 absent in 2 of 39 series, but is not usually narrow: master index is .932

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

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

\*O\* Master series 1889 2015 127 yrs \*O\*

\*F\* Total rings in all series 3980 \*F\*

\*E\* Total dated rings checked 3963 \*E\*

\*C\* Series intercorrelation .720 \*C\*

\*H\* Average mean sensitivity .382 \*H\*

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

\*\*\* Mean length of series 102.1 \*\*\*

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

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

343A 1 absent rings: 2001

343B 2 absent rings: 2001 2006

342A 4 absent rings: 2001 2006 2007 2012

342B 3 absent rings: 2001 2006 2012

341A 2 absent rings: 1936 2001

341B 1 absent rings: 2001

339A 4 absent rings: 2000 2001 2002 2003

339B 2 absent rings: 1988 2001

338A 3 absent rings: 2001 2002 2015

338B 1 absent rings: 2001

335A 1 absent rings: 1988

187A 2 absent rings: 2005 2006

187B 3 absent rings: 1988 2005 2006

180A 2 absent rings: 2001 2006

180B 1 absent rings: 2001

138B 2 absent rings: 2000 2001

135A 3 absent rings: 1954 2006 2007

135B 2 absent rings: 1990 2006

134A 2 absent rings: 1988 1990

134B 2 absent rings: 1988 1990

128B 1 absent rings: 2006

127A 8 absent rings: 2001 2005 2006 2007 2012 2013 2014 2015

127B 5 absent rings: 2005 2006 2012 2014 2015

14A 3 absent rings: 1988 2001 2006

60 absent rings 1.508%

1900 -.659 1 1950 .046 39 2000 -.465 39 2

1901 -1.015 1 1951 1.399 39 2001 -.620 39 15

1902 .071 1 1952 .691 39 2002 .019 39 2<<

1903 -2.799 1 1953 -1.252 39 2003 .233 39 1<<

1904 -2.412 1 1954 -1.696 39 1 2004 .420 39

1905 -2.261 1 1955 .019 39 2005 -.450 39 4

1906 -2.464 3 1956 .343 39 2006 -1.617 39 12

1907 -.014 4 1957 .467 39 2007 -.633 39 3

1908 .459 8 1958 .622 39 2008 1.365 39

1909 .156 12 1959 -.263 39 2009 1.473 39

1910 1.098 15 1960 .588 39 2010 1.063 39

1911 1.086 19 1961 .978 39 2011 .183 39

1912 -.636 19 1962 .383 39 2012 -.597 39 4

1913 -.986 23 1963 -.680 39 2013 .264 39 1<<

1914 -.230 24 1964 -.985 39 2014 .932 39 2<<

1915 .672 26 1965 -1.082 39 2015 -1.143 39 3

1916 -.149 27 1966 -.017 39

1917 -.778 29 1967 1.057 39

1918 -.317 29 1968 .321 39

1919 -.738 29 1969 .258 39

1920 .421 32 1970 .413 39

1921 -.072 32 1971 -.804 39

1922 .303 34 1972 1.246 39

1923 -1.174 34 1973 .238 39

1924 -.070 34 1974 1.014 39

1925 .551 35 1975 -.300 39

1926 .702 35 1976 -.423 39

1927 .609 35 1977 -1.796 39

1928 .406 36 1978 -.861 39

1929 .472 36 1979 .552 39

1930 1.189 38 1980 .594 39

1931 1.398 39 1981 .264 39

1932 1.025 39 1982 1.458 39

1933 -.527 39 1983 .056 39

1934 -.173 39 1984 .252 39

1935 .275 39 1985 .848 39

1936 -4.752 39 1 1986 -.398 39

1937 -.804 39 1987 .601 39

1938 -.597 39 1988 -2.874 39 6

1889 .837 1 1939 -.508 39 1989 .393 39

1890 1.852 1 1940 .375 39 1990 -.326 39 3<<

1891 1.067 1 1941 .553 39 1991 -.087 39

1892 1.465 1 1942 .805 39 1992 1.006 39

1893 .653 1 1943 1.206 39 1993 .679 39

1894 -.067 1 1944 .911 39 1994 .318 39

1895 .698 1 1945 -.959 39 1995 -.161 39

1896 -.207 1 1946 -.501 39 1996 .643 39

1897 -.214 1 1947 1.056 39 1997 .523 39

1898 -.035 1 1948 -.527 39 1998 .645 39

1899 -.775 1 1949 -.396 39 1999 .103 39

PART 5: CORRELATION OF SERIES BY SEGMENTS: HHSG19A05\_ACSA\_Corr2-50 14:30 Tue 28 Jun 2016 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 1900 1925 1950 1975

1949 1974 1999 2024

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

1 343A 1914 2015 .76 .82 .85 .86

2 343B 1922 2015 .82 .86 .79 .80

3 342A 1922 2015 .79 .78 .73 .72

4 342B 1908 2015 .81 .76 .57 .58

5 341A 1907 2015 .69 .67 .70 .63

6 341B 1913 2015 .67 .89 .75 .74

7 340A 1917 2015 .75 .82 .30A .34

8 340B 1911 2015 .81 .82 .56 .59

9 339A 1915 2015 .75 .83 .84 .85

10 339B 1920 2015 .85 .86 .70 .71

11 338A 1913 2015 .74 .81 .67 .72

12 338B 1920 2015 .59 .69 .72 .79

13 337A 1913 2015 .78 .79 .52 .60

14 337B 1916 2015 .51 .57 .66 .75

15 336A 1931 2015 .85 .82 .82

16 336B 1928 2015 .86 .75 .79

17 335A 1909 2015 .79 .83 .72 .77

18 335B 1908 2015 .84 .87 .77 .80

19 208A 1930 2015 .80 .69 .68

20 208B 1911 2015 .84 .84 .54 .59

21 187A 1920 2015 .82 .82 .78 .83

22 187B 1909 2015 .86 .89 .77 .71

23 180A 1910 2015 .84 .81 .62 .63

24 180B 1913 2015 .77 .81 .72 .78

25 171A 1925 2015 .89 .68 .66

26 171B 1930 2015 .72 .72 .75

27 138A 1909 2015 .63 .72 .68 .75

28 138B 1909 2015 .71 .78 .62 .70

29 135A 1908 2015 .78 .80 .63 .59

30 135B 1911 2015 .65 .66 .52 .56

31 134A 1910 2015 .74 .76 .58 .59

32 134B 1915 2015 .78 .83 .61 .62

33 132A 1917 2015 .82 .88 .62 .63

34 132B 1911 2015 .86 .89 .70 .67

35 128A 1906 2015 .72 .67 .63 .66

36 128B 1906 2015 .83 .75 .41B .43

37 127A 1908 2015 .70 .65 .77 .79

38 127B 1910 2015 .80 .78 .82 .81

39 14A 1889 2015 .78 .73 .47 .59

Av segment correlation .76 .79 .67 .69

PART 6: POTENTIAL PROBLEMS: HHSG19A05\_ACSA\_Corr2-50 14:30 Tue 28 Jun 2016 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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343A 1914 to 2015 102 years Series 1

[B] Entire series, effect on correlation ( .784) is:

Lower 1936> -.027 2001< -.018 1986> -.009 2005> -.006 1914> -.006 1975> -.005 Higher 1988 .031 2006 .005

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

2001 -.620 39 15

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

2001 -6.7 SD

343A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1914 169 178 157 125 175 135

1920 153 129 154 150 216 267 280 248 239 263

1930 468 404 420 199 286 197 45 115 121 196

1940 283 279 247 286 282 124 192 299 150 148

1950 263 356 333 180 197 255 342 336 381 212

1960 215 232 233 145 158 151 193 309 260 242

1970 193 153 267 191 222 211 177 139 128 219

1980 239 226 248 152 166 188 195 242 85 213

1990 130 134 171 138 141 129 142 126 151 112

2000 61 0 73 128 130 142 19 15 193 240

2010 178 117 51 142 206 57

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343B 1922 to 2015 94 years Series 2

[B] Entire series, effect on correlation ( .754) is:

Lower 2001< -.055 1986> -.020 1922< -.018 1954> -.009 2000> -.009 1960< -.006 Higher 1936 .034 1988 .034

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

2001 -.620 39 15

2006 -1.617 39 12

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

2001 -5.8 SD

343B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1922 194 188 229 246 254 219 247 279

1930 342 401 313 164 237 185 22 65 133 184

1940 277 269 276 307 275 102 187 277 192 168

1950 250 289 298 169 199 250 302 299 322 199

1960 141 209 255 152 111 117 185 287 250 210

1970 168 96 210 159 210 141 131 75 64 155

1980 198 172 261 150 140 149 202 209 57 163

1990 104 83 96 86 92 70 73 82 132 96

2000 114 0 81 114 106 91 0 10 163 204

2010 135 117 62 95 164 51

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342A 1922 to 2015 94 years Series 3

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

Lower 2003< -.018 1948> -.017 1971> -.008 1974< -.007 2005> -.006 1922< -.006 Higher 1936 .088 1988 .020

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

2001 -.620 39 15

2006 -1.617 39 12

2007 -.633 39 3

2012 -.597 39 4

342A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1922 206 197 235 227 280 352 340 337

1930 420 488 421 208 315 296 30 172 233 187

1940 241 274 221 298 242 63 193 303 307 286

1950 266 242 206 139 105 148 138 144 179 197

1960 262 191 130 114 125 120 162 238 234 275

1970 253 203 231 223 157 111 136 89 46 132

1980 139 185 246 111 137 202 117 139 50 92

1990 113 108 204 187 122 131 131 129 151 143

2000 64 0 105 26 100 136 0 0 169 192

2010 166 103 0 131 208 70

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342B 1908 to 2015 108 years Series 4

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

Lower 1971> -.019 1974< -.018 1909> -.011 1961< -.010 1949> -.009 1973> -.007 Higher 1936 .119 2006 .007

[D] 3 Absent rings: Year Master N series Absent

2001 -.620 39 15

2006 -1.617 39 12

2012 -.597 39 4

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

1971 +3.3 SD

342B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1908 68 128

1910 98 111 84 68 57 100 96 72 152 126

1920 166 194 186 194 205 202 265 286 442 349

1930 394 424 346 224 340 321 45 189 254 229

1940 262 245 183 211 176 50 100 219 125 238

1950 207 232 175 102 84 137 192 172 141 108

1960 160 116 76 108 104 123 164 281 172 174

1970 274 352 459 408 221 240 268 209 207 241

1980 215 179 268 169 165 209 146 142 81 148

1990 107 85 201 182 118 158 146 157 168 158

2000 18 0 91 45 67 93 0 8 100 131

2010 110 77 0 65 150 52

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341A 1907 to 2015 109 years Series 5

[B] Entire series, effect on correlation ( .723) is:

Lower 1940< -.027 1988> -.022 2010< -.013 2001< -.008 2011> -.007 1977< -.007 Higher 1936 .065 1923 .006

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

1936 -4.752 39 1

2001 -.620 39 15

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

1977 -5.8 SD

341A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1907 166 211 156

1910 245 374 164 159 155 266 225 179 260 233

1920 326 349 399 234 347 428 422 425 363 354

1930 455 449 417 278 357 334 0 46 148 228

1940 60 142 264 396 363 183 295 422 268 301

1950 272 396 290 163 125 266 264 353 347 290

1960 329 285 281 210 149 145 222 275 243 250

1970 226 191 215 150 188 159 113 4 46 84

1980 111 117 195 132 164 153 67 69 44 85

1990 34 57 142 123 83 71 113 110 116 84

2000 64 0 48 88 49 86 4 43 162 185

2010 61 134 78 92 126 52

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341B 1913 to 2015 103 years Series 6

[B] Entire series, effect on correlation ( .701) is:

Lower 1917< -.083 1977< -.012 2001< -.006 1937< -.005 1938> -.005 1983> -.004 Higher 1936 .045 1988 .008

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

2001 -.620 39 15

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

1917 -8.1 SD; 1977 -6.1 SD

341B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 226 368 356 283 46 333 330

1920 442 387 444 243 322 389 416 451 421 380

1930 430 483 473 252 235 329 31 78 277 324

1940 374 362 327 315 291 171 187 299 217 236

1950 241 359 290 192 138 167 243 268 256 252

1960 324 295 263 169 154 134 205 282 224 219

1970 190 129 229 142 157 122 117 10 87 127

1980 102 136 152 149 159 208 143 177 57 118

1990 71 94 222 175 148 99 154 140 122 120

2000 74 0 70 90 76 92 28 30 196 174

2010 158 89 40 55 177 59

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340A 1917 to 2015 99 years Series 7

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

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

1950 1999 0 -.07 .19 -.33 .05 -.16 .09 -.02 .07 .10 -.14 .30\* .12 -.15 -.07 .03 -.36 .12 -.25 .23 -.01 .14

[B] Entire series, effect on correlation ( .577) is:

Lower 1988> -.087 1980< -.047 1983> -.013 1917> -.013 1986> -.009 1940< -.007 Higher 1936 .107 1972 .011

1950 to 1999 segment:

Lower 1988> -.174 1980< -.091 1983> -.026 1986> -.016 1991< -.009 1962< -.009 Higher 1977 .050 1972 .044

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

1917 +3.0 SD; 1923 -5.2 SD; 1980 -6.0 SD; 1988 +5.9 SD

340A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 225 168 118

1920 194 179 188 91 192 228 255 194 195 189

1930 206 234 196 88 121 193 15 147 138 57

1940 63 68 135 179 155 90 93 223 86 71

1950 106 222 109 70 66 66 123 131 113 57

1960 96 98 48 61 51 72 86 65 41 71

1970 79 49 130 50 67 18 31 14 51 71

1980 4 68 52 84 53 61 64 55 82 67

1990 21 16 97 74 71 58 135 68 96 69

2000 49 20 55 40 49 31 55 211 426 458

2010 373 334 154 269 314 59

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340B 1911 to 2015 105 years Series 8

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

Lower 1988> -.046 1917> -.016 2006> -.010 1986> -.007 2003< -.006 1938> -.005 Higher 1936 .100 1977 .009

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

1917 +3.4 SD; 1988 +3.9 SD

340B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 234 134 157 162 254 205 263 190 98

1920 125 110 160 63 162 241 241 193 169 136

1930 187 178 185 96 112 195 25 135 152 143

1940 153 111 151 165 102 58 60 154 33 62

1950 62 85 61 45 65 62 99 120 83 85

1960 100 129 79 81 78 83 114 136 95 103

1970 101 50 80 48 62 22 32 13 31 53

1980 55 48 54 42 70 49 49 44 38 76

1990 22 29 123 59 73 41 80 53 93 36

2000 49 30 80 31 46 30 148 362 453 454

2010 313 234 194 390 417 59

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339A 1915 to 2015 101 years Series 9

[B] Entire series, effect on correlation ( .778) is:

Lower 1922> -.019 1921> -.010 1917> -.009 2006> -.009 2002< -.006 1915< -.004 Higher 1988 .035 1936 .027

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

2000 -.465 39 2

2001 -.620 39 15

2002 .019 39 2 >> WARNING: Ring is not usually narrow

2003 .233 39 1 >> WARNING: Ring is not usually narrow

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

1922 +4.4 SD

339A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1915 288 225 324 303 214

1920 301 432 699 306 281 257 300 307 289 224

1930 314 331 254 209 158 154 12 155 106 104

1940 193 271 351 337 264 107 113 214 121 105

1950 91 159 187 86 108 177 140 170 231 137

1960 132 160 149 103 57 40 60 79 54 85

1970 102 50 106 81 104 56 57 20 45 79

1980 125 67 138 76 52 88 37 130 13 47

1990 27 49 53 60 34 18 26 37 37 27

2000 0 0 0 0 19 42 74 81 320 364

2010 466 155 180 165 302 83

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339B 1920 to 2015 96 years Series 10

[B] Entire series, effect on correlation ( .822) is:

Lower 1964> -.013 1960< -.010 1972< -.007 2000< -.007 1922< -.007 1948> -.006 Higher 1936 .069 1988 .019

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

1988 -2.874 39 6

2001 -.620 39 15

339B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 558 508 352 304 294 319 302 292 313 295

1930 344 428 361 215 220 216 21 230 158 141

1940 245 254 294 323 269 111 139 241 185 153

1950 159 280 190 67 54 122 150 128 187 130

1960 97 132 140 105 141 111 156 187 121 84

1970 64 28 61 50 83 50 51 37 23 49

1980 108 91 148 67 43 67 27 97 0 69

1990 55 73 86 58 48 25 52 75 84 85

2000 7 0 39 36 48 89 76 165 279 302

2010 558 337 200 350 575 155

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338A 1913 to 2015 103 years Series 11

[B] Entire series, effect on correlation ( .703) is:

Lower 1986> -.019 2002< -.019 1962< -.016 1919< -.012 1917> -.009 2001< -.009 Higher 1936 .074 1988 .030

[D] 3 Absent rings: Year Master N series Absent

2001 -.620 39 15

2002 .019 39 2 >> WARNING: Ring is not usually narrow

2015 -1.143 39 3

>> WARNING: Last ring in series is ABSENT

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

1986 +3.1 SD; 1988 -4.7 SD

338A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 82 161 202 164 247 212 110

1920 360 237 407 236 236 320 281 293 274 320

1930 354 411 284 170 195 313 43 160 133 96

1940 215 264 236 234 208 27 120 262 134 78

1950 136 241 194 91 93 103 179 182 135 94

1960 184 138 8 71 40 27 79 147 137 99

1970 99 37 163 132 160 92 133 92 98 157

1980 126 125 134 92 119 167 178 123 36 111

1990 109 104 143 133 144 58 119 96 105 68

2000 90 0 0 66 143 106 31 30 79 117

2010 38 25 13 35 35 0

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338B 1920 to 2015 96 years Series 12

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

Lower 1934< -.042 1920< -.016 1923> -.012 1962< -.012 1922< -.010 2001< -.010 Higher 1988 .055 1936 .044

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

2001 -.620 39 15

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

1934 -5.3 SD

338B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 270 496 283 352 460 459 463 367 345 422

1930 455 405 206 221 21 259 35 117 124 73

1940 172 194 207 237 220 76 176 352 162 169

1950 223 307 238 145 169 180 215 262 201 176

1960 265 239 68 89 47 28 46 79 92 99

1970 104 75 171 144 266 175 223 141 131 193

1980 162 145 182 99 68 128 88 85 22 73

1990 59 71 84 82 102 77 142 112 161 115

2000 63 0 72 138 115 91 33 73 200 211

2010 199 61 44 124 154 13

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337A 1913 to 2015 103 years Series 13

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

Lower 1986> -.039 1945> -.011 1992< -.009 1954> -.008 1917> -.008 1939< -.007 Higher 1936 .125 2015 .011

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

1986 +4.7 SD

337A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 176 168 302 273 258 203 210

1920 272 222 298 144 222 270 226 206 198 283

1930 314 288 271 180 216 282 41 188 198 96

1940 158 175 146 162 190 180 122 248 112 136

1950 210 327 204 116 185 160 207 159 145 141

1960 232 246 253 164 199 168 160 222 215 228

1970 228 150 232 168 193 122 152 137 144 154

1980 151 144 179 136 171 238 351 208 68 208

1990 121 123 153 155 170 200 206 145 201 164

2000 208 156 216 254 258 131 100 183 212 186

2010 186 157 77 105 136 24

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337B 1916 to 2015 100 years Series 14

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

Lower 1945> -.017 1958< -.015 1986> -.014 1919> -.014 1954> -.009 1921< -.009 Higher 1988 .059 1923 .011

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

1919 +3.2 SD; 1936 +3.5 SD; 1954 +3.0 SD

337B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1916 257 288 254 329

1920 283 188 322 165 193 324 271 327 269 342

1930 387 339 313 194 350 371 96 270 313 84

1940 127 135 154 227 244 247 146 239 115 127

1950 211 314 251 201 234 263 309 228 145 128

1960 282 297 312 180 237 142 265 365 294 288

1970 258 238 341 241 239 178 193 144 190 225

1980 165 151 228 128 191 251 276 232 120 277

1990 270 267 338 235 229 264 242 230 255 155

2000 195 160 197 263 269 81 98 252 392 377

2010 354 237 150 129 213 50

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336A 1931 to 2015 85 years Series 15

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

Lower 1955< -.009 1945> -.009 1987< -.008 1964> -.008 2000> -.006 1986> -.004 Higher 1936 .007 1953 .005

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

1988 -6.3 SD

336A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1931 856 700 377 492 493 93 289 251 242

1940 387 358 490 476 451 366 303 440 318 318

1950 318 566 402 150 111 106 179 214 224 173

1960 252 262 240 154 210 167 187 259 256 285

1970 214 177 292 238 277 152 170 146 137 229

1980 252 253 333 277 359 340 265 195 19 166

1990 202 186 266 209 216 189 245 196 211 158

2000 211 205 261 278 236 103 64 108 326 414

2010 397 265 165 217 343 96

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336B 1928 to 2015 88 years Series 16

[B] Entire series, effect on correlation ( .831) is:

Lower 1931< -.011 1945> -.010 1984> -.009 1959> -.007 1987< -.007 1966< -.006 Higher 1936 .086 1988 .015

336B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1928 453 463

1930 675 535 518 353 524 623 77 383 456 368

1940 483 541 666 700 655 493 235 332 151 129

1950 215 381 315 145 140 287 319 437 469 428

1960 404 340 202 137 97 89 68 204 171 191

1970 157 114 257 207 189 116 140 94 128 176

1980 207 189 311 260 521 522 351 288 99 385

1990 380 406 392 544 602 557 455 391 443 279

2000 272 217 322 329 298 133 94 162 379 458

2010 410 320 283 277 315 74

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335A 1909 to 2015 107 years Series 17

[B] Entire series, effect on correlation ( .764) is:

Lower 1990> -.012 1923> -.011 1936> -.008 1948> -.006 1909> -.005 1988< -.004 Higher 1977 .006 1951 .005

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

1988 -2.874 39 6

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

1988 -6.0 SD

335A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1909 127

1910 142 144 112 69 91 120 129 95 94 82

1920 159 159 235 250 224 319 413 456 352 373

1930 464 437 411 266 224 266 29 130 152 199

1940 310 358 347 351 372 253 204 321 279 224

1950 181 339 302 179 149 203 178 171 174 203

1960 235 283 290 173 136 142 171 204 237 196

1970 239 137 212 172 193 118 101 52 76 129

1980 187 164 206 146 145 142 142 232 0 178

1990 223 213 186 165 124 103 170 150 118 132

2000 101 85 126 108 146 63 37 87 230 242

2010 203 114 68 212 264 88

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335B 1908 to 2015 108 years Series 18

[B] Entire series, effect on correlation ( .798) is:

Lower 1986> -.021 1962> -.013 1920< -.009 1912> -.009 1923> -.007 1908< -.006 Higher 1936 .075 1988 .031

335B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1908 30 118

1910 145 153 124 69 127 211 180 113 98 103

1920 135 128 218 285 418 478 485 487 463 485

1930 549 664 577 321 316 428 60 234 288 273

1940 316 370 375 349 368 173 191 284 235 192

1950 195 389 262 157 113 229 176 220 167 159

1960 168 199 279 163 124 119 175 167 143 130

1970 165 90 146 133 145 94 85 36 64 102

1980 129 129 192 140 90 105 187 191 31 119

1990 145 135 152 148 128 92 144 131 117 97

2000 81 101 103 248 214 88 47 99 207 298

2010 258 87 99 129 298 103

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208A 1930 to 2015 86 years Series 19

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

Lower 1976< -.029 1992< -.013 1977< -.010 2000< -.009 1973> -.007 1990> -.007 Higher 1936 .055 1988 .017

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

1977 -6.5 SD

208A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1930 418 433 372 197 159 265 48 197 151 142

1940 241 193 184 249 220 84 95 187 123 179

1950 145 261 158 84 81 115 78 93 124 96

1960 145 171 157 104 71 92 119 148 123 120

1970 134 95 124 149 142 99 60 44 109 127

1980 130 137 179 134 155 131 127 176 101 193

1990 167 159 122 136 148 132 137 122 119 111

2000 49 58 136 196 219 119 47 78 223 236

2010 331 99 86 230 254 96

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208B 1911 to 2015 105 years Series 20

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

Lower 1994< -.048 1945> -.017 1988> -.017 1986> -.015 1952< -.008 1955< -.005 Higher 1936 .110 1953 .006

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

1994 -6.4 SD

208B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 226 125 153 204 245 212 210 189 194

1920 244 203 222 199 290 272 305 269 262 314

1930 377 374 341 179 149 236 38 212 245 173

1940 279 253 250 402 293 243 204 232 158 132

1950 126 243 138 85 113 114 112 142 139 94

1960 153 167 153 114 105 93 136 130 141 114

1970 115 86 165 136 187 122 100 94 132 153

1980 162 177 237 154 181 198 205 148 98 194

1990 167 158 147 153 49 79 160 151 160 130

2000 72 78 166 184 189 100 50 79 261 318

2010 392 97 60 257 378 130

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

187A 1920 to 2015 96 years Series 21

[B] Entire series, effect on correlation ( .819) is:

Lower 1995> -.013 1965> -.009 1957< -.007 1962> -.005 1925< -.005 1976> -.005 Higher 1936 .033 1988 .024

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

2005 -.450 39 4

2006 -1.617 39 12

187A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1920 115 89 102 74 97 116 129 214 212 270

1930 405 512 408 203 358 330 8 238 275 249

1940 329 385 389 486 421 195 215 355 165 187

1950 215 294 344 219 189 249 220 180 184 171

1960 234 295 334 182 219 265 308 343 243 276

1970 311 216 284 256 219 154 222 128 116 216

1980 208 147 229 135 135 177 98 178 29 190

1990 124 135 210 167 184 254 200 155 201 158

2000 154 126 141 85 79 0 0 24 229 251

2010 333 229 173 262 312 94

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

187B 1909 to 2015 107 years Series 22

[B] Entire series, effect on correlation ( .813) is:

Lower 1989< -.012 1912> -.009 2005< -.008 1976> -.006 2001> -.004 1914< -.003 Higher 1936 .020 1988 .016

[D] 3 Absent rings: Year Master N series Absent

1988 -2.874 39 6

2005 -.450 39 4

2006 -1.617 39 12

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

1988 -4.9 SD

187B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1909 229

1910 266 307 241 190 134 176 188 136 118 92

1920 126 122 153 121 142 213 196 268 310 331

1930 373 452 381 240 383 381 11 192 215 293

1940 378 356 368 475 450 150 176 390 173 198

1950 256 386 284 189 154 259 229 301 328 238

1960 239 281 234 146 180 185 255 323 275 278

1970 305 213 247 215 255 168 225 138 156 197

1980 186 146 194 104 155 164 75 147 0 35

1990 50 77 85 120 115 80 98 83 87 84

2000 83 112 148 116 126 0 0 28 237 217

2010 281 182 165 120 142 64

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

180A 1910 to 2015 106 years Series 23

[B] Entire series, effect on correlation ( .729) is:

Lower 1987< -.015 1968< -.014 1914< -.014 1966< -.010 2010< -.008 1963> -.008 Higher 1936 .064 1953 .008

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

2001 -.620 39 15

2006 -1.617 39 12

180A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1910 102 241 154 166 92 240 147 167 221 189

1920 293 307 463 329 454 552 502 515 468 444

1930 480 499 462 253 225 328 73 237 291 309

1940 404 364 356 451 347 171 145 275 129 167

1950 183 256 154 93 86 137 130 125 124 96

1960 126 118 143 129 99 117 92 122 86 111

1970 121 102 191 172 176 105 140 106 125 140

1980 121 124 162 108 103 104 71 39 14 54

1990 28 55 154 143 151 100 109 101 125 83

2000 52 0 64 100 102 113 0 79 160 205

2010 79 63 31 80 69 18

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

180B 1913 to 2015 103 years Series 24

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

Lower 2001< -.063 1947< -.011 1954> -.010 1966< -.008 1915< -.007 1989< -.006 Higher 1936 .076 2015 .010

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

2001 -.620 39 15

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

2001 -7.7 SD

180B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1913 124 230 177 111 111 125 252

1920 391 346 493 307 403 472 526 503 374 420

1930 439 459 469 242 222 245 56 157 102 133

1940 190 164 143 140 112 74 48 64 46 82

1950 106 137 166 144 172 231 235 292 289 204

1960 280 293 219 164 163 155 116 157 148 162

1970 163 129 218 165 192 122 122 102 125 164

1980 168 191 211 134 160 175 114 154 93 95

1990 83 107 189 159 137 104 153 152 152 109

2000 73 0 89 99 106 92 25 39 110 155

2010 109 101 76 148 120 32

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171A 1925 to 2015 91 years Series 25

[B] Entire series, effect on correlation ( .796) is:

Lower 1976< -.017 1988> -.014 1986< -.009 1962> -.008 1990> -.008 1946> -.008 Higher 1936 .095 1953 .006

171A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1925 699 590 447 455 428

1930 643 620 626 329 394 444 91 359 360 325

1940 433 479 537 582 488 313 499 537 344 404

1950 351 582 460 200 189 325 280 343 332 260

1960 330 364 424 247 208 232 306 372 247 165

1970 204 167 249 200 238 212 96 127 189 269

1980 218 234 494 281 245 272 102 243 165 257

1990 274 225 262 179 166 147 198 189 250 180

2000 213 207 244 340 364 130 135 171 415 490

2010 477 247 259 396 402 148

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171B 1930 to 2015 86 years Series 26

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

Lower 1959> -.013 1986< -.011 1954> -.009 1933> -.009 1970< -.008 1945> -.007 Higher 1988 .046 1936 .036

171B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1930 508 667 653 536 267 210 43 347 337 467

1940 465 477 504 628 771 554 526 644 315 346

1950 353 595 532 211 334 554 411 584 564 613

1960 493 499 450 261 226 234 306 399 320 258

1970 216 232 293 294 342 274 244 222 319 383

1980 380 430 430 250 313 328 147 164 82 340

1990 340 293 328 289 232 292 316 249 361 285

2000 262 245 293 369 366 200 137 253 389 339

2010 276 154 99 132 272 103

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138A 1909 to 2015 107 years Series 27

[B] Entire series, effect on correlation ( .656) is:

Lower 1909< -.073 1962< -.021 1913> -.009 1929< -.008 1965> -.007 1969< -.006 Higher 1936 .044 1988 .018

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

1909 -6.5 SD

138A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1909 82

1910 246 229 192 237 281 349 282 201 205 190

1920 268 178 208 122 158 199 164 140 101 81

1930 118 170 165 102 91 130 17 106 70 127

1940 209 246 299 347 256 131 110 226 122 122

1950 115 244 178 84 77 144 207 168 146 121

1960 164 191 97 117 115 133 169 181 145 99

1970 104 66 118 88 107 96 127 92 99 132

1980 136 132 172 113 129 111 87 117 72 101

1990 97 86 157 144 166 100 118 129 125 126

2000 101 74 122 149 242 200 150 291 503 473

2010 491 301 216 247 287 104

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

138B 1909 to 2015 107 years Series 28

[B] Entire series, effect on correlation ( .677) is:

Lower 1988> -.023 2000< -.018 1945> -.017 1930< -.008 1990> -.007 1954> -.007 Higher 1936 .080 2015 .009

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

2000 -.465 39 2

2001 -.620 39 15

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

1964 -5.1 SD; 1988 +4.0 SD; 2000 -6.0 SD; 2001 -4.9 SD

138B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1909 107

1910 260 135 108 20 50 49 5 5 122 94

1920 121 112 135 94 122 206 159 109 105 89

1930 92 139 120 77 119 175 36 85 52 126

1940 223 208 242 280 248 232 130 215 133 109

1950 132 241 131 109 145 146 202 166 184 146

1960 146 172 129 87 61 89 101 147 103 101

1970 107 76 159 112 131 82 84 79 77 116

1980 87 81 105 81 70 77 72 104 73 81

1990 90 63 96 100 113 72 71 61 73 53

2000 0 0 74 66 110 134 32 125 293 307

2010 164 154 76 134 147 52

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135A 1908 to 2015 108 years Series 29

[B] Entire series, effect on correlation ( .703) is:

Lower 1975> -.014 2007< -.009 1944< -.008 2000> -.007 1990< -.007 1921> -.007 Higher 1936 .092 2006 .008

[D] 3 Absent rings: Year Master N series Absent

1954 -1.696 39 1

2006 -1.617 39 12

2007 -.633 39 3

135A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1908 225 193

1910 151 157 89 125 177 218 210 124 133 138

1920 211 256 162 120 175 174 376 204 200 215

1930 243 287 205 170 219 131 28 158 168 167

1940 123 154 183 161 75 14 109 117 52 132

1950 157 212 145 48 0 90 130 93 115 52

1960 88 140 94 108 61 102 109 182 99 159

1970 158 166 293 214 245 257 105 112 209 199

1980 192 166 209 142 125 162 70 204 79 229

1990 59 82 119 109 125 99 179 116 117 122

2000 138 125 141 62 66 87 0 0 176 147

2010 104 123 53 91 169 44

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

135B 1911 to 2015 105 years Series 30

[B] Entire series, effect on correlation ( .549) is:

Lower 1990< -.071 1988> -.016 1944< -.012 1975> -.009 1943< -.008 1949> -.006 Higher 1936 .052 2006 .013

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

1989 1990 -4.1 SD

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

1990 -.326 39 3 >> WARNING: Ring is not usually narrow

2006 -1.617 39 12

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

1988 +3.4 SD; 1990 -7.6 SD

135B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 117 79 91 104 144 156 139 140 148

1920 184 140 167 163 181 208 258 272 331 285

1930 396 404 389 269 352 222 39 203 144 135

1940 150 142 159 112 56 20 55 145 124 213

1950 161 215 227 109 56 127 167 79 144 49

1960 78 108 91 93 102 123 117 176 179 149

1970 165 172 256 204 278 239 165 155 218 219

1980 200 122 186 124 106 144 77 192 97 244

1990 0 94 110 132 107 55 79 83 115 115

2000 111 53 63 86 94 85 0 18 152 95

2010 100 87 67 121 188 46

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

134A 1910 to 2015 106 years Series 31

[B] Entire series, effect on correlation ( .697) is:

Lower 1911< -.024 1990< -.022 1945> -.012 1968< -.010 2011< -.010 1967< -.010 Higher 1936 .063 1988 .037

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

1988 -2.874 39 6

1990 -.326 39 3 >> WARNING: Ring is not usually narrow

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

1968 -5.0 SD

134A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1910 174 97 86 164 171 256 341 332 331 308

1920 339 393 479 372 407 588 471 473 394 385

1930 433 446 507 231 201 208 31 162 88 143

1940 237 292 267 291 270 241 189 321 184 114

1950 145 183 206 131 61 171 230 275 227 137

1960 171 198 167 117 101 75 49 56 39 82

1970 92 79 101 92 123 99 60 61 93 156

1980 176 148 218 112 122 153 130 116 0 89

1990 0 24 208 266 232 243 232 329 234 254

2000 133 158 133 239 280 237 45 66 252 470

2010 495 151 167 221 201 29

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

134B 1915 to 2015 101 years Series 32

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

Lower 1919> -.016 1977> -.014 1915< -.013 1973< -.012 1987< -.009 1990< -.009 Higher 1936 .080 1982 .007

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

1988 -2.874 39 6

1990 -.326 39 3 >> WARNING: Ring is not usually narrow

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

1916 -4.6 SD; 1919 +3.2 SD

134B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1915 269 233 271 338 413

1920 362 340 455 342 345 471 423 367 312 283

1930 433 504 452 197 185 244 20 191 181 192

1940 322 271 320 406 309 233 299 376 172 126

1950 163 235 202 110 42 99 111 151 126 65

1960 141 134 152 98 71 31 31 50 47 57

1970 53 36 74 24 107 59 38 59 78 115

1980 139 122 199 102 70 122 58 41 0 68

1990 0 130 145 187 170 126 104 203 160 120

2000 95 85 96 162 198 184 5 161 310 302

2010 311 59 11 69 122 9

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132A 1917 to 2015 99 years Series 33

[B] Entire series, effect on correlation ( .741) is:

Lower 1988> -.033 1923> -.017 1990> -.012 1919> -.012 1977> -.007 1922< -.007 Higher 1936 .099 1953 .008

132A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1917 134 142 218

1920 176 161 143 210 226 316 337 331 264 285

1930 286 289 243 135 175 203 48 139 137 127

1940 127 136 168 156 232 135 133 254 167 148

1950 171 253 203 99 73 145 150 197 153 137

1960 171 167 104 101 55 51 72 82 95 76

1970 87 54 91 67 93 71 73 62 58 53

1980 66 52 72 67 60 63 28 47 38 72

1990 89 68 91 88 72 36 84 110 81 60

2000 9 7 43 43 99 27 15 150 343 424

2010 350 232 108 223 354 135

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132B 1911 to 2015 105 years Series 34

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

Lower 1978< -.035 1916< -.015 1948> -.010 1921> -.008 1962< -.007 1990> -.007 Higher 1936 .076 1972 .005

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

1978 -5.5 SD

132B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1911 74 71 70 97 141 74 83 126 97

1920 178 197 190 132 146 152 181 201 168 187

1930 227 258 191 136 156 159 16 104 96 86

1940 109 170 218 197 263 127 134 233 193 155

1950 181 223 178 105 83 167 164 178 193 137

1960 187 174 94 95 107 64 149 162 159 129

1970 127 70 179 71 135 100 100 74 18 72

1980 97 60 119 79 64 78 34 79 34 98

1990 96 80 110 93 66 50 138 134 103 94

2000 47 79 51 65 97 65 47 249 358 385

2010 335 223 116 181 290 115

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128A 1906 to 2015 110 years Series 35

[B] Entire series, effect on correlation ( .658) is:

Lower 1986< -.027 1960< -.025 1913> -.014 1996< -.013 1971> -.012 1912> -.009 Higher 1988 .042 1936 .014

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

1913 +3.5 SD; 1954 -5.6 SD; 1986 -4.9 SD

128A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1906 69 238 209 192

1910 277 368 322 378 313 376 310 213 183 275

1920 379 324 258 213 255 324 312 341 414 357

1930 416 396 359 258 269 238 48 77 124 215

1940 302 278 318 296 280 61 128 193 121 116

1950 140 145 128 58 34 127 94 106 143 129

1960 87 130 148 133 138 145 237 261 239 242

1970 224 247 267 205 216 215 221 193 216 274

1980 288 238 329 183 179 252 85 279 95 240

1990 134 213 193 192 142 205 118 233 199 193

2000 172 270 239 406 233 33 13 41 246 194

2010 155 129 40 85 116 27

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

128B 1906 to 2015 110 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

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

1950 1999 2 .12 .04 .05 -.06 -.03 .06 -.17 .00 -.15 -.09 .41|-.11 .54\*-.30 -.05 -.04 -.19 .03 .01 -.05 -.01

[B] Entire series, effect on correlation ( .577) is:

Lower 1986< -.120 1998< -.012 2001> -.007 1966> -.007 1992< -.005 1965> -.004 Higher 1936 .042 1906 .011

1950 to 1999 segment:

Lower 1986< -.116 1998< -.019 1965> -.009 1963> -.008 1992< -.008 1966> -.007 Higher 1954 .022 1953 .014

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

1985 1986 -4.6 SD

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

2006 -1.617 39 12

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

1966 +3.7 SD; 1986 -9.1 SD

128B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1906 71 123 187 229

1910 315 307 211 186 234 302 305 246 236 253

1920 330 273 248 233 286 292 299 362 423 412

1930 466 387 341 246 300 266 54 151 200 235

1940 240 255 362 344 271 77 115 168 96 104

1950 184 206 147 90 47 112 120 142 213 195

1960 196 199 218 204 192 206 307 252 208 180

1970 209 190 224 194 208 166 136 141 153 246

1980 206 149 196 171 155 229 58 146 103 131

1990 122 145 129 138 120 112 128 214 101 164

2000 137 184 171 130 95 36 0 74 200 218

2010 176 171 102 102 358 93

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127A 1908 to 2015 108 years Series 37

[B] Entire series, effect on correlation ( .666) is:

Lower 2015> -.024 1936> -.020 2001< -.019 1925< -.009 1964> -.008 1971> -.007 Higher 1988 .055 1923 .008

[D] 8 Absent rings: Year Master N series Absent

2001 -.620 39 15

2005 -.450 39 4

2006 -1.617 39 12

2007 -.633 39 3

2012 -.597 39 4

2013 .264 39 1 >> WARNING: Ring is not usually narrow

2014 .932 39 2 >> WARNING: Ring is not usually narrow

2015 -1.143 39 3

>> WARNING: Last ring in series is ABSENT

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

2001 -5.0 SD

127A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1908 68 66

1910 107 106 42 38 88 130 151 123 171 173

1920 194 180 228 121 167 146 222 254 288 301

1930 392 339 313 205 240 226 62 167 173 327

1940 477 422 378 599 425 286 258 327 209 198

1950 248 293 245 169 133 195 204 191 214 179

1960 195 265 254 135 218 191 229 264 224 171

1970 203 214 242 222 307 224 183 148 146 187

1980 198 128 190 144 136 198 152 253 27 186

1990 122 157 217 133 150 116 135 124 110 83

2000 87 0 64 54 80 0 0 0 66 34

2010 39 24 0 0 0 0

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

127B 1910 to 2015 106 years Series 38

[B] Entire series, effect on correlation ( .738) is:

Lower 2015> -.016 1936> -.015 1986> -.011 2005< -.008 2010< -.007 1939> -.006 Higher 1988 .025 1953 .007

[D] 5 Absent rings: Year Master N series Absent

2005 -.450 39 4

2006 -1.617 39 12

2012 -.597 39 4

2014 .932 39 2 >> WARNING: Ring is not usually narrow

2015 -1.143 39 3

>> WARNING: Last ring in series is ABSENT

127B Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1910 58 63 19 16 63 61 73 55 94 85

1920 102 105 178 101 157 156 190 273 225 303

1930 399 459 453 252 293 296 35 114 170 367

1940 448 486 416 376 318 157 253 343 230 188

1950 239 310 240 94 46 129 172 154 182 122

1960 135 139 136 86 124 135 169 222 172 168

1970 162 137 201 153 189 184 178 154 168 186

1980 218 168 195 165 177 202 201 232 56 134

1990 106 123 154 132 110 90 138 145 132 131

2000 90 83 112 92 130 0 0 20 102 88

2010 20 14 0 27 0 0

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

14A 1889 to 2015 127 years Series 39

[\*] Early part of series cannot be checked from 1889 to 1905 -- not matched by another series

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

Lower 2001< -.026 1957< -.016 1987< -.011 1963> -.010 1917> -.010 1989< -.009 Higher 1936 .037 1988 .018

[D] 3 Absent rings: Year Master N series Absent

1988 -2.874 39 6

2001 -.620 39 15

2006 -1.617 39 12

14A Ring measurements

Annual values

Date 0 1 2 3 4 5 6 7 8 9

1889 41

1890 80 45 57 32 18 35 20 24 31 24

1900 32 34 64 28 41 54 65 147 184 178

1910 262 242 199 159 252 393 398 431 427 455

1920 548 447 428 305 409 427 494 434 341 326

1930 379 427 358 177 107 93 12 88 107 140

1940 185 170 178 275 261 130 113 210 119 109

1950 82 128 126 71 73 158 98 47 80 98

1960 137 129 76 87 63 36 51 103 88 63

1970 81 58 76 71 122 91 80 28 34 50

1980 82 47 87 76 70 36 44 24 0 10

1990 5 59 77 45 36 41 90 101 66 75

2000 69 0 94 91 175 58 0 85 268 326

2010 149 113 26 206 293 54

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PART 7: DESCRIPTIVE STATISTICS: HHSG19A05\_ACSA\_Corr2-50 14:30 Tue 28 Jun 2016 Page 6

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

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

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

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

1 343A 1914 2015 102 4 0 .784 1.94 4.68 .855 .617 .345 2.49 .373 -.030 1

2 343B 1922 2015 94 4 0 .754 1.73 4.01 .846 .674 .415 2.58 .465 -.021 3

3 342A 1922 2015 94 4 0 .775 1.79 4.88 .943 .687 .436 2.44 .380 -.026 2

4 342B 1908 2015 108 4 0 .710 1.70 4.59 .968 .741 .434 2.45 .332 -.003 1

5 341A 1907 2015 109 4 0 .723 1.99 4.55 1.200 .771 .452 2.55 .452 .009 2

6 341B 1913 2015 103 4 0 .701 2.10 4.83 1.188 .747 .395 2.43 .373 .028 1

7 340A 1917 2015 99 4 1 .577 1.16 4.58 .885 .703 .475 2.71 .477 -.040 1

8 340B 1911 2015 105 4 0 .711 1.18 4.54 .921 .725 .415 2.65 .380 -.043 1

9 339A 1915 2015 101 4 0 .778 1.50 6.99 1.223 .747 .453 2.94 .447 -.073 1

10 339B 1920 2015 96 4 0 .822 1.66 5.75 1.310 .765 .465 2.48 .377 -.012 1

11 338A 1913 2015 103 4 0 .703 1.43 4.11 .913 .643 .498 2.52 .456 .002 3

12 338B 1920 2015 96 4 0 .674 1.69 4.96 1.142 .723 .464 2.60 .452 -.036 1

13 337A 1913 2015 103 4 0 .702 1.88 3.51 .595 .307 .296 2.61 .340 -.091 2

14 337B 1916 2015 100 4 0 .616 2.34 3.92 .768 .350 .313 2.53 .485 -.035 1

15 336A 1931 2015 85 3 0 .816 2.67 8.56 1.338 .643 .317 2.52 .340 .039 1

16 336B 1928 2015 88 3 0 .831 3.22 7.00 1.640 .699 .330 2.44 .319 -.032 1

17 335A 1909 2015 107 4 0 .764 1.93 4.64 .964 .732 .320 2.32 .275 -.064 1

18 335B 1908 2015 108 4 0 .798 1.99 6.64 1.273 .783 .335 2.55 .360 -.054 2

19 208A 1930 2015 86 3 0 .775 1.51 4.33 .744 .528 .342 2.63 .487 .091 1

20 208B 1911 2015 105 4 0 .739 1.80 4.02 .797 .560 .305 2.51 .334 -.010 3

21 187A 1920 2015 96 4 0 .819 2.13 5.12 1.020 .602 .377 2.40 .384 -.067 1

22 187B 1909 2015 107 4 0 .813 1.99 4.75 1.049 .682 .358 2.38 .329 -.013 1

23 180A 1910 2015 106 4 0 .729 1.80 5.52 1.314 .851 .393 2.68 .455 -.032 1

24 180B 1913 2015 103 4 0 .708 1.80 5.26 1.137 .851 .312 2.52 .415 -.013 1

25 171A 1925 2015 91 3 0 .796 3.17 6.99 1.412 .631 .296 2.69 .350 -.045 2

26 171B 1930 2015 86 3 0 .739 3.49 7.71 1.493 .684 .289 2.48 .451 -.041 2

27 138A 1909 2015 107 4 0 .656 1.64 5.03 .859 .726 .306 2.61 .470 -.083 1

28 138B 1909 2015 107 4 0 .677 1.17 3.07 .612 .594 .390 2.71 .451 .056 1

29 135A 1908 2015 108 4 0 .703 1.42 3.76 .655 .439 .448 2.65 .399 .041 1

30 135B 1911 2015 105 4 0 .549 1.47 4.04 .805 .670 .406 2.51 .345 -.047 1

31 134A 1910 2015 106 4 0 .697 2.05 5.88 1.270 .770 .402 2.57 .485 -.032 2

32 134B 1915 2015 101 4 0 .718 1.77 5.04 1.265 .797 .494 2.54 .433 .006 1

33 132A 1917 2015 99 4 0 .741 1.37 4.24 .898 .775 .346 2.50 .374 -.017 1

34 132B 1911 2015 105 4 0 .770 1.34 3.85 .696 .656 .370 2.49 .389 -.011 1

35 128A 1906 2015 110 4 0 .658 2.08 4.16 .968 .661 .351 2.54 .467 -.047 1

36 128B 1906 2015 110 4 1 .577 1.97 4.66 .885 .694 .313 2.49 .291 -.054 1

37 127A 1908 2015 108 4 0 .666 1.77 5.99 1.084 .800 .354 2.50 .350 -.055 1

38 127B 1910 2015 106 4 0 .738 1.61 4.86 1.076 .817 .389 2.46 .313 -.031 1

39 14A 1889 2015 127 4 0 .646 1.40 5.48 1.306 .884 .468 2.65 .515 .023 2

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Total or mean: 3980 151 2 .720 1.84 8.56 1.029 .688 .382 2.94 .400 -.022

- = [ COFECHA RSAC2COF ] = -