[] Dendrochronology Program Library Run PPSF3 Program COF 10:18 Mon 11 Mar 2013 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28561

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: PPSF3

File of DATED series: PPSF\_3COMP

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 30 years lagged successively by 15 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 .4226

6 Master dating series saved N

7 Ring measurements listed N

8 Parts printed 1234567

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

Time span of Master dating series is 1897 to 2012 116 years

Continuous time span is 1897 to 2012 116 years

Portion with two or more series is 1902 to 2012 111 years

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

\*C\* Number of dated series 20 \*C\*

\*O\* Master series 1897 2012 116 yrs \*O\*

\*F\* Total rings in all series 1682 \*F\*

\*E\* Total dated rings checked 1677 \*E\*

\*C\* Series intercorrelation .671 \*C\*

\*H\* Average mean sensitivity .221 \*H\*

\*A\* Segments, possible problems 5 \*A\*

\*\*\* Mean length of series 84.1 \*\*\*

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

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

No ring measurements of zero value

PART 2: TIME PLOT OF TREE-RING SERIES: PPSF3 10:18 Mon 11 Mar 2013 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

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

. . . . . . . . . . . . . . . . . . <=====> . 65A 1 1958 2012 55

. . . . . . . . . . . . . . . . . . <======> . 65B 2 1946 2012 67

. . . . . . . . . . . . . . . . . .<=========> . 66A 3 1911 2012 102

. . . . . . . . . . . . . . . . . . <========> . 66B 4 1922 2012 91

. . . . . . . . . . . . . . . . . . <=====> . 67A 5 1950 2012 63

. . . . . . . . . . . . . . . . . . <=====> . 67B 6 1950 2012 63

. . . . . . . . . . . . . . . . . . <========> . 68A 7 1921 2012 92

. . . . . . . . . . . . . . . . . . <======> . 68B 8 1941 2012 72

. . . . . . . . . . . . . . . . . . <========> . 69A 9 1923 2012 90

. . . . . . . . . . . . . . . . . .<=========> . 69B 10 1919 2012 94

. . . . . . . . . . . . . . . . . . <=======> . 70A 11 1934 2012 79

. . . . . . . . . . . . . . . . . . <=======> . 70B 12 1933 2012 80

. . . . . . . . . . . . . . . . . <===========> . 72A 13 1897 2012 116

. . . . . . . . . . . . . . . . . . <========> . 72B 14 1926 2012 87

. . . . . . . . . . . . . . . . . .<=========> . 73A 15 1912 2012 101

. . . . . . . . . . . . . . . . . <==========> . 73B 16 1902 2012 111

. . . . . . . . . . . . . . . . . . <=====> . 74A 17 1950 2012 63

. . . . . . . . . . . . . . . . . . <=====> . 74B 18 1950 2012 63

. . . . . . . . . . . . . . . . . . <========> . 76A 19 1920 2012 93

. . . . . . . . . . . . . . . . . .<=========> . 76B 20 1913 2012 100

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

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: PPSF3 10:18 Mon 11 Mar 2013 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 -.025 1 1950 -1.064 19 2000 .727 20

1901 .579 1 1951 -.007 19 2001 .684 20

1902 .237 2 1952 -.334 19 2002 .243 20

1903 -.186 2 1953 -1.435 19 2003 -1.822 20

1904 .186 2 1954 -.289 19 2004 -.158 20

1905 1.960 2 1955 .209 19 2005 .307 20

1906 .458 2 1956 .344 19 2006 -1.113 20

1907 1.442 2 1957 1.327 19 2007 -.031 20

1908 -.499 2 1958 1.523 20 2008 -.713 20

1909 .991 2 1959 .985 20 2009 1.035 20

1910 -.775 2 1960 1.075 20 2010 2.075 20

1911 -1.384 3 1961 1.267 20 2011 .308 20

1912 -.028 4 1962 .930 20 2012 -.032 20

1913 -.240 5 1963 .232 20

1914 1.199 5 1964 -.532 20

1915 1.515 5 1965 -1.593 20

1916 -.738 5 1966 -2.165 20

1917 -.786 5 1967 -2.001 20

1918 .022 5 1968 -1.292 20

1919 -1.848 6 1969 -.260 20

1920 -.222 7 1970 -.175 20

1921 .461 8 1971 -.172 20

1922 .290 9 1972 -.151 20

1923 -1.171 10 1973 -.090 20

1924 .021 10 1974 .318 20

1925 .726 10 1975 .233 20

1926 .468 11 1976 1.211 20

1927 .594 11 1977 1.501 20

1928 -1.047 11 1978 .468 20

1929 -.829 11 1979 .865 20

1930 1.151 11 1980 .717 20

1931 .329 11 1981 .116 20

1932 -.096 11 1982 .176 20

1933 .712 12 1983 -1.579 20

1934 .020 13 1984 -1.409 20

1935 1.310 13 1985 -.446 20

1936 -.596 13 1986 .502 20

1937 .445 13 1987 .459 20

1938 .954 13 1988 -.745 20

1939 -1.054 13 1989 .401 20

1940 -.524 13 1990 .736 20

1941 1.450 14 1991 .571 20

1942 .400 14 1992 1.899 20

1943 -1.214 14 1993 1.473 20

1944 .440 14 1994 .862 20

1945 .521 14 1995 -.488 20

1946 -.321 15 1996 -1.587 20

1897 -3.494 1 1947 .977 15 1997 -1.963 20

1898 -.054 1 1948 -1.551 15 1998 -.342 20

1899 -1.484 1 1949 -.355 15 1999 -1.123 20

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PART 4: Master Bar Plot: PPSF3 10:18 Mon 11 Mar 2013 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----@ 1950-d 2000--------C

1901-------B 1951----@ 2001--------C

1902------A 1952---a 2002------A

1903----a 1953-f 2003g

1904-----A 1954---a 2004----a

1905----------H 1955-----A 2005------A

1906-------B 1956------A 2006-d

1907----------F 1957----------E 2007----@

1908---b 1958----------F 2008--c

1909---------D 1959---------D 2009---------D

1910--c 1960---------D 2010----------H

1911-f 1961---------E 2011------A

1912----@ 1962---------D 2012----@

1913---a 1963------A

1914---------E 1964--b

1915----------F 1965f

1916--c 1966i

1917--c 1967h

1918-----@ 1968-e

1919g 1969---a

1920---a 1970----a

1921-------B 1971----a

1922------A 1972----a

1923-e 1973----@

1924-----@ 1974------A

1925--------C 1975------A

1926-------B 1976---------E

1927-------B 1977----------F

1928-d 1978-------B

1929--c 1979--------C

1930---------E 1980--------C

1931------A 1981-----@

1932----@ 1982-----A

1933--------C 1983f

1934-----@ 1984-f

1935----------E 1985---b

1936--b 1986-------B

1937-------B 1987-------B

1938---------D 1988--c

1939-d 1989-------B

1940---b 1990--------C

1941----------F 1991-------B

1942-------B 1992----------H

1943-e 1993----------F

1944-------B 1994--------C

1945-------B 1995---b

1946---a 1996f

1897n 1947---------D 1997h

1898----@ 1948f 1998---a

1899-f 1949---a 1999-d

PART 5: CORRELATION OF SERIES BY SEGMENTS: PPSF3 10:18 Mon 11 Mar 2013 Page 5

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Correlations of 30-year dated segments, lagged 15 years

Flags: A = correlation under .4226 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1890 1905 1920 1935 1950 1965 1980 1995

1919 1934 1949 1964 1979 1994 2009 2024

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

1 65A 1958 2012 .65 .66 .81 .83

2 65B 1946 2012 .54 .71 .78 .65 .69

3 66A 1911 2012 .50 .75 .80 .70 .78 .81 .76

4 66B 1922 2012 .53 .75 .78 .69 .74 .70

5 67A 1950 2012 .80 .68 .69 .67

6 67B 1950 2012 .42B .52 .78 .83

7 68A 1921 2012 .59 .73 .83 .81 .84 .86

8 68B 1941 2012 .84 .76 .83 .87 .88

9 69A 1923 2012 .84 .85 .75 .64 .72 .76

10 69B 1919 2012 .49 .49 .57 .65 .63 .77 .77

11 70A 1934 2012 .72 .73 .50 .49 .59 .62

12 70B 1933 2012 .77 .76 .69 .39A .64 .57

13 72A 1897 2012 .32B .33B .65 .72 .65 .62 .77 .81

14 72B 1926 2012 .52 .66 .65 .72 .74 .76

15 73A 1912 2012 .77 .63 .63 .62 .67 .73 .73

16 73B 1902 2012 .47B .50 .62 .72 .82 .83 .75 .75

17 74A 1950 2012 .77 .75 .66 .68

18 74B 1950 2012 .54 .74 .81 .84

19 76A 1920 2012 .68 .82 .78 .73 .74 .73

20 76B 1913 2012 .53 .68 .75 .77 .70 .74 .71

Av segment correlation .40 .52 .65 .73 .69 .68 .74 .75

PART 6: POTENTIAL PROBLEMS: PPSF3 10:18 Mon 11 Mar 2013 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 30-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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65A 1958 to 2012 55 years Series 1

[B] Entire series, effect on correlation ( .772) is:

Lower 1996> -.019 1985< -.018 1968> -.012 1988> -.012 1966> -.010 1978> -.010 Higher 2003 .036 2010 .014

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

65B 1946 to 2012 67 years Series 2

[B] Entire series, effect on correlation ( .641) is:

Lower 1948> -.050 1956< -.027 2002< -.024 1949< -.012 1952> -.012 1996> -.010 Higher 1983 .022 1992 .018

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

1948 +3.2 SD

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

66A 1911 to 2012 102 years Series 3

[B] Entire series, effect on correlation ( .625) is:

Lower 1916< -.071 1928> -.020 2011> -.015 1911> -.015 1922> -.007 2004< -.006 Higher 1939 .026 2003 .015

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66B 1922 to 2012 91 years Series 4

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

Lower 1926< -.046 1928> -.021 2011> -.017 1943> -.015 1924< -.011 1922> -.011 Higher 1939 .031 2003 .028

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

1938 +3.2 SD

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

67A 1950 to 2012 63 years Series 5

[B] Entire series, effect on correlation ( .694) is:

Lower 1984> -.028 2011> -.028 2002< -.017 2003> -.011 1988< -.010 1995< -.010 Higher 1983 .025 1992 .015

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67B 1950 to 2012 63 years Series 6

[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 1979 1 -.26 -.20 -.18 -.26 -.15 .14 -.14 .34 -.02 .36 .42| .56\* .45 .10 -.15 -.22 -.30 -.15 -.28 -.40 -.28

[B] Entire series, effect on correlation ( .650) is:

Lower 1951< -.046 1984> -.034 1971< -.034 1950> -.021 1976< -.013 1981> -.010 Higher 2003 .040 1983 .021

1950 to 1979 segment:

Lower 1951< -.092 1971< -.055 1950> -.054 1976< -.025 1968> -.022 1967> -.011 Higher 1966 .083 1957 .025

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

1984 +3.4 SD

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68A 1921 to 2012 92 years Series 7

[B] Entire series, effect on correlation ( .731) is:

Lower 1939> -.030 1930< -.016 1928< -.015 1931> -.008 1948> -.007 1937< -.007 Higher 1983 .011 2003 .011

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68B 1941 to 2012 72 years Series 8

[B] Entire series, effect on correlation ( .841) is:

Lower 1953> -.011 1943> -.008 1988< -.004 1963< -.004 1972> -.004 2000< -.004 Higher 1983 .009 2010 .006

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69A 1923 to 2012 90 years Series 9

[B] Entire series, effect on correlation ( .771) is:

Lower 1983> -.015 1931> -.012 1998< -.009 1988> -.009 1969< -.008 1982< -.007 Higher 1939 .011 2003 .009

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69B 1919 to 2012 94 years Series 10

[B] Entire series, effect on correlation ( .599) is:

Lower 1946< -.029 1948> -.028 1922< -.025 1995> -.011 1934> -.009 1988> -.008 Higher 2003 .025 1939 .020

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70A 1934 to 2012 79 years Series 11

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

Lower 2006> -.022 1936< -.019 1950> -.018 1986< -.012 1967> -.011 1988> -.010 Higher 1948 .046 2003 .018

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70B 1933 to 2012 80 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

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

1965 1994 0 -.01 -.17 .03 .20 -.01 .07 -.15 .08 .18 -.03 .39\* .17 .12 .12 -.12 -.02 -.11 -.52 -.18 -.14 .13

[B] Entire series, effect on correlation ( .647) is:

Lower 2006> -.024 1988> -.023 2010< -.022 1973< -.018 1938< -.018 1993< -.013 Higher 1939 .021 2003 .017

1965 to 1994 segment:

Lower 1988> -.084 1973< -.068 1993< -.050 1984> -.038 1979< -.011 1975< -.010 Higher 1992 .093 1966 .044

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

1989 +3.2 SD

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72A 1897 to 2012 116 years Series 13

[\*] Early part of series cannot be checked from 1897 to 1901 -- not matched by another series

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

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

1902 1931 -3 - - - - - -.17 -.05 .48\* .08 -.02 .32|-.21 -.13 -.20 -.20 .36 -.12 .01 .20 -.13 -.01

1905 1934 -3 - - -.14 -.07 -.11 -.15 -.14 .52\* .11 -.06 .33|-.22 -.05 -.25 -.25 .48 -.11 -.14 .27 -.03 -.10

[B] Entire series, effect on correlation ( .572) is:

Lower 1908> -.087 1916> -.021 1911< -.013 1972< -.012 1937< -.010 1918< -.009 Higher 1948 .033 1919 .015

1902 to 1931 segment:

Lower 1908> -.201 1916> -.034 1911< -.034 1918< -.026 1931< -.017 1921< -.007 Higher 1919 .073 1905 .042

1905 to 1934 segment:

Lower 1908> -.190 1911< -.032 1916> -.031 1918< -.026 1931< -.016 1932> -.013 Higher 1919 .070 1930 .038

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

1908 +5.0 SD

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72B 1926 to 2012 87 years Series 14

[B] Entire series, effect on correlation ( .604) is:

Lower 1937< -.045 1931< -.035 1928> -.024 1975< -.023 1939> -.018 2003> -.013 Higher 1948 .051 1983 .017

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

1937 -5.1 SD

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73A 1912 to 2012 101 years Series 15

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

Lower 1968< -.020 1948> -.013 1939> -.013 1989< -.011 1967< -.010 2011> -.008 Higher 1919 .015 1983 .013

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73B 1902 to 2012 111 years Series 16

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

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

1902 1931 3 - - - - - .08 -.13 .10 -.05 -.32 .47|-.24 -.11 .49\*-.18 -.08 -.18 -.06 .39 .01 -.08

[B] Entire series, effect on correlation ( .638) is:

Lower 1908< -.077 2003> -.013 1942> -.008 1918> -.007 1917> -.007 1921< -.007 Higher 1939 .023 1983 .014

1902 to 1931 segment:

Lower 1908< -.200 1917> -.022 1923> -.022 1918> -.018 1921< -.016 1902< -.010 Higher 1916 .061 1919 .061

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

1908 -5.0 SD; 1918 +3.4 SD; 2004 +3.2 SD

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74A 1950 to 2012 63 years Series 17

[B] Entire series, effect on correlation ( .707) is:

Lower 1999> -.042 2006> -.019 1975< -.014 2008> -.011 1994< -.008 1968> -.008 Higher 2003 .043 1965 .013

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74B 1950 to 2012 63 years Series 18

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

Lower 1959< -.024 1962< -.021 1967> -.015 1961< -.014 2006> -.011 2000< -.009 Higher 2003 .027 2010 .018

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76A 1920 to 2012 93 years Series 19

[B] Entire series, effect on correlation ( .714) is:

Lower 1931> -.017 1999> -.014 1930< -.013 1936> -.011 1928> -.011 1994< -.007 Higher 1948 .023 2003 .022

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76B 1913 to 2012 100 years Series 20

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

Lower 1916> -.054 1934< -.012 1943> -.008 2011> -.008 1936> -.007 1942< -.007 Higher 1948 .033 1919 .015

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PART 7: DESCRIPTIVE STATISTICS: PPSF3 10:18 Mon 11 Mar 2013 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 65A 1958 2012 55 4 0 .772 1.68 4.16 .853 .897 .221 2.85 .619 .024 1

2 65B 1946 2012 67 5 0 .641 1.74 3.23 .702 .796 .238 2.86 .607 -.104 2

3 66A 1911 2012 102 7 0 .625 1.15 2.37 .596 .897 .188 2.44 .343 .027 1

4 66B 1922 2012 91 6 0 .627 1.56 3.72 .728 .865 .199 2.80 .502 -.019 1

5 67A 1950 2012 63 4 0 .694 .96 1.96 .457 .789 .264 2.76 .564 -.023 1

6 67B 1950 2012 63 4 1 .650 1.08 3.25 .616 .766 .304 2.82 .721 .011 1

7 68A 1921 2012 92 6 0 .731 1.19 2.80 .454 .716 .230 2.65 .443 .000 1

8 68B 1941 2012 72 5 0 .841 1.45 3.15 .727 .829 .256 2.49 .399 -.065 1

9 69A 1923 2012 90 6 0 .771 1.39 3.57 1.021 .876 .258 2.82 .471 -.023 1

10 69B 1919 2012 94 7 0 .599 1.12 3.25 .848 .906 .225 2.59 .498 -.080 2

11 70A 1934 2012 79 6 0 .653 1.25 2.55 .565 .816 .222 2.61 .459 -.042 1

12 70B 1933 2012 80 6 1 .647 .96 3.16 .657 .890 .221 2.75 .545 -.116 1

13 72A 1897 2012 116 8 2 .572 1.03 2.15 .416 .839 .202 2.64 .455 -.033 1

14 72B 1926 2012 87 6 0 .604 1.26 2.40 .389 .537 .244 2.63 .473 -.080 2

15 73A 1912 2012 101 7 0 .677 1.53 2.67 .424 .591 .202 2.74 .555 .025 1

16 73B 1902 2012 111 8 1 .638 1.23 2.50 .464 .730 .183 2.68 .484 -.008 1

17 74A 1950 2012 63 4 0 .707 1.98 3.03 .537 .552 .192 2.80 .520 .045 1

18 74B 1950 2012 63 4 0 .708 1.21 2.11 .480 .786 .218 2.89 .525 .011 1

19 76A 1920 2012 93 6 0 .714 1.38 2.59 .426 .736 .184 2.41 .381 -.046 1

20 76B 1913 2012 100 7 0 .659 1.92 3.92 .764 .767 .233 2.69 .516 .062 1

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Total or mean: 1682 116 5 .671 1.34 4.16 .599 .779 .221 2.89 .494 -.021

- = [ COFECHA PPSF3COF ] = -