[] Dendrochronology Program Library Run 3 Program COF 15:50 Tue 06 Mar 2012 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 28191

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

Title of run: 3

File of DATED series: CEN001\_PIST

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 N

8 Parts printed 1234567

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

Time span of Master dating series is 1910 to 2011 102 years

Continuous time span is 1910 to 2011 102 years

Portion with two or more series is 1911 to 2011 101 years

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

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

\*O\* Master series 1910 2011 102 yrs \*O\*

\*F\* Total rings in all series 1697 \*F\*

\*E\* Total dated rings checked 1696 \*E\*

\*C\* Series intercorrelation .584 \*C\*

\*H\* Average mean sensitivity .246 \*H\*

\*A\* Segments, possible problems 7 \*A\*

\*\*\* Mean length of series 84.8 \*\*\*

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

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

02B 4 absent rings: 1991 1992 1993 1994

07A 1 absent rings: 2011

33A 2 absent rings: 1999 2011

33B 1 absent rings: 1999

38A 1 absent rings: 2011

38B 1 absent rings: 2011

10 absent rings .589%

PART 2: TIME PLOT OF TREE-RING SERIES: 3 15:50 Tue 06 Mar 2012 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

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

. . . . . . . . . . . . . . . . . . <======> . 02A 1 1944 2011 68

. . . . . . . . . . . . . . . . . . <========> . 02B 2 1921 2011 91

. . . . . . . . . . . . . . . . . . <========> . 04A 3 1923 2011 89

. . . . . . . . . . . . . . . . . .<=========> . 04B 4 1914 2011 98

. . . . . . . . . . . . . . . . . . <========> . 07A 5 1923 2011 89

. . . . . . . . . . . . . . . . . . <======> . 07B 6 1941 2011 71

. . . . . . . . . . . . . . . . . .<=========> . 13A 7 1913 2011 99

. . . . . . . . . . . . . . . . . .<=========> . 13B 8 1911 2011 101

. . . . . . . . . . . . . . . . . . .<====> . 25A 9 1964 2011 48

. . . . . . . . . . . . . . . . . . <========> . 25B 10 1929 2011 83

. . . . . . . . . . . . . . . . . . <========> . 30A 11 1925 2011 87

. . . . . . . . . . . . . . . . . .<=========> . 30B 12 1911 2011 101

. . . . . . . . . . . . . . . . . . <=======> . 33A 13 1930 2011 82

. . . . . . . . . . . . . . . . . .<=========> . 33B 14 1910 2011 102

. . . . . . . . . . . . . . . . . .<=========> . 38A 15 1917 2011 95

. . . . . . . . . . . . . . . . . . <========> . 38B 16 1925 2011 87

. . . . . . . . . . . . . . . . . . <=======> . 39A 17 1933 2011 79

. . . . . . . . . . . . . . . . . . <=====> . 39B 18 1952 2011 60

. . . . . . . . . . . . . . . . . .<=========> . 43A 19 1915 2011 97

. . . . . . . . . . . . . . . . . . <======> . 43B 20 1942 2011 70

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

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: 3 15:50 Tue 06 Mar 2012 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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1950 -.030 18 2000 .581 20

1951 .219 18 2001 .168 20

1952 -1.052 19 2002 .257 20

1953 .725 19 2003 .164 20

1954 .187 19 2004 .401 20

1955 -.547 19 2005 -.719 20

1956 -.316 19 2006 .916 20

1957 -.387 19 2007 .839 20

1958 1.244 19 2008 .793 20

1959 .384 19 2009 1.628 20

1910 2.513 1 1960 .485 19 2010 1.311 20

1911 -.964 3 1961 1.536 19 2011 -3.296 20 4

1912 .137 3 1962 1.042 19

1913 -.261 4 1963 .165 19

1914 .489 5 1964 .542 20

1915 1.787 6 1965 .474 20

1916 .183 6 1966 -.538 20

1917 -1.071 7 1967 -.162 20

1918 .754 7 1968 1.408 20

1919 -.670 7 1969 -.277 20

1920 .760 7 1970 -.895 20

1921 -.475 8 1971 -1.305 20

1922 .905 8 1972 -.346 20

1923 -.453 10 1973 -.128 20

1924 .105 10 1974 1.268 20

1925 .343 12 1975 -1.340 20

1926 -.817 12 1976 -.745 20

1927 .027 12 1977 -.947 20

1928 -1.391 12 1978 -.477 20

1929 .437 13 1979 -.193 20

1930 -.070 14 1980 .515 20

1931 1.315 14 1981 .852 20

1932 2.070 14 1982 .125 20

1933 1.422 15 1983 .727 20

1934 -.322 15 1984 .454 20

1935 -.720 15 1985 .419 20

1936 .745 15 1986 1.329 20

1937 .086 15 1987 -.206 20

1938 .494 15 1988 .407 20

1939 -.960 15 1989 .919 20

1940 -.769 15 1990 1.196 20

1941 -.922 16 1991 -2.759 20 1

1942 .671 17 1992 -1.329 20 1

1943 .275 17 1993 -.792 20 1

1944 -1.114 18 1994 -1.073 20 1

1945 .210 18 1995 -.274 20

1946 -.784 18 1996 .957 20

1947 -.494 18 1997 -1.847 20

1948 -2.133 18 1998 -.620 20

1949 -1.155 18 1999 -2.221 20 2

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PART 4: Master Bar Plot: 3 15:50 Tue 06 Mar 2012 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

1950----@ 2000-------B

1951------A 2001-----A

1952-d 2002------A

1953--------C 2003-----A

1954-----A 2004-------B

1955---b 2005--c

1956----a 2006---------D

1957---b 2007--------C

1958---------E 2008--------C

1959-------B 2009----------G

1910----------J 1960-------B 2010----------E

1911-d 1961----------F 2011m

1912-----A 1962---------D

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

1914-------B 1964-------B

1915----------G 1965-------B

1916-----A 1966---b

1917-d 1967----a

1918--------C 1968----------F

1919--c 1969----a

1920--------C 1970-d

1921---b 1971e

1922---------D 1972---a

1923---b 1973----a

1924-----@ 1974---------E

1925------A 1975e

1926--c 1976--c

1927-----@ 1977-d

1928f 1978---b

1929-------B 1979----a

1930----@ 1980-------B

1931----------E 1981--------C

1932----------H 1982-----A

1933----------F 1983--------C

1934----a 1984-------B

1935--c 1985-------B

1936--------C 1986----------E

1937-----@ 1987----a

1938-------B 1988-------B

1939-d 1989---------D

1940--c 1990---------E

1941-d 1991k

1942--------C 1992e

1943------A 1993--c

1944-d 1994-d

1945------A 1995----a

1946--c 1996---------D

1947---b 1997g

1948i 1998--b

1949-e 1999i

PART 5: CORRELATION OF SERIES BY SEGMENTS: 3 15:50 Tue 06 Mar 2012 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 02A 1944 2011 .47 .49 .57

2 02B 1921 2011 .08B .13B .42 .71

3 04A 1923 2011 .67 .63 .71 .76

4 04B 1914 2011 .62 .54 .67 .82

5 07A 1923 2011 .42 .46 .66 .72

6 07B 1941 2011 .43 .67 .74

7 13A 1913 2011 .34 .43 .48 .55

8 13B 1911 2011 .46 .51 .56 .74

9 25A 1964 2011 .69

10 25B 1929 2011 .41 .47B .51B

11 30A 1925 2011 .49 .27A .54

12 30B 1911 2011 .34 .48 .46 .57

13 33A 1930 2011 .38 .16B .21A

14 33B 1910 2011 .49 .43 .40 .48

15 38A 1917 2011 .50 .47 .56 .61

16 38B 1925 2011 .42 .49 .57

17 39A 1933 2011 .42 .55 .72

18 39B 1952 2011 .58 .65

19 43A 1915 2011 .49 .51 .75 .83

20 43B 1942 2011 .71 .73 .86

Av segment correlation .44 .46 .54 .64

PART 6: POTENTIAL PROBLEMS: 3 15:50 Tue 06 Mar 2012 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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02A 1944 to 2011 68 years Series 1

[B] Entire series, effect on correlation ( .546) is:

Lower 1997> -.050 1944> -.049 1963< -.022 1990< -.021 1970> -.010 1957< -.010 Higher 2011 .086 1975 .024

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

02B 1921 to 2011 91 years Series 2

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

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

1921 1970 8 -.17 .06 -.12 .25 -.15 .05 -.11 .20 .00 -.08 .08|-.18 .26 -.20 .35 -.04 -.03 -.12 .36\* .02 -.14

1925 1974 4 -.18 .03 -.12 .30 -.17 .06 -.08 .15 -.01 -.10 .13|-.17 .26 -.25 .40\*-.04 -.05 -.15 .35 .00 -.14

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

Lower 1942< -.038 1948> -.032 1934> -.022 1928> -.021 1923> -.018 1966> -.015 Higher 2011 .157 1991 .027

1921 to 1970 segment:

Lower 1942< -.069 1948> -.054 1934> -.041 1928> -.035 1923> -.031 1966> -.028 Higher 1952 .044 1968 .036

1925 to 1974 segment:

Lower 1942< -.073 1948> -.060 1934> -.045 1928> -.039 1966> -.030 1931< -.025 Higher 1952 .044 1968 .034

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

1991 -2.759 20 1

1992 -1.329 20 1

1993 -.792 20 1

1994 -1.073 20 1

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

04A 1923 to 2011 89 years Series 3

[B] Entire series, effect on correlation ( .737) is:

Lower 2000< -.017 1959> -.013 1981< -.010 1940< -.009 1992> -.008 1974< -.007 Higher 1991 .055 2011 .047

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04B 1914 to 2011 98 years Series 4

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

Lower 1938< -.017 1966> -.015 1944> -.010 1952> -.010 1937> -.008 1947< -.008 Higher 2011 .080 1997 .012

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

07A 1923 to 2011 89 years Series 5

[B] Entire series, effect on correlation ( .588) is:

Lower 1939< -.033 1988< -.020 1994< -.012 1950< -.012 1928> -.012 1978< -.011 Higher 1991 .085 1975 .010

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

2011 -3.296 20 4

>> WARNING: Last ring in series is ABSENT

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07B 1941 to 2011 71 years Series 6

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

Lower 1953< -.019 1946> -.019 1982> -.012 1996< -.010 1974< -.010 1988< -.009 Higher 1991 .077 2011 .037

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13A 1913 to 2011 99 years Series 7

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

Lower 1952< -.033 1928> -.014 1934> -.011 1924< -.010 2010< -.009 1989< -.009 Higher 1948 .020 1975 .017

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

1952 -6.1 SD

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13B 1911 to 2011 101 years Series 8

[B] Entire series, effect on correlation ( .592) is:

Lower 1952< -.049 1911> -.016 1926> -.015 1939> -.011 2004< -.010 1922< -.010 Higher 2011 .045 1975 .017

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

1952 -4.6 SD

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25A 1964 to 2011 48 years Series 9

[B] Entire series, effect on correlation ( .687) is:

Lower 1975> -.036 1982< -.033 1977> -.013 1985< -.013 1980< -.012 1964< -.011 Higher 1991 .054 2011 .054

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25B 1929 to 2011 83 years Series 10

[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 -6 .02 -.11 -.04 -.07 .52\*-.02 .01 .07 .04 -.23 .47|-.29 .20 -.10 .20 -.14 .06 -.11 .09 -.18 .10

1962 2011 -6 .06 -.16 -.06 -.11 .57\*-.06 .00 .04 .04 -.25 .51| - - - - - - - - - -

[B] Entire series, effect on correlation ( .491) is:

Lower 1991> -.024 1997< -.021 1975> -.019 1937< -.017 1944> -.013 1959> -.009 Higher 2011 .016 1974 .012

1950 to 1999 segment:

Lower 1991> -.076 1975> -.038 1959> -.014 1968< -.009 1980< -.006 1981< -.005 Higher 1997 .025 1974 .023

1962 to 2011 segment:

Lower 1997< -.059 1991> -.040 1975> -.027 1968< -.006 1980< -.005 1987< -.004 Higher 1974 .016 1986 .014

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

1997 1998 4.1 SD

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

1997 -6.2 SD

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30A 1925 to 2011 87 years Series 11

[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 -.09 -.01 -.13 -.09 -.25 -.12 -.17 -.02 -.04 .00 .27\*-.04 .13 -.03 .15 .09 .17 .05 .26 .12 -.02

[B] Entire series, effect on correlation ( .537) is:

Lower 1999> -.041 1997> -.033 1974< -.011 2007< -.010 1952> -.009 1963> -.008 Higher 2011 .165 1975 .009

1950 to 1999 segment:

Lower 1999> -.075 1997> -.053 1974< -.025 1989< -.022 1963> -.015 1957< -.013 Higher 1991 .105 1975 .054

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

1999 +3.6 SD

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30B 1911 to 2011 101 years Series 12

[B] Entire series, effect on correlation ( .456) is:

Lower 1991> -.061 1916> -.053 1944< -.024 1955> -.012 1917> -.009 2003< -.007 Higher 2011 .046 1975 .024

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

1991 +3.3 SD

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33A 1930 to 2011 82 years Series 13

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

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

1950 1999 7 -.07 .09 -.26 .13 .11 -.21 -.28 .14 -.07 -.24 .16| .08 -.33 .13 -.07 -.02 -.03 .33\*-.09 .26 -.05

1962 2011 0 .15 .06 -.19 .18 .17 -.14 -.14 .12 .05 -.20 .21\* - - - - - - - - - -

[B] Entire series, effect on correlation ( .354) is:

Lower 1990< -.029 1975> -.028 2011> -.027 1971> -.025 1952> -.019 1984< -.014 Higher 1948 .031 1999 .027

1950 to 1999 segment:

Lower 1990< -.049 1975> -.040 1971> -.038 1952> -.029 1984< -.022 1970> -.011 Higher 1999 .062 1997 .049

1962 to 2011 segment:

Lower 1990< -.042 1975> -.035 1971> -.034 1984< -.021 2001< -.018 2004< -.013 Higher 1999 .044 1997 .035

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

1999 -2.221 20 2

2011 -3.296 20 4

>> WARNING: Last ring in series is ABSENT

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

1971 +3.3 SD

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33B 1910 to 2011 102 years Series 14

[\*] Early part of series cannot be checked from 1910 to 1910 -- not matched by another series

[B] Entire series, effect on correlation ( .490) is:

Lower 1959< -.033 2011> -.023 1953< -.017 1946> -.017 1921> -.013 1990< -.010 Higher 1991 .038 1999 .023

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

1999 -2.221 20 2

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38A 1917 to 2011 95 years Series 15

[B] Entire series, effect on correlation ( .588) is:

Lower 1958< -.024 1998< -.017 1952> -.013 1981< -.012 2000< -.010 1929< -.009 Higher 1991 .057 2011 .027

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

2011 -3.296 20 4

>> WARNING: Last ring in series is ABSENT

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38B 1925 to 2011 87 years Series 16

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

Lower 1971< -.071 1952> -.024 1998< -.015 1929< -.009 1997> -.008 1990> -.008 Higher 2011 .073 1991 .052

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

2011 -3.296 20 4

>> WARNING: Last ring in series is ABSENT

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39A 1933 to 2011 79 years Series 17

[B] Entire series, effect on correlation ( .669) is:

Lower 1988< -.021 1979< -.017 1962< -.014 1939> -.012 1980< -.012 1955> -.012 Higher 2011 .091 1991 .051

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39B 1952 to 2011 60 years Series 18

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

Lower 1983< -.026 1966< -.019 1975> -.015 1954< -.014 1982< -.013 1979> -.013 Higher 1991 .098 2011 .056

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43A 1915 to 2011 97 years Series 19

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

Lower 1921> -.022 1937> -.015 1940> -.013 1928< -.011 1939> -.010 1932< -.008 Higher 2011 .050 1991 .040

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43B 1942 to 2011 70 years Series 20

[B] Entire series, effect on correlation ( .797) is:

Lower 1952> -.014 1959> -.011 1973< -.009 1948> -.009 1944> -.008 1950< -.008 Higher 2011 .081 1991 .048

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PART 7: DESCRIPTIVE STATISTICS: 3 15:50 Tue 06 Mar 2012 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 02A 1944 2011 68 3 0 .546 2.56 6.13 1.239 .586 .331 2.96 .646 -.055 1

2 02B 1921 2011 91 4 2 .463 1.82 4.55 1.014 .859 .285 2.68 .416 -.026 1

3 04A 1923 2011 89 4 0 .737 2.16 5.91 .923 .818 .208 2.42 .401 -.024 2

4 04B 1914 2011 98 4 0 .739 1.74 4.96 .704 .720 .203 2.50 .376 .011 2

5 07A 1923 2011 89 4 0 .588 1.73 2.81 .555 .521 .252 2.63 .439 -.022 2

6 07B 1941 2011 71 3 0 .703 2.03 3.80 .553 .575 .187 2.56 .416 -.048 1

7 13A 1913 2011 99 4 0 .450 1.56 4.63 .922 .817 .269 2.66 .400 -.055 1

8 13B 1911 2011 101 4 0 .592 1.30 5.91 1.068 .906 .238 2.61 .405 -.019 1

9 25A 1964 2011 48 1 0 .687 2.89 5.31 1.092 .717 .229 2.72 .632 -.066 1

10 25B 1929 2011 83 3 2 .491 2.22 6.46 1.160 .696 .229 2.51 .319 -.109 1

11 30A 1925 2011 87 3 1 .537 1.70 4.51 .780 .755 .197 2.58 .374 -.115 1

12 30B 1911 2011 101 4 0 .456 1.78 6.08 1.157 .894 .252 2.56 .374 -.082 1

13 33A 1930 2011 82 3 2 .354 2.15 7.69 1.447 .775 .392 2.74 .589 -.070 3

14 33B 1910 2011 102 4 0 .490 1.99 5.67 1.221 .832 .318 2.75 .493 -.032 2

15 38A 1917 2011 95 4 0 .588 1.35 4.03 .806 .879 .260 2.69 .528 -.005 1

16 38B 1925 2011 87 3 0 .616 1.57 3.72 .795 .825 .238 2.83 .407 -.032 1

17 39A 1933 2011 79 3 0 .669 1.85 3.53 .647 .803 .183 2.79 .493 -.013 1

18 39B 1952 2011 60 2 0 .632 2.84 5.75 1.193 .811 .212 2.71 .504 .069 1

19 43A 1915 2011 97 4 0 .684 1.77 4.74 .713 .752 .204 2.65 .526 -.025 1

20 43B 1942 2011 70 3 0 .797 1.91 4.03 .808 .830 .211 2.44 .407 -.001 1

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Total or mean: 1697 67 7 .584 1.89 7.69 .935 .775 .246 2.96 .450 -.037

- = [ COFECHA 3 COF ] = -