[] Dendrochronology Program Library Run RS\_E Program COF 14:58 Mon 20 Apr 2020 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 31158

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QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS COF12K.for

Title of run: Red Spruce, Cone Pond, NH (KT Smith)

File of DATED series: RS\_E.rrw

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 not transformed to logarithms N

5 CORRELATION is Pearson (parametric, quantitative)

Critical correlation, 99% confidence level 0.3281

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 1846 to 1993 148 years

Continuous time span is 1846 to 1993 148 years

Portion with two or more series is 1847 to 1993 147 years

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

\*C\* Number of dated series 65 \*C\*

\*O\* Master series 1846 1993 148 yrs \*O\*

\*F\* Total rings in all series 7946 \*F\*

\*E\* Total dated rings checked 7945 \*E\*

\*C\* Series intercorrelation 0.616 \*C\*

\*H\* Average mean sensitivity 0.195 \*H\*

\*A\* Segments, possible problems 1 \*A\*

\*\*\* Mean length of series 122.0 \*\*\*

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

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: Red Spruce, Cone Pond, NH (KT Smith) 14:58 Mon 20 Apr 2020 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

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. . . . . . . . . . . . . . . . <=============>. . E192 1 1853 1991 139

. . . . . . . . . . . . . . . . .<============>. . E191 2 1867 1991 125

. . . . . . . . . . . . . . . . <=============>. . E182 3 1852 1991 140

. . . . . . . . . . . . . . . . <=============>. . E181 4 1852 1991 140

. . . . . . . . . . . . . . . . .<============>. . E172 5 1865 1991 127

. . . . . . . . . . . . . . . . .<============>. . E171 6 1860 1991 132

. . . . . . . . . . . . . . . . <=============>. . E142 7 1859 1991 133

. . . . . . . . . . . . . . . . <=============>. . E141 8 1856 1991 136

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. . . . . . . . . . . . . . . . <=============>. . E322 48 1855 1992 138

. . . . . . . . . . . . . . . . . <===========>. . E321 49 1875 1992 118

. . . . . . . . . . . . . . . . . <===========>. . E382 50 1878 1992 115

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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

PART 2: TIME PLOT OF TREE-RING SERIES: Red Spruce, Cone Pond, NH (KT Smith) 14:58 Mon 20 Apr 2020 Page 3

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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

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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

PART 3: Master Dating Series: Red Spruce, Cone Pond, NH (KT Smith) 14:58 Mon 20 Apr 2020 Page 4

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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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1850 -0.810 4 1900 -1.152 59 1950 -0.403 65

1851 0.576 4 1901 -0.512 59 1951 -0.150 65

1852 -1.240 7 1902 -0.202 59 1952 -0.302 65

1853 0.211 9 1903 2.039 59 1953 -0.748 65

1854 -0.769 10 1904 1.117 60 1954 -0.643 65

1855 0.349 13 1905 1.240 60 1955 -0.471 65

1856 -1.652 16 1906 0.484 62 1956 -1.021 65

1857 0.305 16 1907 0.345 62 1957 0.794 65

1858 0.966 17 1908 -0.794 62 1958 2.077 65

1859 -0.239 18 1909 -1.389 62 1959 1.223 65

1860 1.837 21 1910 0.682 62 1960 0.221 65

1861 0.187 22 1911 -2.275 62 1961 2.540 65

1862 -1.154 22 1912 -0.129 62 1962 0.388 65

1863 -0.020 25 1913 0.762 63 1963 0.525 65

1864 -0.925 26 1914 0.468 63 1964 -1.152 65

1865 1.961 29 1915 2.391 63 1965 -0.388 65

1866 -0.153 30 1916 0.855 65 1966 -1.745 65

1867 0.536 32 1917 -0.447 65 1967 -1.404 65

1868 -0.510 34 1918 -0.079 65 1968 -0.583 65

1869 0.464 38 1919 -0.154 65 1969 0.589 65

1870 0.591 39 1920 -0.147 65 1970 1.031 65

1871 1.148 40 1921 0.155 65 1971 1.285 65

1872 0.206 41 1922 -0.638 65 1972 0.156 65

1873 -1.254 44 1923 -2.793 65 1973 0.036 65

1874 0.019 44 1924 0.917 65 1974 -0.210 65

1875 -0.372 45 1925 0.366 65 1975 -0.069 65

1876 -1.210 47 1926 -0.689 65 1976 0.537 65

1877 1.904 48 1927 0.951 65 1977 1.436 65

1878 0.022 49 1928 0.175 65 1978 -0.043 65

1879 -1.543 50 1929 -0.956 65 1979 -0.535 65

1880 -0.640 52 1930 -0.144 65 1980 0.157 65

1881 -0.064 53 1931 1.326 65 1981 -1.534 65

1882 0.061 53 1932 2.095 65 1982 -1.029 65

1883 0.493 54 1933 -1.200 65 1983 0.026 65

1884 0.524 54 1934 -0.267 65 1984 -1.125 65

1885 -0.127 55 1935 0.486 65 1985 -0.485 65

1886 1.258 55 1936 -0.451 65 1986 -0.650 65

1887 -0.444 55 1937 -0.930 65 1987 -0.408 65

1888 -0.198 55 1938 0.863 65 1988 0.343 65

1889 1.279 55 1939 0.409 65 1989 -0.289 65

1890 0.963 56 1940 0.038 65 1990 0.584 65

1891 1.084 56 1941 1.287 65 1991 0.248 65

1892 -0.326 57 1942 0.517 65 1992 2.030 47

1893 -1.585 58 1943 -0.923 65 1993 1.756 12

1894 0.399 58 1944 -0.120 65

1895 -1.735 58 1945 1.024 65

1846 -1.908 1 1896 -1.327 58 1946 -0.568 65

1847 -1.732 2 1897 0.256 59 1947 0.143 65

1848 0.656 3 1898 0.641 59 1948 -2.152 65

1849 -1.186 3 1899 -0.197 59 1949 -0.195 65

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PART 4: Master Bar Plot: Red Spruce, Cone Pond, NH (KT Smith) 14:58 Mon 20 Apr 2020 Page 5

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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

1850--c 1900-e 1950---b

1851--------B 1901---b 1951----a

1852-e 1902----a 1952----a

1853------A 1903----------H 1953--c

1854--c 1904---------D 1954--c

1855-------A 1905---------E 1955---b

1856g 1906-------B 1956-d

1857------A 1907-------A 1957--------C

1858---------D 1908--c 1958----------H

1859----a 1909-f 1959---------E

1860----------G 1910--------C 1960------A

1861------A 1911i 1961----------J

1862-e 1912----a 1962-------B

1863-----@ 1913--------C 1963-------B

1864-d 1914-------B 1964-e

1865----------H 1915----------J 1965---b

1866----a 1916--------C 1966g

1867-------B 1917---b 1967f

1868---b 1918-----@ 1968--b

1869-------B 1919----a 1969--------B

1870--------B 1920----a 1970---------D

1871---------E 1921------A 1971---------E

1872------A 1922--c 1972------A

1873-e 1923k 1973-----@

1874-----@ 1924---------D 1974----a

1875---a 1925-------A 1975-----@

1876-e 1926--c 1976-------B

1877----------H 1927---------D 1977---------F

1878-----@ 1928------A 1978-----@

1879f 1929-d 1979---b

1880--c 1930----a 1980------A

1881-----@ 1931---------E 1981f

1882-----@ 1932----------H 1982-d

1883-------B 1933-e 1983-----@

1884-------B 1934----a 1984-d

1885----a 1935-------B 1985---b

1886---------E 1936---b 1986--c

1887---b 1937-d 1987---b

1888----a 1938--------C 1988-------A

1889---------E 1939-------B 1989----a

1890---------D 1940-----@ 1990--------B

1891---------D 1941---------E 1991------A

1892---a 1942-------B 1992----------H

1893f 1943-d 1993----------G

1894-------B 1944----@

1895g 1945---------D

1846h 1896-e 1946--b

1847g 1897------A 1947------A

1848--------C 1898--------C 1948i

1849-e 1899----a 1949----a

PART 5: CORRELATION OF SERIES BY SEGMENTS: Red Spruce, Cone Pond, NH (KT Smith) 14:58 Mon 20 Apr 2020 Page 5

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Correlations of 50-year dated segments, lagged 25 years

Flags: A = correlation under 0.3281 but highest as dated; B = correlation higher at other than dated position

Seq Series Time\_span 1825 1850 1875 1900 1925 1950

1874 1899 1924 1949 1974 1999

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

1 E192 1853 1991 .52 .53 .58 .64 .61

2 E191 1867 1991 .48 .54 .49 .37 .45

3 E182 1852 1991 .40 .20B .34 .49 .54

4 E181 1852 1991 .42 .37 .40 .51 .59

5 E172 1865 1991 .47 .57 .65 .70 .68

6 E171 1860 1991 .56 .60 .73 .67 .42

7 E142 1859 1991 .78 .77 .67 .47 .50

8 E141 1856 1991 .52 .65 .58 .54 .65

9 E152 1876 1991 .61 .70 .60 .61

10 E151 1876 1991 .64 .68 .59 .67

11 E111 1916 1991 .74 .72 .68

12 E161 1866 1991 .61 .74 .74 .79 .72

13 E112 1906 1991 .74 .67 .69

14 R131 1863 1991 .65 .69 .74 .74 .62

15 E132 1880 1991 .73 .75 .59 .41

16 E162 1850 1991 .47 .76 .78 .69 .66

17 E122 1872 1991 .53 .56 .55 .63 .58

18 E121 1877 1991 .68 .70 .59 .60

19 E231 1873 1992 .64 .67 .73 .72 .62

20 E211 1863 1992 .50 .66 .67 .64 .44

21 E291 1846 1992 .62 .63 .75 .65 .48 .50

22 E261 1854 1992 .76 .73 .78 .61 .52

23 E242 1860 1992 .68 .78 .79 .64 .59

24 E281 1853 1992 .58 .69 .72 .62 .56

25 E241 1855 1992 .68 .77 .78 .78 .60

26 E292 1852 1992 .64 .70 .62 .61 .42

27 E221 1864 1992 .79 .77 .72 .66 .64

28 E252 1856 1992 .81 .79 .70 .60 .61

29 E251 1863 1992 .84 .80 .71 .64 .72

30 E222 1858 1992 .74 .80 .77 .69 .64

31 E232 1865 1992 .68 .68 .63 .49 .44

32 E272 1867 1992 .70 .72 .62 .61 .74

33 E212 1869 1992 .60 .69 .77 .74 .70

34 E271 1860 1992 .50 .64 .60 .51 .48

35 E282 1871 1992 .62 .62 .68 .44 .38

36 E262 1847 1992 .63 .63 .66 .70 .66 .66

37 E342 1897 1992 .68 .73 .64 .66

38 E341 1885 1992 .68 .68 .65 .72

39 E372 1856 1992 .74 .76 .67 .55 .55

40 E351 1881 1992 .67 .69 .60 .61

41 E371 1855 1992 .67 .75 .65 .49 .51

42 E381 1880 1992 .68 .68 .67 .78

43 E361 1879 1992 .60 .63 .45 .52

44 E362 1893 1992 .55 .57 .69 .69

45 E391 1869 1992 .70 .70 .58 .59 .65

46 E311 1890 1992 .66 .63 .52 .56

47 E312 1892 1992 .77 .77 .78 .63

48 E322 1855 1992 .47 .62 .73 .79 .62

49 E321 1875 1992 .70 .81 .75 .63

50 E382 1878 1992 .72 .77 .77 .78

51 E392 1883 1992 .67 .69 .66 .56

52 E331 1868 1992 .43 .53 .59 .70 .72

53 E332 1870 1992 .43 .47 .73 .77 .72

54 E411 1848 1993 .59 .59 .59 .57 .56 .38

55 E421 1861 1993 .59 .65 .66 .70 .67

56 E422 1869 1993 .64 .70 .66 .66 .63

57 E431 1904 1993 .63 .62 .53

58 E432 1906 1993 .68 .56 .43

59 E441 1916 1993 .69 .69 .65

60 E451 1913 1993 .59 .63 .68

61 E461 1873 1993 .48 .53 .63 .53 .55

62 E462 1868 1993 .63 .63 .70 .75 .72

63 E491 1869 1993 .62 .70 .71 .72 .77

64 E481 1865 1993 .39 .45 .48 .47 .54

65 E482 1873 1993 .60 .58 .55 .55 .46

Av segment correlation 0.61 0.60 0.65 0.67 0.63 0.60

PART 6: POTENTIAL PROBLEMS: Red Spruce, Cone Pond, NH (KT Smith) 14:58 Mon 20 Apr 2020 Page 6

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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

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

E192 1853 to 1991 139 years Series 1

[B] Entire series, effect on correlation ( 0.563) is:

Lower 1895>-0.019 1903<-0.013 1860<-0.013 1988<-0.012 1886<-0.011 1887>-0.010 Higher 1877 0.018 1865 0.018

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

1931 +4.6 SD

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

E191 1867 to 1991 125 years Series 2

[B] Entire series, effect on correlation ( 0.476) is:

Lower 1895>-0.018 1937>-0.015 1948>-0.013 1927<-0.013 1893>-0.012 1939<-0.011 Higher 1924 0.019 1911 0.019

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

1949 +3.7 SD

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

E182 1852 to 1991 140 years Series 3

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

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

1875 1924 2 .09 .15 .06 .18 .10 -.07 -.01 -.14 -.26 -.02 .20|-.09 .37\*-.01 -.42 -.01 -.07 -.01 .26 -.13 -.02

[B] Entire series, effect on correlation ( 0.395) is:

Lower 1896>-0.033 1877<-0.028 1915<-0.028 1903<-0.022 1932<-0.017 1875>-0.013 Higher 1961 0.029 1948 0.020

1875 to 1924 segment:

Lower 1896>-0.071 1877<-0.057 1915<-0.057 1903<-0.043 1875>-0.025 1922>-0.020 Higher 1923 0.068 1909 0.031

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

1896 +4.4 SD

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

E181 1852 to 1991 140 years Series 4

[B] Entire series, effect on correlation ( 0.434) is:

Lower 1903<-0.019 1940<-0.013 1911>-0.013 1872>-0.011 1858<-0.011 1861>-0.011 Higher 1961 0.027 1948 0.014

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E172 1865 to 1991 127 years Series 5

[B] Entire series, effect on correlation ( 0.561) is:

Lower 1922>-0.039 1865<-0.036 1873>-0.012 1937>-0.011 1880>-0.009 1939<-0.009 Higher 1911 0.029 1923 0.028

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

1922 +4.2 SD; 1977 +3.2 SD

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

E171 1860 to 1991 132 years Series 6

[B] Entire series, effect on correlation ( 0.566) is:

Lower 1975>-0.040 1922>-0.014 1946>-0.012 1893>-0.012 1870<-0.011 1883<-0.010 Higher 1923 0.028 1961 0.016

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

1975 +5.1 SD

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

E142 1859 to 1991 133 years Series 7

[B] Entire series, effect on correlation ( 0.651) is:

Lower 1924<-0.015 1973>-0.011 1936>-0.011 1965>-0.011 1937>-0.010 1904<-0.010 Higher 1865 0.016 1903 0.016

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

E141 1856 to 1991 136 years Series 8

[B] Entire series, effect on correlation ( 0.605) is:

Lower 1876>-0.022 1931<-0.019 1900>-0.019 1932<-0.015 1873>-0.012 1861<-0.009 Higher 1915 0.019 1877 0.018

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

E152 1876 to 1991 116 years Series 9

[B] Entire series, effect on correlation ( 0.606) is:

Lower 1950>-0.020 1876>-0.019 1939<-0.014 1989>-0.010 1969<-0.009 1889<-0.009 Higher 1895 0.015 1911 0.014

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

1894 +3.4 SD; 1950 +3.0 SD

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

E151 1876 to 1991 116 years Series 10

[B] Entire series, effect on correlation ( 0.629) is:

Lower 1931<-0.015 1896>-0.012 1956>-0.010 1893>-0.010 1933>-0.010 1903<-0.009 Higher 1948 0.019 1923 0.019

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E111 1916 to 1991 76 years Series 11

[B] Entire series, effect on correlation ( 0.690) is:

Lower 1979>-0.019 1920>-0.018 1938<-0.016 1926>-0.011 1949<-0.010 1962>-0.010 Higher 1961 0.032 1923 0.025

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

E161 1866 to 1991 126 years Series 12

[B] Entire series, effect on correlation ( 0.669) is:

Lower 1870>-0.023 1871<-0.018 1869<-0.011 1976<-0.010 1934<-0.010 1873>-0.009 Higher 1911 0.013 1923 0.012

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

E112 1906 to 1991 86 years Series 13

[B] Entire series, effect on correlation ( 0.726) is:

Lower 1935<-0.014 1970<-0.012 1925<-0.010 1946>-0.008 1916<-0.008 1966>-0.007 Higher 1911 0.025 1915 0.020

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

R131 1863 to 1991 129 years Series 14

[B] Entire series, effect on correlation ( 0.669) is:

Lower 1982>-0.015 1886<-0.011 1910<-0.011 1985>-0.010 1988<-0.010 1873>-0.008 Higher 1923 0.014 1865 0.012

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

E132 1880 to 1991 112 years Series 15

[B] Entire series, effect on correlation ( 0.577) is:

Lower 1988<-0.018 1987>-0.017 1982>-0.016 1941<-0.015 1977<-0.014 1886<-0.013 Higher 1923 0.026 1948 0.022

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

E162 1850 to 1991 142 years Series 16

[B] Entire series, effect on correlation ( 0.634) is:

Lower 1869<-0.028 1860<-0.014 1850<-0.011 1922>-0.010 1891<-0.008 1873>-0.007 Higher 1923 0.014 1915 0.012

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

E122 1872 to 1991 120 years Series 17

[B] Entire series, effect on correlation ( 0.590) is:

Lower 1909>-0.035 1915<-0.012 1926>-0.011 1945<-0.011 1957<-0.010 1902<-0.009 Higher 1877 0.022 1961 0.021

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

1909 +3.6 SD

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

E121 1877 to 1991 115 years Series 18

[B] Entire series, effect on correlation ( 0.645) is:

Lower 1889<-0.019 1902<-0.015 1938<-0.012 1961<-0.010 1986>-0.008 1957<-0.008 Higher 1911 0.019 1923 0.015

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

E231 1873 to 1992 120 years Series 19

[B] Entire series, effect on correlation ( 0.671) is:

Lower 1885>-0.012 1879>-0.011 1884<-0.010 1961<-0.010 1898<-0.009 1978>-0.008 Higher 1877 0.017 1958 0.011

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

E211 1863 to 1992 130 years Series 20

[B] Entire series, effect on correlation ( 0.523) is:

Lower 1981>-0.063 1868>-0.025 1904<-0.013 1929>-0.012 1887>-0.012 1865<-0.009 Higher 1911 0.023 1923 0.021

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

1868 +3.4 SD; 1981 +4.7 SD

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

E291 1846 to 1992 147 years Series 21

[\*] Early part of series cannot be checked from 1846 to 1846 -- not matched by another series

[B] Entire series, effect on correlation ( 0.594) is:

Lower 1861>-0.025 1938<-0.015 1952>-0.011 1984>-0.010 1848>-0.009 1979>-0.009 Higher 1923 0.012 1903 0.012

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

1861 +3.7 SD

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

E261 1854 to 1992 139 years Series 22

[B] Entire series, effect on correlation ( 0.698) is:

Lower 1945<-0.016 1970<-0.016 1971<-0.011 1886<-0.011 1896>-0.010 1966>-0.008 Higher 1923 0.017 1865 0.011

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

E242 1860 to 1992 133 years Series 23

[B] Entire series, effect on correlation ( 0.666) is:

Lower 1954>-0.011 1990<-0.010 1889<-0.009 1873>-0.009 1939>-0.008 1917>-0.008 Higher 1877 0.016 1903 0.014

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

E281 1853 to 1992 140 years Series 24

[B] Entire series, effect on correlation ( 0.636) is:

Lower 1895>-0.019 1973>-0.012 1960>-0.011 1854>-0.009 1853<-0.008 1855<-0.008 Higher 1961 0.016 1948 0.013

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

E241 1855 to 1992 138 years Series 25

[B] Entire series, effect on correlation ( 0.671) is:

Lower 1990<-0.018 1984>-0.013 1917>-0.012 1855<-0.008 1871<-0.008 1868>-0.006 Higher 1961 0.015 1948 0.015

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

E292 1852 to 1992 141 years Series 26

[B] Entire series, effect on correlation ( 0.584) is:

Lower 1945<-0.021 1861>-0.018 1991<-0.014 1979>-0.013 1986>-0.009 1910<-0.008 Higher 1923 0.014 1958 0.010

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

1861 +3.4 SD

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

E221 1864 to 1992 129 years Series 27

[B] Entire series, effect on correlation ( 0.705) is:

Lower 1984>-0.014 1941<-0.013 1956>-0.011 1955>-0.010 1986>-0.007 1934>-0.007 Higher 1877 0.014 1915 0.011

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

E252 1856 to 1992 137 years Series 28

[B] Entire series, effect on correlation ( 0.707) is:

Lower 1946>-0.016 1917>-0.010 1938<-0.008 1991<-0.008 1977<-0.007 1973>-0.007 Higher 1865 0.012 1877 0.011

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

1946 +3.1 SD

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

E251 1863 to 1992 130 years Series 29

[B] Entire series, effect on correlation ( 0.737) is:

Lower 1889<-0.013 1933>-0.012 1945<-0.010 1938<-0.008 1988<-0.007 1883>-0.007 Higher 1911 0.012 1865 0.012

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

1877 +3.1 SD

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

E222 1858 to 1992 135 years Series 30

[B] Entire series, effect on correlation ( 0.708) is:

Lower 1974>-0.016 1864>-0.011 1871<-0.010 1918<-0.009 1981>-0.006 1927<-0.006 Higher 1877 0.013 1903 0.012

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

1970 +3.1 SD

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

E232 1865 to 1992 128 years Series 31

[B] Entire series, effect on correlation ( 0.571) is:

Lower 1956>-0.019 1879>-0.018 1975>-0.016 1939<-0.015 1870<-0.015 1952>-0.012 Higher 1877 0.023 1923 0.017

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E272 1867 to 1992 126 years Series 32

[B] Entire series, effect on correlation ( 0.681) is:

Lower 1978>-0.014 1901>-0.013 1885>-0.012 1929>-0.010 1940<-0.009 1953>-0.009 Higher 1923 0.015 1992 0.013

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E212 1869 to 1992 124 years Series 33

[B] Entire series, effect on correlation ( 0.674) is:

Lower 1977<-0.010 1892>-0.009 1886<-0.008 1974>-0.008 1874<-0.008 1877<-0.008 Higher 1915 0.012 1933 0.011

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E271 1860 to 1992 133 years Series 34

[B] Entire series, effect on correlation ( 0.558) is:

Lower 1862>-0.013 1945<-0.012 1902>-0.012 1895>-0.011 1954>-0.011 1861<-0.009 Higher 1877 0.021 1992 0.016

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

1902 +3.3 SD

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

E282 1871 to 1992 122 years Series 35

[B] Entire series, effect on correlation ( 0.553) is:

Lower 1967>-0.037 1895>-0.017 1945<-0.016 1915<-0.016 1886<-0.015 1959<-0.014 Higher 1961 0.025 1877 0.019

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

1967 +4.0 SD; 1968 +3.1 SD

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

E262 1847 to 1992 146 years Series 36

[B] Entire series, effect on correlation ( 0.644) is:

Lower 1982<-0.017 1885>-0.016 1848<-0.015 1970<-0.013 1852>-0.009 1898<-0.009 Higher 1961 0.019 1923 0.013

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

E342 1897 to 1992 96 years Series 37

[B] Entire series, effect on correlation ( 0.660) is:

Lower 1977<-0.030 1931<-0.021 1929>-0.011 1897<-0.011 1934>-0.009 1898<-0.009 Higher 1903 0.020 1915 0.018

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E341 1885 to 1992 108 years Series 38

[B] Entire series, effect on correlation ( 0.673) is:

Lower 1933>-0.016 1893>-0.013 1897<-0.012 1936>-0.011 1901>-0.010 1941<-0.010 Higher 1915 0.016 1958 0.013

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E372 1856 to 1992 137 years Series 39

[B] Entire series, effect on correlation ( 0.663) is:

Lower 1905<-0.011 1927<-0.009 1887>-0.009 1939>-0.009 1971<-0.009 1989>-0.008 Higher 1877 0.015 1915 0.013

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E351 1881 to 1992 112 years Series 40

[B] Entire series, effect on correlation ( 0.647) is:

Lower 1968>-0.018 1923>-0.015 1933>-0.009 1956>-0.009 1979>-0.009 1980<-0.009 Higher 1915 0.018 1992 0.017

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E371 1855 to 1992 138 years Series 41

[B] Entire series, effect on correlation ( 0.608) is:

Lower 1931<-0.023 1981>-0.018 1855<-0.016 1939>-0.014 1974>-0.014 1952>-0.010 Higher 1923 0.021 1911 0.015

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

1939 +3.6 SD

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

E381 1880 to 1992 113 years Series 42

[B] Entire series, effect on correlation ( 0.703) is:

Lower 1887<-0.015 1924<-0.014 1940>-0.013 1926>-0.013 1983<-0.011 1890<-0.010 Higher 1923 0.018 1911 0.015

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E361 1879 to 1992 114 years Series 43

[B] Entire series, effect on correlation ( 0.554) is:

Lower 1883<-0.041 1956>-0.022 1958<-0.013 1954>-0.010 1938<-0.010 1941<-0.008 Higher 1961 0.024 1903 0.020

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

1956 +3.2 SD

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

E362 1893 to 1992 100 years Series 44

[B] Entire series, effect on correlation ( 0.601) is:

Lower 1915<-0.048 1918>-0.016 1898<-0.012 1893>-0.011 1940<-0.010 1948>-0.009 Higher 1923 0.017 1903 0.014

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E391 1869 to 1992 124 years Series 45

[B] Entire series, effect on correlation ( 0.636) is:

Lower 1931<-0.017 1948>-0.016 1926>-0.013 1876>-0.011 1900>-0.010 1941<-0.008 Higher 1915 0.020 1911 0.019

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

E311 1890 to 1992 103 years Series 46

[B] Entire series, effect on correlation ( 0.614) is:

Lower 1956>-0.025 1903<-0.016 1902>-0.016 1958<-0.015 1918>-0.014 1904<-0.013 Higher 1915 0.022 1895 0.018

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

1956 +3.2 SD

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

E312 1892 to 1992 101 years Series 47

[B] Entire series, effect on correlation ( 0.704) is:

Lower 1979>-0.017 1977<-0.014 1960>-0.012 1910<-0.012 1972>-0.008 1916<-0.007 Higher 1915 0.018 1895 0.012

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

E322 1855 to 1992 138 years Series 48

[B] Entire series, effect on correlation ( 0.626) is:

Lower 1877<-0.023 1904<-0.014 1991>-0.011 1900>-0.010 1953>-0.008 1978>-0.007 Higher 1915 0.017 1948 0.013

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E321 1875 to 1992 118 years Series 49

[B] Entire series, effect on correlation ( 0.691) is:

Lower 1877<-0.027 1904<-0.018 1992<-0.018 1991>-0.012 1884>-0.007 1875>-0.007 Higher 1915 0.016 1911 0.015

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

E382 1878 to 1992 115 years Series 50

[B] Entire series, effect on correlation ( 0.743) is:

Lower 1980>-0.010 1886<-0.010 1920>-0.009 1899>-0.008 1890<-0.008 1958<-0.007 Higher 1923 0.016 1911 0.014

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

E392 1883 to 1992 110 years Series 51

[B] Entire series, effect on correlation ( 0.637) is:

Lower 1891<-0.020 1977<-0.017 1907<-0.015 1931<-0.015 1958<-0.012 1984>-0.012 Higher 1915 0.020 1992 0.017

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

1945 +3.2 SD

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E331 1868 to 1992 125 years Series 52

[B] Entire series, effect on correlation ( 0.572) is:

Lower 1877<-0.034 1868>-0.021 1939>-0.015 1879>-0.014 1914>-0.014 1898<-0.012 Higher 1961 0.015 1911 0.015

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E332 1870 to 1992 123 years Series 53

[B] Entire series, effect on correlation ( 0.610) is:

Lower 1877<-0.037 1895>-0.014 1981>-0.013 1898<-0.009 1880>-0.009 1884<-0.008 Higher 1961 0.020 1992 0.013

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E411 1848 to 1993 146 years Series 54

[B] Entire series, effect on correlation ( 0.525) is:

Lower 1861>-0.024 1992<-0.022 1993<-0.016 1903<-0.011 1945<-0.011 1916>-0.008 Higher 1923 0.016 1860 0.013

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

1861 +4.1 SD

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E421 1861 to 1993 133 years Series 55

[B] Entire series, effect on correlation ( 0.645) is:

Lower 1908>-0.019 1871<-0.013 1861>-0.012 1915<-0.011 1867<-0.009 1976<-0.009 Higher 1877 0.016 1865 0.011

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E422 1869 to 1993 125 years Series 56

[B] Entire series, effect on correlation ( 0.645) is:

Lower 1977<-0.023 1976<-0.012 1869<-0.010 1932<-0.010 1900>-0.009 1907<-0.009 Higher 1895 0.012 1911 0.010

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

E431 1904 to 1993 90 years Series 57

[B] Entire series, effect on correlation ( 0.552) is:

Lower 1988>-0.022 1984>-0.019 1956>-0.015 1927<-0.015 1990<-0.010 1914<-0.010 Higher 1948 0.023 1915 0.015

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

1988 +3.8 SD

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

E432 1906 to 1993 88 years Series 58

[B] Entire series, effect on correlation ( 0.546) is:

Lower 1984>-0.031 1937>-0.029 1977<-0.024 1983>-0.020 1992<-0.013 1932<-0.011 Higher 1915 0.040 1923 0.027

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

1937 +3.2 SD; 1983 +3.5 SD; 1984 +3.8 SD

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E441 1916 to 1993 78 years Series 59

[B] Entire series, effect on correlation ( 0.639) is:

Lower 1938<-0.026 1918>-0.022 1977<-0.021 1944>-0.017 1983>-0.015 1939>-0.010 Higher 1923 0.033 1961 0.029

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E451 1913 to 1993 81 years Series 60

[B] Entire series, effect on correlation ( 0.618) is:

Lower 1918>-0.025 1926>-0.021 1946>-0.016 1977<-0.012 1941<-0.011 1929>-0.010 Higher 1923 0.031 1992 0.021

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E461 1873 to 1993 121 years Series 61

[B] Entire series, effect on correlation ( 0.526) is:

Lower 1893>-0.021 1880<-0.020 1937>-0.018 1886<-0.014 1932<-0.014 1922>-0.007 Higher 1923 0.025 1961 0.016

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E462 1868 to 1993 126 years Series 62

[B] Entire series, effect on correlation ( 0.655) is:

Lower 1881<-0.016 1932<-0.013 1922>-0.011 1983<-0.010 1871<-0.010 1937>-0.010 Higher 1877 0.015 1961 0.013

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

E491 1869 to 1993 125 years Series 63

[B] Entire series, effect on correlation ( 0.671) is:

Lower 1869<-0.021 1984>-0.018 1932<-0.015 1877<-0.014 1876>-0.010 1940>-0.008 Higher 1961 0.019 1915 0.017

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

E481 1865 to 1993 129 years Series 64

[B] Entire series, effect on correlation ( 0.421) is:

Lower 1877<-0.038 1865<-0.018 1940>-0.016 1869<-0.016 1875>-0.014 1986>-0.013 Higher 1981 0.018 1911 0.018

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

1876 1877 -4.6 SD

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

1875 +3.4 SD; 1876 +3.2 SD; 1940 +3.6 SD; 1986 +3.2 SD

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E482 1873 to 1993 121 years Series 65

[B] Entire series, effect on correlation ( 0.528) is:

Lower 1982>-0.021 1939>-0.015 1951>-0.014 1981>-0.011 1953>-0.010 1875>-0.009 Higher 1903 0.018 1911 0.016

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

1982 +3.5 SD

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PART 7: DESCRIPTIVE STATISTICS: Red Spruce, Cone Pond, NH (KT Smith) 14:58 Mon 20 Apr 2020 Page 7

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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 E192 1853 1991 139 5 0 0.563 1.16 4.02 0.866 0.871 0.223 1.25 0.289 0.017 1

2 E191 1867 1991 125 5 0 0.476 1.15 2.95 0.616 0.821 0.223 0.78 0.276 0.001 1

3 E182 1852 1991 140 5 1 0.395 0.94 3.11 0.767 0.934 0.227 0.91 0.323 0.018 2

4 E181 1852 1991 140 5 0 0.434 0.80 2.98 0.722 0.932 0.225 0.78 0.302 -0.022 1

5 E172 1865 1991 127 5 0 0.561 1.23 2.75 0.507 0.861 0.157 0.70 0.239 0.004 1

6 E171 1860 1991 132 5 0 0.566 0.94 2.14 0.502 0.887 0.204 1.50 0.390 -0.017 1

7 E142 1859 1991 133 5 0 0.651 1.44 3.52 0.679 0.904 0.157 0.71 0.211 0.009 1

8 E141 1856 1991 136 5 0 0.605 1.24 2.42 0.435 0.830 0.165 0.64 0.214 0.031 1

9 E152 1876 1991 116 4 0 0.606 1.20 2.13 0.414 0.794 0.173 0.57 0.203 0.006 1

10 E151 1876 1991 116 4 0 0.629 1.02 2.00 0.418 0.860 0.170 0.45 0.211 0.021 1

11 E111 1916 1991 76 3 0 0.690 1.64 2.87 0.461 0.674 0.172 0.56 0.218 0.022 1

12 E161 1866 1991 126 5 0 0.669 1.30 2.19 0.359 0.761 0.152 0.67 0.195 0.049 1

13 E112 1906 1991 86 3 0 0.726 1.78 2.95 0.395 0.519 0.167 0.54 0.219 0.006 1

14 R131 1863 1991 129 5 0 0.669 1.34 2.51 0.407 0.717 0.174 0.46 0.217 0.020 1

15 E132 1880 1991 112 4 0 0.577 2.14 3.82 0.603 0.690 0.185 0.47 0.228 0.013 1

16 E162 1850 1991 142 5 0 0.634 1.23 2.09 0.338 0.740 0.154 0.54 0.200 0.011 1

17 E122 1872 1991 120 5 0 0.590 1.21 2.00 0.348 0.717 0.171 0.50 0.190 -0.002 1

18 E121 1877 1991 115 4 0 0.645 1.33 2.57 0.500 0.808 0.183 0.33 0.188 -0.002 1

19 E231 1873 1992 120 5 0 0.671 1.17 2.43 0.436 0.780 0.192 0.73 0.263 0.025 1

20 E211 1863 1992 130 5 0 0.523 1.14 2.95 0.667 0.891 0.207 0.74 0.265 0.001 1

21 E291 1846 1992 147 6 0 0.594 1.24 2.69 0.419 0.679 0.197 0.68 0.257 0.013 1

22 E261 1854 1992 139 5 0 0.698 0.98 2.34 0.422 0.755 0.203 0.59 0.241 0.012 1

23 E242 1860 1992 133 5 0 0.666 1.29 2.81 0.583 0.851 0.183 0.84 0.272 0.012 1

24 E281 1853 1992 140 5 0 0.636 1.15 2.41 0.561 0.804 0.231 0.65 0.269 -0.005 1

25 E241 1855 1992 138 5 0 0.671 1.13 2.40 0.452 0.839 0.169 0.77 0.233 0.011 1

26 E292 1852 1992 141 5 0 0.584 1.32 2.98 0.540 0.782 0.194 0.59 0.260 0.007 1

27 E221 1864 1992 129 5 0 0.705 1.19 2.20 0.384 0.716 0.201 0.67 0.249 0.008 1

28 E252 1856 1992 137 5 0 0.707 1.03 2.25 0.358 0.682 0.197 0.72 0.268 0.020 1

29 E251 1863 1992 130 5 0 0.737 1.14 2.60 0.461 0.752 0.201 1.05 0.280 0.000 1

30 E222 1858 1992 135 5 0 0.708 1.42 15.02 1.261 0.172 0.201 1.11 0.392 0.034 1

31 E232 1865 1992 128 5 0 0.571 0.79 2.24 0.419 0.872 0.214 0.88 0.279 0.014 1

32 E272 1867 1992 126 5 0 0.681 0.77 2.88 0.450 0.827 0.229 0.97 0.321 0.023 1

33 E212 1869 1992 124 5 0 0.674 0.88 2.37 0.597 0.933 0.181 0.64 0.236 -0.009 1

34 E271 1860 1992 133 5 0 0.558 0.98 2.48 0.549 0.836 0.238 0.90 0.312 0.006 1

35 E282 1871 1992 122 5 0 0.553 0.79 1.97 0.421 0.832 0.208 0.66 0.248 0.018 1

36 E262 1847 1992 146 6 0 0.644 1.13 2.72 0.558 0.834 0.207 0.79 0.251 -0.005 1

37 E342 1897 1992 96 4 0 0.660 1.83 3.32 0.510 0.717 0.173 0.53 0.201 -0.003 1

38 E341 1885 1992 108 4 0 0.673 1.52 3.01 0.539 0.808 0.173 0.53 0.220 -0.003 2

39 E372 1856 1992 137 5 0 0.663 0.90 2.83 0.595 0.913 0.196 0.66 0.232 0.003 1

40 E351 1881 1992 112 4 0 0.647 1.47 2.90 0.505 0.763 0.182 0.68 0.230 0.047 1

41 E371 1855 1992 138 5 0 0.608 1.03 2.90 0.521 0.879 0.204 0.70 0.268 -0.023 1

42 E381 1880 1992 113 4 0 0.703 1.31 2.74 0.636 0.869 0.191 0.63 0.260 0.030 1

43 E361 1879 1992 114 4 0 0.554 1.02 1.99 0.407 0.804 0.191 0.63 0.269 -0.007 1

44 E362 1893 1992 100 4 0 0.601 1.46 2.85 0.735 0.904 0.192 0.55 0.252 0.025 2

45 E391 1869 1992 124 5 0 0.636 1.57 3.16 0.453 0.636 0.191 0.67 0.234 -0.012 2

46 E311 1890 1992 103 4 0 0.614 0.98 2.37 0.412 0.752 0.218 0.68 0.285 0.027 1

47 E312 1892 1992 101 4 0 0.704 1.39 2.77 0.482 0.727 0.201 0.60 0.235 0.029 1

48 E322 1855 1992 138 5 0 0.626 0.90 2.13 0.493 0.846 0.226 0.79 0.291 -0.014 1

PART 7: DESCRIPTIVE STATISTICS: Red Spruce, Cone Pond, NH (KT Smith) 14:58 Mon 20 Apr 2020 Page 8

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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 ()

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

49 E321 1875 1992 118 4 0 0.691 1.03 2.15 0.467 0.785 0.227 0.75 0.302 -0.032 1

50 E382 1878 1992 115 4 0 0.743 1.26 2.44 0.491 0.868 0.175 0.45 0.217 0.016 1

51 E392 1883 1992 110 4 0 0.637 1.37 3.03 0.474 0.795 0.165 0.75 0.219 0.033 1

52 E331 1868 1992 125 5 0 0.572 1.09 2.42 0.521 0.858 0.208 0.74 0.270 -0.009 1

53 E332 1870 1992 123 5 0 0.610 1.17 2.65 0.504 0.810 0.209 0.63 0.247 -0.002 1

54 E411 1848 1993 146 6 0 0.525 1.07 3.72 0.675 0.841 0.250 0.98 0.367 -0.014 1

55 E421 1861 1993 133 5 0 0.645 1.05 2.19 0.420 0.783 0.192 0.70 0.242 0.015 1

56 E422 1869 1993 125 5 0 0.645 1.30 2.82 0.650 0.884 0.200 0.47 0.235 -0.002 1

57 E431 1904 1993 90 3 0 0.552 1.70 3.71 0.708 0.769 0.182 0.74 0.231 -0.021 1

58 E432 1906 1993 88 3 0 0.546 1.52 3.57 0.665 0.806 0.192 1.04 0.278 0.024 1

59 E441 1916 1993 78 3 0 0.639 1.39 2.69 0.473 0.800 0.157 0.46 0.200 0.003 1

60 E451 1913 1993 81 3 0 0.618 1.54 2.61 0.355 0.595 0.161 0.50 0.208 -0.005 1

61 E461 1873 1993 121 5 0 0.526 1.50 2.94 0.860 0.897 0.206 0.52 0.257 0.020 1

62 E462 1868 1993 126 5 0 0.655 1.64 3.03 0.578 0.731 0.197 0.52 0.229 0.002 1

63 E491 1869 1993 125 5 0 0.671 1.03 2.48 0.466 0.878 0.197 0.96 0.257 -0.016 1

64 E481 1865 1993 129 5 0 0.421 1.12 2.89 0.593 0.877 0.186 0.63 0.243 0.022 1

65 E482 1873 1993 121 5 0 0.528 1.17 3.49 0.595 0.793 0.223 0.78 0.287 0.023 1

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Total or mean: 7946 301 1 0.616 1.21 15.02 0.536 0.797 0.195 1.50 0.256 0.008

- = [ COFECHA RS\_E COF ] = -