[] Dendrochronology Program Library Run RS\_A Program COF 14:46 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, Howland, ME (KT Smith)

File of DATED series: RS\_A.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 1860 to 1993 134 years

Continuous time span is 1860 to 1993 134 years

Portion with two or more series is 1861 to 1993 133 years

>> A211 1915 absent in 1 of 48 series, but is not usually narrow: master index is 0.152

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

\*C\* Number of dated series 53 \*C\*

\*O\* Master series 1860 1993 134 yrs \*O\*

\*F\* Total rings in all series 5751 \*F\*

\*E\* Total dated rings checked 5750 \*E\*

\*C\* Series intercorrelation 0.600 \*C\*

\*H\* Average mean sensitivity 0.210 \*H\*

\*A\* Segments, possible problems 4 \*A\*

\*\*\* Mean length of series 108.0 \*\*\*

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

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

A161 1 absent rings: 1919

A162 1 absent rings: 1919

A191 2 absent rings: 1918 1920

A171 1 absent rings: 1921

A151 2 absent rings: 1918 1919

A172 1 absent rings: 1919

A291 1 absent rings: 1984

A242 2 absent rings: 1918 1919

A241 2 absent rings: 1919 1920

A211 7 absent rings: 1915 1916 1917 1918 1919 1920 1921

A391 2 absent rings: 1918 1919

A312 3 absent rings: 1917 1918 1919

A392 2 absent rings: 1918 1919

A352 3 absent rings: 1918 1919 1920

A362 2 absent rings: 1918 1919

A371 2 absent rings: 1918 1919

A372 1 absent rings: 1919

A482 3 absent rings: 1917 1918 1919

A481 3 absent rings: 1917 1918 1919

A442 1 absent rings: 1919

A451 1 absent rings: 1919

A452 1 absent rings: 1919

A441 2 absent rings: 1918 1919

46 absent rings 0.800%

PART 2: TIME PLOT OF TREE-RING SERIES: Red Spruce, Howland, ME (KT Smith) 14:46 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

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

. . . . . . . . . . . . . . . . . . <===>. . A122 1 1954 1991 38

. . . . . . . . . . . . . . . . . . <===>. . A121 2 1950 1991 42

. . . . . . . . . . . . . . . . . <===========>. . A161 3 1872 1991 120

. . . . . . . . . . . . . . . . . <===========>. . A162 4 1877 1991 115

. . . . . . . . . . . . . . . . . <==========>. . A112 5 1887 1991 105

. . . . . . . . . . . . . . . . . <===========>. . A152 6 1870 1991 122

. . . . . . . . . . . . . . . . . <========>. . A132 7 1903 1991 89

. . . . . . . . . . . . . . . . . <========>. . A131 8 1900 1991 92

. . . . . . . . . . . . . . . . .<============>. . A191 9 1860 1991 132

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. . . . . . . . . . . . . . . . . . <=====>. . A192 11 1939 1991 53

. . . . . . . . . . . . . . . . . <===========>. . A171 12 1875 1991 117

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. . . . . . . . . . . . . . . . . <========>. . A151 14 1901 1991 91

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. . . . . . . . . . . . . . . . . <==========>. . A291 17 1888 1992 105

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. . . . . . . . . . . . . . . . . <===========>. . A252 20 1872 1992 121

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. . . . . . . . . . . . . . . . . <===========>. . A211 23 1875 1992 118

. . . . . . . . . . . . . . . . . <========>. . A331 24 1901 1992 92

. . . . . . . . . . . . . . . . . <==========>. . A332 25 1883 1992 110

. . . . . . . . . . . . . . . . . <=========>. . A391 26 1890 1992 103

. . . . . . . . . . . . . . . . . <=========>. . A321 27 1895 1992 98

. . . . . . . . . . . . . . . . . . <======>. . A311 28 1925 1992 68

. . . . . . . . . . . . . . . . . <=========>. . A312 29 1893 1992 100

. . . . . . . . . . . . . . . . . <==========>. . A361 30 1882 1992 111

. . . . . . . . . . . . . . . . .<============>. . A342 31 1862 1992 131

. . . . . . . . . . . . . . . . .<============>. . A341 32 1861 1992 132

. . . . . . . . . . . . . . . . .<============>. . A392 33 1868 1992 125

. . . . . . . . . . . . . . . . . <===========>. . A382 34 1876 1992 117

. . . . . . . . . . . . . . . . . <========>. . A381 35 1900 1992 93

. . . . . . . . . . . . . . . . . <===========>. . A352 36 1873 1992 120

. . . . . . . . . . . . . . . . .<============>. . A362 37 1866 1992 127

. . . . . . . . . . . . . . . . . <==========>. . A371 38 1886 1992 107

. . . . . . . . . . . . . . . . . <===========>. . A372 39 1873 1992 120

. . . . . . . . . . . . . . . . . <===========>. . A482 40 1878 1993 116

. . . . . . . . . . . . . . . . . <===========>. . A481 41 1878 1993 116

. . . . . . . . . . . . . . . . .<============>. . A442 42 1867 1993 127

. . . . . . . . . . . . . . . . . <===========>. . A431 43 1874 1993 120

. . . . . . . . . . . . . . . . .<============>. . A451 44 1863 1993 131

. . . . . . . . . . . . . . . . . <==========>. . A452 45 1889 1993 105

. . . . . . . . . . . . . . . . . <===========>. . A441 46 1870 1993 124

. . . . . . . . . . . . . . . . . <==========>. . A421 47 1889 1993 105

. . . . . . . . . . . . . . . . . <==========>. . A422 48 1884 1993 110

. . . . . . . . . . . . . . . . . <=========>. . A411 49 1891 1993 103

. . . . . . . . . . . . . . . . .<============>. . A412 50 1869 1993 125

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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, Howland, ME (KT Smith) 14:46 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

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

. . . . . . . . . . . . . . . . . . <======>. . A461 51 1924 1993 70

. . . . . . . . . . . . . . . . . <========>. . A462 52 1902 1993 92

. . . . . . . . . . . . . . . . . <===========>. . A432 53 1879 1993 115

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

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, Howland, ME (KT Smith) 14:46 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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1900 1.531 44 1950 0.449 52

1901 -0.278 46 1951 2.304 52

1902 0.295 47 1952 -0.504 52

1903 1.147 48 1953 0.931 52

1904 0.631 48 1954 0.177 53

1905 -0.524 48 1955 0.370 53

1906 -0.384 48 1956 -0.893 53

1907 -0.208 48 1957 0.606 53

1908 -0.200 48 1958 0.929 53

1909 0.470 48 1959 0.324 53

1860 -2.405 1 1910 0.781 48 1960 1.075 53

1861 -1.429 2 1911 0.519 48 1961 1.031 53

1862 -1.256 3 1912 1.272 48 1962 -0.585 53

1863 -1.079 5 1913 2.175 48 1963 0.236 53

1864 -0.399 5 1914 0.879 48 1964 -0.712 53

1865 0.898 6 1915 0.152 48 1<< 1965 -1.788 53

1866 0.781 8 1916 -0.763 48 1 1966 -1.978 53

1867 2.060 9 1917 -1.528 48 4 1967 -1.379 53

1868 0.513 10 1918 -2.048 48 13 1968 -0.849 53

1869 0.970 13 1919 -1.989 48 20 1969 1.531 53

1870 -0.769 15 1920 -1.809 48 4 1970 1.375 53

1871 0.528 16 1921 -1.694 48 2 1971 0.443 53

1872 -0.354 19 1922 -1.276 48 1972 -0.034 53

1873 0.211 21 1923 -1.160 48 1973 -0.207 53

1874 0.901 22 1924 -0.323 49 1974 0.113 53

1875 0.740 24 1925 -0.117 50 1975 1.130 53

1876 0.050 25 1926 0.158 50 1976 1.145 53

1877 0.094 26 1927 0.610 50 1977 -0.103 53

1878 0.251 28 1928 0.404 50 1978 2.168 53

1879 0.083 29 1929 0.433 50 1979 0.201 53

1880 0.997 29 1930 0.413 50 1980 -0.085 53

1881 0.470 29 1931 1.019 50 1981 -0.038 53

1882 -0.768 30 1932 1.912 50 1982 -0.943 53

1883 -0.877 31 1933 1.545 50 1983 -1.596 53

1884 -0.966 32 1934 0.421 50 1984 -1.951 53 1

1885 -1.641 32 1935 0.076 50 1985 -0.873 53

1886 -0.342 33 1936 -0.328 50 1986 -0.325 53

1887 -1.004 35 1937 -0.136 50 1987 -0.300 53

1888 -0.347 36 1938 -0.120 50 1988 -0.836 53

1889 1.106 38 1939 0.313 51 1989 -0.421 53

1890 -0.743 39 1940 0.805 51 1990 0.988 53

1891 0.356 40 1941 0.650 51 1991 1.353 53

1892 -0.197 40 1942 -0.481 51 1992 1.681 37

1893 -0.808 41 1943 -1.240 51 1993 1.210 14

1894 0.038 41 1944 -1.167 51

1895 -1.304 42 1945 -0.239 51

1896 0.082 42 1946 -1.472 51

1897 0.054 42 1947 -0.487 51

1898 0.976 42 1948 -1.028 51

1899 1.412 42 1949 0.137 51

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PART 4: Master Bar Plot: Red Spruce, Howland, ME (KT Smith) 14:46 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

1900----------F 1950-------B

1901----a 1951----------I

1902------A 1952---b

1903---------E 1953--------D

1904-------C 1954------A

1905---b 1955-------A

1906---b 1956--d

1907----a 1957-------B

1908----a 1958--------D

1909-------B 1959------A

1860j 1910--------C 1960---------D

1861-f 1911-------B 1961---------D

1862-e 1912---------E 1962---b

1863-d 1913----------I 1963------A

1864---b 1914--------D 1964--c

1865--------D 1915-----A 1965g

1866--------C 1916--c 1966h

1867----------H 1917f 1967-f

1868-------B 1918h 1968--c

1869--------D 1919h 1969----------F

1870--c 1920g 1970---------E

1871-------B 1921g 1971-------B

1872---a 1922-e 1972-----@

1873------A 1923-e 1973----a

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

1875--------C 1925----@ 1975---------E

1876-----@ 1926-----A 1976---------E

1877-----@ 1927-------B 1977----@

1878------A 1928-------B 1978----------I

1879-----@ 1929-------B 1979------A

1880---------D 1930-------B 1980----@

1881-------B 1931---------D 1981-----@

1882--c 1932----------H 1982--d

1883--d 1933----------F 1983f

1884--d 1934-------B 1984h

1885g 1935-----@ 1985--c

1886---a 1936---a 1986---a

1887-d 1937----a 1987---a

1888---a 1938----@ 1988--c

1889---------D 1939------A 1989---b

1890--c 1940--------C 1990--------D

1891------A 1941-------C 1991---------E

1892----a 1942---b 1992----------G

1893--c 1943-e 1993---------E

1894-----@ 1944-e

1895-e 1945----a

1896-----@ 1946-f

1897-----@ 1947---b

1898--------D 1948-d

1899----------F 1949-----A

PART 5: CORRELATION OF SERIES BY SEGMENTS: Red Spruce, Howland, ME (KT Smith) 14:46 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 1850 1875 1900 1925 1950

1899 1924 1949 1974 1999

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

1 A122 1954 1991 .75

2 A121 1950 1991 .53

3 A161 1872 1991 .51 .52 .47 .51 .47

4 A162 1877 1991 .69 .67 .55 .55

5 A112 1887 1991 .51 .58 .59 .63

6 A152 1870 1991 .67 .67 .57 .56 .54

7 A132 1903 1991 .58 .38 .42

8 A131 1900 1991 .48 .64 .68

9 A191 1860 1991 .50B .56 .71 .61 .54

10 A142 1869 1991 .70 .75 .62 .51 .55

11 A192 1939 1991 .66 .64

12 A171 1875 1991 .75 .75 .71 .74

13 A141 1865 1991 .51 .61 .69 .52 .57

14 A151 1901 1991 .59 .67 .68

15 A111 1871 1991 .53 .56 .62 .55 .57

16 A172 1863 1991 .60 .65 .76 .71 .77

17 A291 1888 1992 .67 .60 .43 .49

18 A251 1869 1992 .44 .44 .51 .55 .68

19 A242 1887 1992 .72 .66 .69 .72

20 A252 1872 1992 .70 .71 .52 .52 .70

21 A241 1872 1992 .71 .73 .54 .66 .75

22 A271 1866 1992 .53 .58 .59 .53 .60

23 A211 1875 1992 .41 .58 .58 .66

24 A331 1901 1992 .61 .63 .68

25 A332 1883 1992 .55 .54 .59 .60

26 A391 1890 1992 .73 .71 .62 .68

27 A321 1895 1992 .77 .74 .81 .75

28 A311 1925 1992 .62 .74

29 A312 1893 1992 .68 .74 .63 .64

30 A361 1882 1992 .45 .39 .49 .62

31 A342 1862 1992 .50 .48 .58 .62 .71

32 A341 1861 1992 .49 .55 .66 .45 .57

33 A392 1868 1992 .59 .64 .67 .55 .58

34 A382 1876 1992 .70 .70 .54 .61

35 A381 1900 1992 .57 .66 .70

36 A352 1873 1992 .57 .57 .76 .64 .54

37 A362 1866 1992 .62 .63 .54 .50 .53

38 A371 1886 1992 .38 .46 .64 .69

39 A372 1873 1992 .38 .40 .42 .67 .74

40 A482 1878 1993 .13B .25B .66 .74

41 A481 1878 1993 .34B .52 .63 .67

42 A442 1867 1993 .44 .55 .54 .54 .65

43 A431 1874 1993 .39 .46 .65 .62 .71

44 A451 1863 1993 .55 .58 .48 .55 .60

45 A452 1889 1993 .52 .58 .72 .67

46 A441 1870 1993 .49 .58 .64 .57 .67

47 A421 1889 1993 .45 .54 .78 .78

48 A422 1884 1993 .69 .66 .65 .73

49 A411 1891 1993 .59 .66 .65 .75

50 A412 1869 1993 .37 .50 .58 .68 .74

51 A461 1924 1993 .64 .66 .66

52 A462 1902 1993 .46 .44 .45

53 A432 1879 1993 .56 .60 .63 .66

Av segment correlation 0.54 0.57 0.59 0.60 0.64

PART 6: POTENTIAL PROBLEMS: Red Spruce, Howland, ME (KT Smith) 14:46 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

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

A122 1954 to 1991 38 years Series 1

[B] Entire series, effect on correlation ( 0.745) is:

Lower 1959>-0.028 1978<-0.026 1958<-0.023 1961<-0.015 1964>-0.013 1968>-0.009 Higher 1965 0.026 1969 0.022

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

A121 1950 to 1991 42 years Series 2

[B] Entire series, effect on correlation ( 0.529) is:

Lower 1950<-0.053 1969<-0.042 1960<-0.021 1978<-0.016 1961<-0.012 1970>-0.012 Higher 1951 0.040 1983 0.024

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

A161 1872 to 1991 120 years Series 3

[B] Entire series, effect on correlation ( 0.492) is:

Lower 1946>-0.029 1956>-0.021 1895>-0.021 1900<-0.019 1965>-0.014 1945<-0.011 Higher 1969 0.032 1952 0.020

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

1919 -1.989 48 20

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

A162 1877 to 1991 115 years Series 4

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

Lower 1956>-0.029 1979>-0.016 1959<-0.013 1983>-0.013 1900<-0.011 1953<-0.010 Higher 1969 0.024 1951 0.018

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

1919 -1.989 48 20

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

A112 1887 to 1991 105 years Series 5

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

Lower 1890>-0.022 1892>-0.019 1981>-0.018 1940<-0.013 1974<-0.012 1895>-0.011 Higher 1969 0.022 1978 0.021

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

A152 1870 to 1991 122 years Series 6

[B] Entire series, effect on correlation ( 0.599) is:

Lower 1946>-0.029 1990<-0.015 1958<-0.015 1896<-0.014 1953<-0.014 1971>-0.013 Higher 1978 0.026 1951 0.015

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

A132 1903 to 1991 89 years Series 7

[B] Entire series, effect on correlation ( 0.508) is:

Lower 1952>-0.039 1987>-0.024 1956>-0.021 1955<-0.016 1991<-0.014 1911<-0.011 Higher 1978 0.017 1953 0.016

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

1951 1952 4.1 SD

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

1953 +3.3 SD; 1954 +3.2 SD; 1987 +3.1 SD

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

A131 1900 to 1991 92 years Series 8

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

Lower 1900>-0.131 1949<-0.011 1974<-0.010 1902<-0.007 1975<-0.007 1952>-0.006 Higher 1978 0.013 1990 0.012

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

1900 1901 -5.1 SD

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

1900 +7.3 SD

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

A191 1860 to 1991 132 years Series 9

[\*] Early part of series cannot be checked from 1860 to 1860 -- 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

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

1861 1910 2 - - - - - - - - - .12 .50|-.09 .55\*-.14 -.07 .11 -.01 -.06 .02 -.06 .16

[B] Entire series, effect on correlation ( 0.570) is:

Lower 1979>-0.024 1957<-0.019 1880<-0.016 1978<-0.015 1966>-0.014 1887>-0.012 Higher 1951 0.019 1952 0.017

1861 to 1910 segment:

Lower 1880<-0.043 1887>-0.034 1897>-0.022 1877<-0.018 1896<-0.017 1863>-0.015 Higher 1867 0.046 1895 0.039

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

1918 -2.048 48 13

1920 -1.809 48 4

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

A142 1869 to 1991 123 years Series 10

[B] Entire series, effect on correlation ( 0.587) is:

Lower 1975<-0.022 1956>-0.018 1984>-0.016 1881>-0.014 1980>-0.012 1932<-0.010 Higher 1969 0.022 1978 0.021

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

1871 +3.1 SD

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

A192 1939 to 1991 53 years Series 11

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

Lower 1979>-0.046 1957<-0.035 1991<-0.033 1962>-0.023 1973>-0.012 1955<-0.007 Higher 1951 0.034 1965 0.023

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

A171 1875 to 1991 117 years Series 12

[B] Entire series, effect on correlation ( 0.736) is:

Lower 1962>-0.014 1970<-0.010 1875>-0.009 1949<-0.007 1933<-0.007 1897>-0.007 Higher 1952 0.012 1951 0.011

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

1921 -1.694 48 2

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

A141 1865 to 1991 127 years Series 13

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

Lower 1952>-0.022 1884>-0.019 1965>-0.019 1867<-0.018 1953<-0.013 1958<-0.012 Higher 1969 0.024 1978 0.021

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

1884 +3.3 SD

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

A151 1901 to 1991 91 years Series 14

[B] Entire series, effect on correlation ( 0.685) is:

Lower 1977>-0.016 1942>-0.015 1946>-0.014 1915>-0.012 1933<-0.011 1953<-0.011 Higher 1969 0.019 1952 0.014

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

1918 -2.048 48 13

1919 -1.989 48 20

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

A111 1871 to 1991 121 years Series 15

[B] Entire series, effect on correlation ( 0.539) is:

Lower 1990<-0.021 1885>-0.019 1952>-0.018 1887>-0.016 1873>-0.011 1989>-0.011 Higher 1978 0.027 1913 0.020

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

1873 +3.3 SD

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

A172 1863 to 1991 129 years Series 16

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

Lower 1869<-0.020 1948>-0.020 1961<-0.010 1876<-0.009 1970<-0.009 1897>-0.008 Higher 1978 0.013 1952 0.012

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

1919 -1.989 48 20

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

A291 1888 to 1992 105 years Series 17

[B] Entire series, effect on correlation ( 0.557) is:

Lower 1961<-0.040 1977>-0.015 1963<-0.014 1944>-0.014 1899<-0.013 1897>-0.010 Higher 1946 0.014 1890 0.014

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

1984 -1.951 53 1

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

A251 1869 to 1992 124 years Series 18

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

Lower 1962>-0.019 1961<-0.017 1970<-0.017 1902<-0.014 1890>-0.013 1896<-0.011 Higher 1978 0.027 1969 0.020

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

A242 1887 to 1992 106 years Series 19

[B] Entire series, effect on correlation ( 0.718) is:

Lower 1945>-0.023 1953<-0.019 1939<-0.012 1896<-0.009 1947>-0.008 1890>-0.007 Higher 1951 0.018 1969 0.011

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

1918 -2.048 48 13

1919 -1.989 48 20

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

1945 +3.7 SD

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

A252 1872 to 1992 121 years Series 20

[B] Entire series, effect on correlation ( 0.643) is:

Lower 1932<-0.018 1882>-0.018 1971>-0.016 1940<-0.013 1944>-0.010 1943>-0.009 Higher 1951 0.020 1978 0.015

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

A241 1872 to 1992 121 years Series 21

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

Lower 1976<-0.013 1926>-0.012 1944>-0.008 1901>-0.008 1971>-0.008 1878>-0.005 Higher 1952 0.012 1969 0.011

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

1919 -1.989 48 20

1920 -1.809 48 4

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

A271 1866 to 1992 127 years Series 22

[B] Entire series, effect on correlation ( 0.565) is:

Lower 1951<-0.068 1921>-0.012 1971>-0.011 1904>-0.010 1866<-0.008 1871<-0.008 Higher 1969 0.020 1952 0.016

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

1950 1951 -4.4 SD

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

A211 1875 to 1992 118 years Series 23

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

Lower 1876>-0.019 1969<-0.015 1890>-0.013 1877<-0.012 1958<-0.011 1884>-0.010 Higher 1952 0.012 1946 0.011

[D] 7 Absent rings: Year Master N series Absent

1915 0.152 48 1 >> WARNING: Ring is not usually narrow

1916 -0.763 48 1

1917 -1.528 48 4

1918 -2.048 48 13

1919 -1.989 48 20

1920 -1.809 48 4

1921 -1.694 48 2

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

1939 +3.0 SD

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

A331 1901 to 1992 92 years Series 24

[B] Entire series, effect on correlation ( 0.642) is:

Lower 1974>-0.021 1954>-0.020 1905>-0.011 1973<-0.011 1912<-0.010 1976<-0.009 Higher 1969 0.029 1913 0.018

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

A332 1883 to 1992 110 years Series 25

[B] Entire series, effect on correlation ( 0.576) is:

Lower 1973<-0.026 1970<-0.025 1971<-0.017 1885>-0.012 1898<-0.011 1905>-0.007 Higher 1969 0.030 1978 0.016

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

1973 -4.6 SD; 1976 +3.2 SD

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

A391 1890 to 1992 103 years Series 26

[B] Entire series, effect on correlation ( 0.695) is:

Lower 1951<-0.026 1954>-0.010 1977>-0.010 1897<-0.008 1966>-0.008 1942>-0.008 Higher 1913 0.013 1952 0.012

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

1918 -2.048 48 13

1919 -1.989 48 20

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

A321 1895 to 1992 98 years Series 27

[B] Entire series, effect on correlation ( 0.746) is:

Lower 1984>-0.034 1986>-0.011 1941<-0.011 1937>-0.011 1910<-0.007 1992<-0.006 Higher 1951 0.019 1969 0.014

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

1984 +3.0 SD

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A311 1925 to 1992 68 years Series 28

[B] Entire series, effect on correlation ( 0.620) is:

Lower 1925>-0.030 1938>-0.026 1977>-0.020 1926<-0.018 1941<-0.013 1954>-0.012 Higher 1951 0.031 1965 0.025

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A312 1893 to 1992 100 years Series 29

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

Lower 1897>-0.019 1957<-0.019 1975<-0.013 1974>-0.011 1958>-0.011 1976<-0.009 Higher 1965 0.012 1913 0.012

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

1917 -1.528 48 4

1918 -2.048 48 13

1919 -1.989 48 20

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

1974 +3.0 SD

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A361 1882 to 1992 111 years Series 30

[B] Entire series, effect on correlation ( 0.535) is:

Lower 1887>-0.045 1946>-0.022 1958<-0.019 1931<-0.016 1990<-0.013 1922>-0.012 Higher 1978 0.023 1969 0.017

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

1887 +3.7 SD

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

A342 1862 to 1992 131 years Series 31

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

Lower 1883>-0.013 1961<-0.013 1923>-0.012 1946>-0.011 1885>-0.011 1873<-0.011 Higher 1952 0.016 1951 0.016

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A341 1861 to 1992 132 years Series 32

[B] Entire series, effect on correlation ( 0.575) is:

Lower 1965>-0.028 1898<-0.019 1891<-0.017 1950<-0.016 1873<-0.014 1946>-0.013 Higher 1978 0.020 1969 0.017

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

1889 +3.5 SD

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A392 1868 to 1992 125 years Series 33

[B] Entire series, effect on correlation ( 0.598) is:

Lower 1969<-0.018 1978<-0.015 1871<-0.011 1971<-0.010 1879<-0.010 1970>-0.009 Higher 1913 0.015 1932 0.012

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

1918 -2.048 48 13

1919 -1.989 48 20

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

A382 1876 to 1992 117 years Series 34

[B] Entire series, effect on correlation ( 0.620) is:

Lower 1981>-0.022 1956>-0.016 1982>-0.016 1969<-0.015 1893>-0.013 1957<-0.010 Higher 1978 0.024 1951 0.019

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

1982 +3.1 SD

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A381 1900 to 1992 93 years Series 35

[B] Entire series, effect on correlation ( 0.667) is:

Lower 1900<-0.032 1969<-0.019 1945<-0.014 1977>-0.013 1982>-0.012 1974<-0.008 Higher 1978 0.029 1951 0.015

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A352 1873 to 1992 120 years Series 36

[B] Entire series, effect on correlation ( 0.585) is:

Lower 1983>-0.032 1952>-0.029 1990<-0.013 1898<-0.013 1897<-0.012 1981>-0.011 Higher 1932 0.012 1951 0.009

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

1918 -2.048 48 13

1919 -1.989 48 20

1920 -1.809 48 4

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

1983 +3.7 SD

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A362 1866 to 1992 127 years Series 37

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

Lower 1946>-0.038 1866<-0.019 1958<-0.019 1877<-0.012 1899<-0.010 1894<-0.007 Higher 1978 0.018 1895 0.012

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

1918 -2.048 48 13

1919 -1.989 48 20

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

1946 +3.6 SD

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A371 1886 to 1992 107 years Series 38

[B] Entire series, effect on correlation ( 0.576) is:

Lower 1900<-0.017 1886<-0.016 1902<-0.015 1895>-0.014 1888>-0.012 1932<-0.011 Higher 1978 0.024 1951 0.013

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

1918 -2.048 48 13

1919 -1.989 48 20

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

1895 +3.1 SD

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A372 1873 to 1992 120 years Series 39

[B] Entire series, effect on correlation ( 0.567) is:

Lower 1900<-0.031 1901>-0.016 1882>-0.014 1889<-0.013 1883<-0.010 1873<-0.009 Higher 1951 0.019 1952 0.017

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

1919 -1.989 48 20

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A482 1878 to 1993 116 years Series 40

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

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1878 1927 -2 -.20 -.19 -.08 .02 -.07 .11 .16 -.04 .52\*-.22 .13| .10 -.03 -.06 -.17 .03 .16 -.16 -.02 -.03 .07

1900 1949 -2 -.17 -.25 .02 -.24 -.03 -.02 .15 .06 .42\* .27 .25| .01 .01 -.21 -.10 -.06 -.08 -.20 .03 .29 .03

[B] Entire series, effect on correlation ( 0.466) is:

Lower 1889<-0.041 1882>-0.022 1899<-0.017 1903<-0.017 1913<-0.017 1893>-0.016 Higher 1951 0.036 1917 0.013

1878 to 1927 segment:

Lower 1889<-0.081 1882>-0.041 1899<-0.035 1903<-0.034 1893>-0.030 1913<-0.029 Higher 1898 0.058 1917 0.043

1900 to 1949 segment:

Lower 1903<-0.049 1913<-0.046 1901>-0.030 1915>-0.026 1937<-0.022 1914>-0.020 Higher 1917 0.050 1943 0.033

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

1917 -1.528 48 4

1918 -2.048 48 13

1919 -1.989 48 20

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A481 1878 to 1993 116 years Series 41

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

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

1878 1927 -2 -.34 -.07 -.04 -.05 .05 .05 .09 .04 .38\*-.23 .34| .11 -.24 .05 -.12 .03 .15 -.21 -.05 .05 .07

[B] Entire series, effect on correlation ( 0.534) is:

Lower 1889<-0.032 1958<-0.023 1882>-0.021 1883>-0.016 1931<-0.015 1881<-0.012 Higher 1951 0.017 1890 0.013

1878 to 1927 segment:

Lower 1889<-0.073 1882>-0.044 1883>-0.031 1881<-0.022 1913<-0.021 1896<-0.018 Higher 1890 0.039 1917 0.035

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

1888 1889 -4.2 SD

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

1917 -1.528 48 4

1918 -2.048 48 13

1919 -1.989 48 20

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

1888 +3.0 SD

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A442 1867 to 1993 127 years Series 42

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

Lower 1896<-0.020 1867<-0.018 1943>-0.016 1944>-0.015 1872>-0.012 1874<-0.012 Higher 1978 0.018 1952 0.011

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

1919 -1.989 48 20

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

1873 +3.6 SD; 1944 +3.3 SD

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A431 1874 to 1993 120 years Series 43

[B] Entire series, effect on correlation ( 0.533) is:

Lower 1889<-0.033 1893>-0.031 1874<-0.030 1933<-0.010 1897<-0.010 1900<-0.009 Higher 1952 0.019 1978 0.017

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

1894 +3.2 SD; 1895 +3.3 SD

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A451 1863 to 1993 131 years Series 44

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

Lower 1983>-0.029 1979>-0.015 1943>-0.012 1959>-0.011 1886<-0.011 1942>-0.010 Higher 1951 0.026 1978 0.024

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

1919 -1.989 48 20

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

1943 +3.1 SD

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A452 1889 to 1993 105 years Series 45

[B] Entire series, effect on correlation ( 0.622) is:

Lower 1983>-0.051 1889<-0.024 1898<-0.016 1894>-0.013 1931<-0.010 1991<-0.008 Higher 1978 0.033 1951 0.030

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

1919 -1.989 48 20

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

1894 +3.1 SD; 1983 +3.5 SD

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A441 1870 to 1993 124 years Series 46

[B] Entire series, effect on correlation ( 0.596) is:

Lower 1953<-0.020 1895>-0.015 1956>-0.013 1891<-0.013 1967>-0.012 1871<-0.011 Higher 1978 0.021 1951 0.018

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

1918 -2.048 48 13

1919 -1.989 48 20

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A421 1889 to 1993 105 years Series 47

[B] Entire series, effect on correlation ( 0.624) is:

Lower 1893>-0.032 1903<-0.029 1894<-0.028 1991<-0.019 1892<-0.015 1939<-0.014 Higher 1969 0.023 1951 0.022

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A422 1884 to 1993 110 years Series 48

[B] Entire series, effect on correlation ( 0.701) is:

Lower 1948>-0.022 1890>-0.015 1992<-0.012 1955<-0.011 1893>-0.011 1957<-0.009 Higher 1978 0.022 1969 0.019

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A411 1891 to 1993 103 years Series 49

[B] Entire series, effect on correlation ( 0.686) is:

Lower 1962>-0.021 1894<-0.017 1937>-0.012 1899<-0.012 1963<-0.008 1897<-0.008 Higher 1969 0.018 1952 0.015

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A412 1869 to 1993 125 years Series 50

[B] Entire series, effect on correlation ( 0.574) is:

Lower 1869<-0.030 1899<-0.016 1898<-0.014 1870>-0.013 1895>-0.010 1933<-0.010 Higher 1951 0.020 1952 0.017

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

1949 +3.1 SD

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A461 1924 to 1993 70 years Series 51

[B] Entire series, effect on correlation ( 0.633) is:

Lower 1948>-0.044 1992<-0.027 1975<-0.024 1971>-0.014 1957<-0.011 1943>-0.010 Higher 1978 0.040 1951 0.032

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A462 1902 to 1993 92 years Series 52

[B] Entire series, effect on correlation ( 0.474) is:

Lower 1960<-0.031 1903<-0.024 1905>-0.023 1992<-0.022 1991<-0.019 1948>-0.018 Higher 1978 0.029 1951 0.021

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A432 1879 to 1993 115 years Series 53

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

Lower 1945>-0.020 1893>-0.019 1889<-0.018 1950<-0.015 1890>-0.015 1959>-0.015 Higher 1952 0.020 1965 0.013

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

1894 +3.2 SD; 1945 +3.8 SD

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PART 7: DESCRIPTIVE STATISTICS: Red Spruce, Howland, ME (KT Smith) 14:46 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 A122 1954 1991 38 1 0 0.745 3.67 6.88 1.619 0.871 0.205 0.57 0.283 0.108 1

2 A121 1950 1991 42 1 0 0.529 3.03 5.37 1.194 0.796 0.197 0.88 0.300 -0.172 1

3 A161 1872 1991 120 5 0 0.492 1.07 2.38 0.479 0.910 0.202 0.94 0.319 -0.024 1

4 A162 1877 1991 115 4 0 0.610 1.39 3.23 0.644 0.922 0.187 0.84 0.286 0.013 1

5 A112 1887 1991 105 4 0 0.546 1.81 5.30 1.484 0.939 0.216 0.88 0.360 0.016 1

6 A152 1870 1991 122 5 0 0.599 1.29 3.88 0.959 0.940 0.209 0.83 0.290 0.065 1

7 A132 1903 1991 89 3 0 0.508 0.88 3.67 0.558 0.808 0.211 1.09 0.362 -0.009 2

8 A131 1900 1991 92 3 0 0.525 1.81 6.07 1.356 0.937 0.191 3.23 0.489 -0.149 1

9 A191 1860 1991 132 5 1 0.570 1.08 2.88 0.617 0.905 0.255 0.74 0.312 0.000 3

10 A142 1869 1991 123 5 0 0.587 1.04 2.34 0.470 0.917 0.162 0.64 0.234 -0.016 1

11 A192 1939 1991 53 2 0 0.634 2.05 3.47 0.625 0.684 0.194 0.46 0.207 0.003 1

12 A171 1875 1991 117 4 0 0.736 1.43 3.19 0.731 0.905 0.231 0.60 0.278 -0.015 2

13 A141 1865 1991 127 5 0 0.572 1.32 2.63 0.522 0.888 0.158 0.72 0.238 0.003 1

14 A151 1901 1991 91 3 0 0.685 1.48 3.08 0.865 0.931 0.223 0.90 0.316 0.005 2

15 A111 1871 1991 121 5 0 0.539 1.09 3.89 0.842 0.938 0.211 1.04 0.333 -0.008 1

16 A172 1863 1991 129 5 0 0.704 1.11 2.87 0.600 0.886 0.230 0.77 0.288 0.081 1

17 A291 1888 1992 105 4 0 0.557 0.99 2.46 0.620 0.934 0.258 1.00 0.409 0.004 1

18 A251 1869 1992 124 5 0 0.571 1.29 3.39 0.785 0.916 0.228 1.02 0.381 0.011 5

19 A242 1887 1992 106 4 0 0.718 1.28 3.63 0.976 0.933 0.241 1.15 0.395 -0.002 3

20 A252 1872 1992 121 5 0 0.643 1.26 3.41 0.755 0.935 0.191 0.94 0.382 -0.001 1

21 A241 1872 1992 121 5 0 0.690 1.30 3.65 1.031 0.947 0.227 0.83 0.352 -0.012 1

22 A271 1866 1992 127 5 0 0.565 1.52 2.79 0.454 0.751 0.164 0.57 0.242 -0.001 1

23 A211 1875 1992 118 4 0 0.571 1.38 3.99 1.021 0.961 0.184 0.88 0.355 0.000 2

24 A331 1901 1992 92 3 0 0.642 1.47 5.10 1.253 0.920 0.254 3.52 1.123 0.026 2

25 A332 1883 1992 110 4 0 0.576 1.14 4.06 0.947 0.917 0.256 6.19 1.838 0.019 1

26 A391 1890 1992 103 4 0 0.695 1.49 3.90 0.939 0.952 0.205 0.80 0.315 -0.036 1

27 A321 1895 1992 98 4 0 0.746 1.55 3.64 0.847 0.918 0.175 0.87 0.327 0.008 1

28 A311 1925 1992 68 2 0 0.620 1.69 3.60 0.730 0.890 0.150 0.50 0.217 0.050 1

29 A312 1893 1992 100 4 0 0.666 1.24 3.60 0.894 0.916 0.249 1.00 0.341 0.000 1

30 A361 1882 1992 111 4 0 0.535 1.41 2.99 0.616 0.831 0.213 0.92 0.308 -0.008 1

31 A342 1862 1992 131 5 0 0.614 1.10 2.46 0.612 0.899 0.186 0.69 0.289 0.003 1

32 A341 1861 1992 132 5 0 0.575 1.20 2.40 0.564 0.891 0.182 0.91 0.295 0.003 1

33 A392 1868 1992 125 5 0 0.598 0.75 1.94 0.396 0.884 0.220 1.03 0.320 -0.028 1

34 A382 1876 1992 117 4 0 0.620 1.28 2.37 0.434 0.866 0.161 0.58 0.216 -0.022 1

35 A381 1900 1992 93 3 0 0.667 1.18 2.34 0.496 0.910 0.156 0.71 0.260 0.005 2

36 A352 1873 1992 120 5 0 0.585 0.85 2.05 0.423 0.903 0.215 0.92 0.343 -0.006 1

37 A362 1866 1992 127 5 0 0.594 1.39 2.92 0.621 0.803 0.257 0.72 0.345 0.004 1

38 A371 1886 1992 107 4 0 0.576 1.43 2.71 0.548 0.847 0.219 0.65 0.289 0.003 2

39 A372 1873 1992 120 5 0 0.567 1.44 3.79 0.873 0.914 0.235 0.86 0.321 -0.001 1

40 A482 1878 1993 116 4 2 0.466 1.36 4.00 1.027 0.940 0.245 1.15 0.353 -0.024 1

41 A481 1878 1993 116 4 1 0.534 1.37 3.81 1.024 0.929 0.254 0.98 0.351 0.006 3

42 A442 1867 1993 127 5 0 0.558 0.98 2.09 0.458 0.880 0.242 0.79 0.317 -0.005 1

43 A431 1874 1993 120 5 0 0.533 1.59 4.42 0.850 0.902 0.210 0.62 0.278 0.079 1

44 A451 1863 1993 131 5 0 0.566 1.49 3.24 0.727 0.916 0.196 0.84 0.278 0.012 2

45 A452 1889 1993 105 4 0 0.622 1.74 3.38 0.735 0.874 0.213 1.11 0.318 -0.021 1

46 A441 1870 1993 124 5 0 0.596 1.18 3.15 0.694 0.914 0.255 1.16 0.310 -0.004 1

47 A421 1889 1993 105 4 0 0.624 1.55 3.48 0.718 0.889 0.179 0.76 0.292 -0.048 1

48 A422 1884 1993 110 4 0 0.701 1.26 2.80 0.626 0.882 0.183 0.82 0.279 -0.015 1

PART 7: DESCRIPTIVE STATISTICS: Red Spruce, Howland, ME (KT Smith) 14:46 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 A411 1891 1993 103 4 0 0.686 1.09 2.61 0.566 0.906 0.196 0.63 0.268 0.014 1

50 A412 1869 1993 125 5 0 0.574 1.18 3.12 0.649 0.892 0.211 0.94 0.288 0.041 1

51 A461 1924 1993 70 3 0 0.633 1.50 3.86 0.737 0.861 0.186 0.67 0.256 -0.046 1

52 A462 1902 1993 92 3 0 0.474 1.02 2.15 0.514 0.890 0.195 0.51 0.276 -0.007 2

53 A432 1879 1993 115 4 0 0.605 1.39 2.57 0.531 0.842 0.205 0.91 0.288 -0.006 1

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Total or mean: 5751 217 4 0.600 1.33 6.88 0.736 0.897 0.210 6.19 0.352 0.000

- = [ COFECHA RS\_A COF ] = -