[] Dendrochronology Program Library Run 58BKE Program COF 15:51 Wed 16 Mar 2011 Page 1

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[] P R O G R A M C O F E C H A Version 6.06P 27835

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 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run: 58\_BKE\_Corr3-30

 File of DATED series: 58\_BKE\_corr3

 CONTENTS:

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

 Part 2: Histogram of time spans

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

 Part 4: Bar plot of Master Dating Series

 Part 5: Correlation by segment of each series with Master

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

 Part 7: Descriptive statistics

 RUN CONTROL OPTIONS SELECTED VALUE

 1 Cubic smoothing spline 50% wavelength cutoff for filtering

 32 years

 2 Segments examined are 30 years lagged successively by 15 years

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

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

 5 CORRELATION is Pearson (parametric, quantitative)

 Critical correlation, 99% confidence level .4226

 6 Master dating series saved N

 7 Ring measurements listed Y

 8 Parts printed 1234567

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

 Time span of Master dating series is 1753 to 2010 258 years

 Continuous time span is 1753 to 2010 258 years

 Portion with two or more series is 1759 to 2010 252 years

 >> 198-b 1986 absent in 1 of 20 series, but is not usually narrow: master index is .232

 >> 200-a 1947 absent in 1 of 20 series, but is not usually narrow: master index is .190

 >> 200-a 2007 absent in 2 of 20 series, but is not usually narrow: master index is .604

 >> 200-a 2008 absent in 2 of 20 series, but is not usually narrow: master index is .687

 >> 200-a 2009 absent in 2 of 20 series, but is not usually narrow: master index is .532

 >> 200-a 2010 absent in 2 of 20 series, but is not usually narrow: master index is 1.408

 >> 200-b 2007 absent in 2 of 20 series, but is not usually narrow: master index is .604

 >> 200-b 2008 absent in 2 of 20 series, but is not usually narrow: master index is .687

 >> 200-b 2009 absent in 2 of 20 series, but is not usually narrow: master index is .532

 >> 200-b 2010 absent in 2 of 20 series, but is not usually narrow: master index is 1.408

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

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

 \*O\* Master series 1753 2010 258 yrs \*O\*

 \*F\* Total rings in all series 2420 \*F\*

 \*E\* Total dated rings checked 2414 \*E\*

 \*C\* Series intercorrelation .555 \*C\*

 \*H\* Average mean sensitivity .267 \*H\*

 \*A\* Segments, possible problems 32 \*A\*

 \*\*\* Mean length of series 121.0 \*\*\*

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

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

 193-a 1 absent rings: 2004

 193-b 1 absent rings: 2004

 196-a 1 absent rings: 2004

 198-a 2 absent rings: 2004 2005

 198-b 2 absent rings: 1986 2004

 200-a 5 absent rings: 1947 2007 2008 2009 2010

 200-b 5 absent rings: 2004 2007 2008 2009 2010

 17 absent rings .702%

PART 2: TIME PLOT OF TREE-RING SERIES: 58\_BKE\_Corr3-30 15:51 Wed 16 Mar 2011 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

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

 . . . . . . . . . . . . . . . . . <=============> . 191-a 1 1874 2010 137

 . . . . . . . . . . . . . . . . . <==========> . 191-b 2 1903 2010 108

 . . . . . . . . . . . . . . <=========================> . 192-a 3 1759 2010 252

 . . . . . . . . . . . . . . . . .<==============> . 192-b 4 1863 2010 148

 . . . . . . . . . . . . . . . <=====================> . 193-a 5 1795 2010 216

 . . . . . . . . . . . . . . . . . <===========> . 193-b 6 1898 2010 113

 . . . . . . . . . . . . . . . . . <============> . 194-a 7 1880 2010 131

 . . . . . . . . . . . . . . . . . . <======> . 194-b 8 1944 2010 67

 . . . . . . . . . . . . . . . . . . <=======> . 195-a 9 1931 2010 80

 . . . . . . . . . . . . . . . . . . <========> . 195-b 10 1925 2010 86

 . . . . . . . . . . . . . . . . . . <=======> . 196-a 11 1936 2010 75

 . . . . . . . . . . . . . . . . . . <======> . 196-b 12 1941 2010 70

 . . . . . . . . . . . . . . <=========================> . 197-a 13 1753 2010 258

 . . . . . . . . . . . . . . . <=====================> . 197-b 14 1791 2010 220

 . . . . . . . . . . . . . . . . . . <=======> . 198-a 15 1935 2010 76

 . . . . . . . . . . . . . . . . . . <======> . 198-b 16 1944 2010 67

 . . . . . . . . . . . . . . . . . . <=======> . 199-a 17 1936 2010 75

 . . . . . . . . . . . . . . . . . . <======> . 199-b 18 1947 2010 64

 . . . . . . . . . . . . . . . . . .<=========> . 200-a 19 1918 2010 93

 . . . . . . . . . . . . . . . . . . <========> . 200-b 20 1927 2010 84

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

 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: 58\_BKE\_Corr3-30 15:51 Wed 16 Mar 2011 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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 1800 1.515 4 1850 -1.107 4 1900 1.167 8 1950 .696 20 2000 -.508 20

 1801 2.018 4 1851 .082 4 1901 1.027 8 1951 .741 20 2001 .343 20

 1802 .249 4 1852 -1.329 4 1902 .625 8 1952 .535 20 2002 .871 20

 1753 -.810 1 1803 .609 4 1853 -1.153 4 1903 1.454 9 1953 .286 20 2003 -1.987 20

 1754 .326 1 1804 .421 4 1854 -.303 4 1904 .082 9 1954 1.004 20 2004 -2.713 20 6

 1755 -1.491 1 1805 .907 4 1855 .699 4 1905 -.359 9 1955 .476 20 2005 -1.371 20 1

 1756 -.072 1 1806 -1.217 4 1856 1.540 4 1906 .452 9 1956 -1.009 20 2006 -.177 20

 1757 -.585 1 1807 .870 4 1857 1.041 4 1907 -.967 9 1957 .344 20 2007 .604 20 2<<

 1758 1.751 1 1808 -.603 4 1858 1.117 4 1908 .286 9 1958 1.266 20 2008 .687 20 2<<

 1759 1.580 2 1809 -1.288 4 1859 .502 4 1909 -1.828 9 1959 .239 20 2009 .532 20 2<<

 1760 .749 2 1810 -.321 4 1860 .760 4 1910 -.160 9 1960 -.435 20 2010 1.408 20 2<<

 1761 1.830 2 1811 -.677 4 1861 1.091 4 1911 -1.359 9 1961 .651 20

 1762 .139 2 1812 -1.263 4 1862 .830 4 1912 -.939 9 1962 -.770 20

 1763 .395 2 1813 -.065 4 1863 1.030 5 1913 -.070 9 1963 -.714 20

 1764 1.765 2 1814 -.537 4 1864 -.543 5 1914 .944 9 1964 .216 20

 1765 .412 2 1815 1.670 4 1865 -1.241 5 1915 .997 9 1965 .090 20

 1766 -.436 2 1816 .581 4 1866 -1.185 5 1916 1.827 9 1966 -1.339 20

 1767 -1.627 2 1817 1.605 4 1867 .293 5 1917 .895 9 1967 -.973 20

 1768 -4.129 2 1818 .411 4 1868 -1.261 5 1918 -.330 10 1968 -.988 20

 1769 -1.234 2 1819 1.687 4 1869 -2.001 5 1919 -.059 10 1969 -.803 20

 1770 -1.135 2 1820 -1.125 4 1870 -.023 5 1920 -.369 10 1970 .414 20

 1771 -1.739 2 1821 -1.137 4 1871 -1.073 5 1921 .236 10 1971 1.284 20

 1772 -1.181 2 1822 .491 4 1872 .332 5 1922 .318 10 1972 .486 20

 1773 -.886 2 1823 -1.579 4 1873 -2.378 5 1923 -1.704 10 1973 .354 20

 1774 -.579 2 1824 -1.217 4 1874 -.232 6 1924 .528 10 1974 -.019 20

 1775 -.936 2 1825 -.683 4 1875 .284 6 1925 -1.974 11 1975 .629 20

 1776 .288 2 1826 -.490 4 1876 .219 6 1926 -.202 11 1976 -.557 20

 1777 -.443 2 1827 .660 4 1877 -.830 6 1927 -.130 12 1977 -.826 20

 1778 -.402 2 1828 -.562 4 1878 .408 6 1928 .160 12 1978 .630 20

 1779 1.106 2 1829 -1.806 4 1879 .843 6 1929 -1.010 12 1979 -.577 20

 1780 1.867 2 1830 1.747 4 1880 1.177 7 1930 .041 12 1980 .368 20

 1781 .125 2 1831 .290 4 1881 .519 7 1931 1.316 13 1981 -.917 20

 1782 .597 2 1832 -.391 4 1882 .186 7 1932 1.488 13 1982 -1.571 20

 1783 .078 2 1833 .419 4 1883 -.373 7 1933 .798 13 1983 -.374 20

 1784 1.015 2 1834 1.271 4 1884 .190 7 1934 -.001 13 1984 -.302 20

 1785 .702 2 1835 .539 4 1885 .302 7 1935 -1.738 14 1985 .178 20

 1786 2.008 2 1836 1.618 4 1886 2.061 7 1936 -1.445 16 1986 .232 20 1<<

 1787 .983 2 1837 .156 4 1887 -.615 7 1937 -.311 16 1987 1.716 20

 1788 .215 2 1838 -2.133 4 1888 -.664 7 1938 .537 16 1988 .734 20

 1789 .078 2 1839 -1.047 4 1889 -.554 7 1939 .895 16 1989 -.082 20

 1790 .240 2 1840 .772 4 1890 -.154 7 1940 -.590 16 1990 1.050 20

 1791 .636 3 1841 -.580 4 1891 -.292 7 1941 .757 17 1991 .149 20

 1792 -1.784 3 1842 -.224 4 1892 .784 7 1942 .024 17 1992 .780 20

 1793 1.584 3 1843 -.517 4 1893 -1.155 7 1943 -.367 17 1993 .859 20

 1794 -1.180 3 1844 -.662 4 1894 -.708 7 1944 -.383 19 1994 .564 20

 1795 -.634 4 1845 1.237 4 1895 -.713 7 1945 .341 19 1995 .081 20

 1796 -2.285 4 1846 1.443 4 1896 -.938 7 1946 -.221 19 1996 -.787 20

 1797 -.136 4 1847 .486 4 1897 -.830 7 1947 .190 20 1<< 1997 -.217 20

 1798 .150 4 1848 1.857 4 1898 .341 8 1948 -1.249 20 1998 .076 20

 1799 -.277 4 1849 -.439 4 1899 .907 8 1949 .776 20 1999 .576 20

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PART 4: Master Bar Plot: 58\_BKE\_Corr3-30 15:51 Wed 16 Mar 2011 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

 1800----------F 1850-d 1900---------E 1950--------C 2000---b

 1801----------H 1851-----@ 1901---------D 1951--------C 2001------A

 1802------A 1852-e 1902-------B 1952-------B 2002--------C

 1753--c 1803-------B 1853-e 1903----------F 1953------A 2003h

 1754------A 1804-------B 1854----a 1904-----@ 1954---------D 2004k

 1755f 1805---------D 1855--------C 1905---a 1955-------B 2005-e

 1756----@ 1806-e 1856----------F 1906-------B 1956-d 2006----a

 1757--b 1807--------C 1857---------D 1907-d 1957------A 2007-------B

 1758----------G 1808--b 1858---------D 1908------A 1958---------E 2008--------C

 1759----------F 1809-e 1859-------B 1909g 1959------A 2009-------B

 1760--------C 1810---a 1860--------C 1910----a 1960---b 2010----------F

 1761----------G 1811--c 1861---------D 1911-e 1961--------C

 1762-----A 1812-e 1862--------C 1912-d 1962--c

 1763------B 1813----@ 1863---------D 1913----@ 1963--c

 1764----------G 1814---b 1864---b 1914---------D 1964-----A

 1765------B 1815----------G 1865-e 1915---------D 1965-----@

 1766---b 1816-------B 1866-e 1916----------G 1966-e

 1767g 1817----------F 1867------A 1917--------D 1967-d

 1768q 1818------B 1868-e 1918---a 1968-d

 1769-e 1819----------G 1869h 1919----@ 1969--c

 1770-e 1820-e 1870----@ 1920---a 1970------B

 1771g 1821-e 1871-d 1921------A 1971---------E

 1772-e 1822-------B 1872------A 1922------A 1972-------B

 1773--d 1823f 1873j 1923g 1973------A

 1774--b 1824-e 1874----a 1924-------B 1974-----@

 1775-d 1825--c 1875------A 1925h 1975-------C

 1776------A 1826---b 1876-----A 1926----a 1976---b

 1777---b 1827--------C 1877--c 1927----a 1977--c

 1778---b 1828---b 1878------B 1928-----A 1978-------C

 1779---------D 1829g 1879--------C 1929-d 1979---b

 1780----------G 1830----------G 1880---------E 1930-----@ 1980------A

 1781-----A 1831------A 1881-------B 1931---------E 1981--d

 1782-------B 1832---b 1882-----A 1932----------F 1982f

 1783-----@ 1833-------B 1883---a 1933--------C 1983---a

 1784---------D 1834---------E 1884-----A 1934-----@ 1984----a

 1785--------C 1835-------B 1885------A 1935g 1985-----A

 1786----------H 1836----------F 1886----------H 1936-f 1986------A

 1787---------D 1837-----A 1887--b 1937---a 1987----------G

 1788-----A 1838i 1888--c 1938-------B 1988--------C

 1789-----@ 1839-d 1889---b 1939---------D 1989----@

 1790------A 1840--------C 1890----a 1940--b 1990---------D

 1791-------C 1841--b 1891----a 1941--------C 1991-----A

 1792g 1842----a 1892--------C 1942-----@ 1992--------C

 1793----------F 1843---b 1893-e 1943---a 1993--------C

 1794-e 1844--c 1894--c 1944---b 1994-------B

 1795--c 1845---------E 1895--c 1945------A 1995-----@

 1796i 1846----------F 1896-d 1946----a 1996--c

 1797----a 1847-------B 1897--c 1947-----A 1997----a

 1798-----A 1848----------G 1898------A 1948-e 1998-----@

 1799----a 1849---b 1899---------D 1949--------C 1999-------B

PART 5: CORRELATION OF SERIES BY SEGMENTS: 58\_BKE\_Corr3-30 15:51 Wed 16 Mar 2011 Page 5

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 Correlations of 30-year dated segments, lagged 15 years

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

 Seq Series Time\_span 1755 1770 1785 1800 1815 1830 1845 1860 1875 1890 1905 1920 1935 1950 1965 1980 1995

 1784 1799 1814 1829 1844 1859 1874 1889 1904 1919 1934 1949 1964 1979 1994 2009 2024

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

 1 191-a 1874 2010 .25B .22B .48 .61 .66 .61 .68 .66 .29A .34A

 2 191-b 1903 2010 .64 .69 .62 .40B .54 .58 .63 .63

 3 192-a 1759 2010 .29B .36A .60 .65 .58 .59 .73 .72 .62 .72 .77 .70 .68 .70 .49 .61 .62

 4 192-b 1863 2010 .61 .54 .44 .72 .81 .60 .60 .76 .72 .72

 5 193-a 1795 2010 .33B .30B .61 .51 .51 .52 .53 .61 .81 .82 .53 .54 .73 .66 .67

 6 193-b 1898 2010 .80 .83 .63 .49 .68 .66 .58 .56

 7 194-a 1880 2010 .62 .63 .51 .56 .59 .24B .42 .76 .75

 8 194-b 1944 2010 .40A .27B .29B .59 .62

 9 195-a 1931 2010 .52 .43 .43 .65 .59 .57

 10 195-b 1925 2010 .46 .37B .45 .51 .30B .35B

 11 196-a 1936 2010 .49 .30B .37A .70 .72

 12 196-b 1941 2010 .33B .49 .68 .82 .81

 13 197-a 1753 2010 .29B .46 .66 .68 .68 .69 .73 .57 .50 .63 .49 .57 .71 .58 .68 .79 .80

 14 197-b 1791 2010 .77 .79 .76 .73 .67 .59 .55 .54 .53 .53 .56 .44B .52 .71 .73

 15 198-a 1935 2010 .26B .29B .01B .34A .36A

 16 198-b 1944 2010 .08B .08B .22B .68 .70

 17 199-a 1936 2010 .54 .72 .80 .91 .91

 18 199-b 1947 2010 .81 .78 .78 .78 .78

 19 200-a 1918 2010 .28A .39A .58 .65 .62 .57 .56

 20 200-b 1927 2010 .66 .53 .34A .59 .61 .60

 Av segment correlation .29 .41 .59 .61 .66 .63 .66 .54 .51 .61 .62 .61 .50 .49 .55 .63 .64

PART 6: POTENTIAL PROBLEMS: 58\_BKE\_Corr3-30 15:51 Wed 16 Mar 2011 Page 5

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 For each series with potential problems the following diagnostics may appear:

 [A] Correlations with master dating series of flagged 30-year segments of series filtered with 32-year spline,

 at every point from ten years earlier (-10) to ten years later (+10) than dated

 [B] Effect of those data values which most lower or raise correlation with master series

 Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

 [C] Year-to-year changes very different from the mean change in other series

 [D] Absent rings (zero values)

 [E] Values which are statistical outliers from mean for the year

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 191-a 1874 to 2010 137 years Series 1

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

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

 1874 1903 2 -.03 .17 .05 -.04 .08 -.21 .03 .09 -.08 .03 .25|-.28 .35\*-.02 -.20 -.19 -.17 .09 .17 -.10 -.08

 1875 1904 2 -.05 .14 .04 -.01 .06 -.23 .08 .07 -.05 -.05 .22|-.29 .36\*-.12 -.17 -.21 -.11 .06 .17 -.10 -.03

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

 1980 2009 0 -.27 .10 -.27 -.15 -.07 -.16 -.08 .00 -.12 -.15 .29\*-.06 - - - - - - - - -

 1981 2010 0 -.31 .14 -.21 -.29 -.16 -.16 -.06 .04 -.09 -.13 .34\* - - - - - - - - - -

 [B] Entire series, effect on correlation ( .469) is:

 Lower 2004> -.022 1877> -.019 1885< -.015 1880< -.013 2003> -.013 1918> -.012 Higher 1923 .021 1956 .012

 1874 to 1903 segment:

 Lower 1877> -.097 1885< -.059 1880< -.051 1874< -.027 1881< -.017 1888> -.014 Higher 1886 .059 1887 .053

 1875 to 1904 segment:

 Lower 1877> -.084 1885< -.064 1880< -.055 1904> -.052 1881< -.021 1902< -.016 Higher 1887 .066 1886 .058

 1980 to 2009 segment:

 Lower 2004> -.095 2007< -.037 1997< -.022 2003> -.021 1999< -.015 1989> -.011 Higher 1987 .067 1982 .054

 1981 to 2010 segment:

 Lower 2004> -.091 2007< -.038 2003> -.028 1997< -.023 1999< -.016 1991< -.011 Higher 1987 .055 1982 .049

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

 1877 +3.2 SD; 2004 +4.3 SD

 191-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1874 120 192 219 263 288 206

 1880 118 89 95 104 131 80 151 100 119 122

 1890 132 113 160 103 85 106 68 58 135 180

 1900 216 298 157 229 247 192 160 79 190 119

 1910 183 149 153 188 289 389 254 219 263 189

 1920 174 261 240 149 242 195 206 226 273 175

 1930 260 307 297 242 151 178 152 243 216 329

 1940 177 265 188 150 138 197 219 227 154 218

 1950 252 189 182 176 194 164 123 180 164 191

 1960 123 140 119 111 128 109 82 106 91 93

 1970 117 137 102 109 80 95 73 56 65 53

 1980 58 60 39 66 80 87 90 102 75 69

 1990 63 38 51 48 52 40 41 35 49 44

 2000 34 58 69 54 65 62 67 56 67 62

 2010 87

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 191-b 1903 to 2010 108 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

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

 1935 1964 -7 -.23 -.01 .00 .49\*-.06 -.02 -.05 -.02 -.30 .06 .40|-.32 -.01 .08 .16 -.44 .08 -.09 .04 -.22 .14

 [B] Entire series, effect on correlation ( .575) is:

 Lower 1935> -.027 1982< -.021 1918> -.021 1949< -.018 1996> -.013 1904> -.012 Higher 2003 .045 1909 .019

 1935 to 1964 segment:

 Lower 1935> -.097 1949< -.082 1953< -.023 1962> -.020 1955< -.011 1942< -.007 Higher 1940 .042 1961 .027

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

 1961 +3.2 SD

 191-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1903 155 180 175 201 102 181 109

 1910 168 154 162 260 311 308 254 250 286 261

 1920 207 223 182 122 182 112 167 142 130 104

 1930 143 203 198 193 116 144 115 150 169 208

 1940 96 165 97 105 102 138 96 100 88 80

 1950 134 120 111 81 101 81 84 94 107 95

 1960 80 160 102 65 75 74 49 53 51 67

 1970 68 90 93 79 73 67 69 59 71 53

 1980 67 59 33 48 58 46 61 59 43 37

 1990 62 42 50 48 53 36 48 38 39 36

 2000 41 50 54 23 27 36 49 72 91 110

 2010 123

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 192-a 1759 to 2010 252 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

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

 1759 1788 3 - - - - -.13 .10 -.14 .19 .20 .25 .29|-.01 .11 .36\* .34 .08 .06 .06 -.17 -.12 -.15

 1770 1799 0 -.11 -.17 -.32 .14 -.12 -.13 .13 .11 .27 -.12 .36\*-.18 .20 -.11 .20 -.08 -.11 .04 .01 -.14 .01

 [B] Entire series, effect on correlation ( .590) is:

 Lower 1988< -.013 1776< -.010 1818< -.009 1843> -.008 1788< -.008 1782< -.007 Higher 2003 .017 1838 .008

 1759 to 1788 segment:

 Lower 1776< -.060 1788< -.046 1782< -.044 1771> -.025 1775> -.022 1766> -.016 Higher 1786 .055 1761 .045

 1770 to 1799 segment:

 Lower 1776< -.070 1788< -.064 1782< -.050 1771> -.022 1775> -.020 1774> -.014 Higher 1794 .078 1786 .062

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

 1767 1768 -4.2 SD

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

 1768 -6.4 SD

 192-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1759 90

 1760 78 92 69 74 85 70 63 44 27 39

 1770 44 45 44 44 48 48 38 36 36 65

 1780 87 54 40 41 49 53 72 60 32 28

 1790 31 36 26 50 19 14 12 17 16 17

 1800 37 56 23 22 25 25 13 31 22 12

 1810 19 23 21 23 23 39 29 43 25 34

 1820 25 26 33 24 28 27 30 43 29 32

 1830 81 71 66 88 89 51 70 62 26 35

 1840 54 40 37 97 98 105 119 117 134 94

 1850 78 93 73 80 92 119 123 120 138 167

 1860 139 171 137 143 82 58 48 44 36 33

 1870 46 31 36 21 20 26 17 15 20 29

 1880 35 32 32 21 28 31 33 16 19 18

 1890 26 23 27 21 31 22 28 41 49 97

 1900 116 171 171 215 181 163 175 161 169 102

 1910 173 132 115 166 189 207 244 181 136 139

 1920 131 128 123 73 115 38 66 95 72 60

 1930 96 101 99 68 41 41 49 46 111 202

 1940 97 208 119 70 64 109 114 123 98 119

 1950 118 123 126 118 153 122 94 166 254 118

 1960 57 88 45 38 50 38 31 28 48 63

 1970 142 219 122 135 80 86 58 55 66 76

 1980 91 90 76 103 113 163 257 309 133 113

 1990 122 94 133 150 139 128 140 157 176 130

 2000 104 127 157 61 80 60 97 179 213 199

 2010 228

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 192-b 1863 to 2010 148 years Series 4

 [B] Entire series, effect on correlation ( .621) is:

 Lower 1869> -.017 1876< -.016 1868< -.013 1918< -.013 1900< -.012 1907> -.008 Higher 1873 .028 1925 .023

 192-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1863 179 140 89 99 98 51 66

 1870 69 49 72 38 45 48 30 25 28 31

 1880 32 46 39 31 40 43 84 43 36 55

 1890 62 60 71 41 52 39 33 45 46 53

 1900 48 72 113 160 143 112 135 125 115 93

 1910 134 109 95 120 135 118 140 110 65 82

 1920 83 81 72 44 67 35 49 61 49 36

 1930 59 88 104 85 68 49 59 48 56 64

 1940 43 80 60 53 56 73 58 74 71 131

 1950 127 123 99 88 92 73 67 83 100 45

 1960 30 44 32 25 27 27 21 27 27 27

 1970 45 63 56 48 41 37 34 27 31 22

 1980 28 26 18 34 45 53 65 101 116 102

 1990 131 96 108 119 89 68 69 82 105 100

 2000 84 88 74 36 33 33 82 123 238 367

 2010 327

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 193-a 1795 to 2010 216 years Series 5

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

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

 1795 1824 -2 -.09 -.41 -.01 -.19 -.28 -.10 .32 -.09 .34\* .12 .33|-.09 .21 -.17 -.11 -.25 -.20 -.08 -.03 -.22 .05

 1800 1829 -2 .01 -.35 .05 -.23 -.24 .15 .21 .03 .34\* .10 .30|-.19 .16 -.18 -.08 -.11 -.33 -.18 -.09 -.04 -.02

 [B] Entire series, effect on correlation ( .560) is:

 Lower 1802> -.023 1807< -.015 1877> -.014 1820> -.008 1955< -.007 1944< -.006 Higher 1925 .014 2003 .013

 1795 to 1824 segment:

 Lower 1802> -.142 1807< -.101 1810< -.035 1821> -.020 1804< -.016 1795< -.013 Higher 1796 .064 1815 .063

 1800 to 1829 segment:

 Lower 1802> -.158 1807< -.105 1810< -.037 1821> -.022 1804< -.016 1818> -.012 Higher 1815 .072 1819 .052

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

 2004 -2.713 20 6

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

 1877 +3.1 SD

 193-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1795 43 29 55 56 56

 1800 57 63 94 90 47 60 33 16 24 15

 1810 9 17 12 15 24 53 33 40 36 49

 1820 32 35 35 22 19 20 20 32 24 24

 1830 62 42 30 54 92 82 89 61 41 47

 1840 81 57 36 39 25 77 85 107 113 73

 1850 61 71 55 65 90 81 94 70 61 53

 1860 60 57 62 56 45 41 41 51 49 41

 1870 61 59 59 49 74 72 60 81 91 90

 1880 74 62 68 74 64 63 91 44 53 58

 1890 74 52 69 56 64 59 115 82 126 165

 1900 212 129 111 132 85 85 95 88 100 86

 1910 107 71 91 107 130 112 160 169 106 103

 1920 106 108 122 85 140 74 117 117 112 84

 1930 105 127 142 121 95 69 70 68 93 98

 1940 78 128 123 92 63 93 79 80 68 89

 1950 85 81 84 104 106 74 76 72 95 72

 1960 86 104 78 99 143 106 80 81 87 91

 1970 104 140 95 69 68 73 52 48 71 53

 1980 60 43 47 56 52 54 46 72 59 32

 1990 48 38 45 68 53 24 24 21 30 26

 2000 18 23 24 8 0 26 18 32 35 33

 2010 37

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

 193-b 1898 to 2010 113 years Series 6

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

 Lower 2004< -.019 1940> -.015 1996> -.015 1903< -.014 1982> -.012 2005> -.008 Higher 2003 .026 1923 .012

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

 2004 2005 4.4 SD

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

 2004 -2.713 20 6

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

 2004 -6.7 SD

 193-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1898 165 183

 1900 178 146 137 119 99 116 128 86 146 96

 1910 149 121 130 189 286 261 254 252 204 255

 1920 287 295 277 161 267 166 242 235 257 175

 1930 175 227 229 194 131 122 122 148 171 339

 1940 277 263 171 96 84 91 80 138 130 157

 1950 137 143 139 139 171 100 90 88 132 107

 1960 113 171 100 114 163 106 78 65 69 72

 1970 82 114 96 86 65 78 65 62 76 63

 1980 89 56 73 69 77 96 71 97 74 51

 1990 69 64 71 73 76 54 75 69 80 79

 2000 63 60 66 28 0 52 46 48 56 57

 2010 49

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

 194-a 1880 to 2010 131 years Series 7

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

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

 1950 1979 -1 -.08 .21 -.06 .16 .20 .21 .05 .30 -.07 .30\* .24|-.28 -.14 -.14 -.34 -.19 -.07 .20 -.12 -.01 .07

 [B] Entire series, effect on correlation ( .557) is:

 Lower 1934> -.023 1976> -.012 1939< -.011 1887> -.009 1979> -.009 1912> -.009 Higher 1935 .023 1925 .015

 1950 to 1979 segment:

 Lower 1976> -.063 1979> -.044 1959> -.039 1971< -.039 1970< -.034 1956> -.020 Higher 1958 .078 1966 .059

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

 1934 +4.0 SD

 194-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1880 130 97 68 74 82 87 139 95 84 60

 1890 66 76 110 76 74 77 77 82 115 143

 1900 149 142 125 143 132 110 159 123 104 76

 1910 89 64 90 70 74 72 77 69 42 53

 1920 36 39 42 33 46 30 64 63 71 57

 1930 58 63 98 103 214 72 51 57 69 55

 1940 49 85 125 106 135 124 148 220 125 184

 1950 170 149 158 132 162 177 156 148 207 194

 1960 136 136 103 101 144 83 53 34 27 12

 1970 23 28 35 53 32 27 33 24 26 25

 1980 28 19 15 16 17 20 19 40 28 29

 1990 33 37 34 39 46 36 37 47 46 62

 2000 36 51 78 45 25 28 58 151 206 151

 2010 162

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

 194-b 1944 to 2010 67 years Series 8

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

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

 1944 1973 0 -.02 -.28 .13 .19 .33 .00 .34 -.04 -.33 -.18 .40\*-.23 .04 -.05 .00 -.20 .01 -.13 .05 .12 -.10

 1950 1979 -7 .06 -.23 -.03 .42\* .15 .20 .25 .12 -.50 -.06 .27|-.23 .13 .07 -.07 -.21 -.01 -.12 -.21 .33 -.12

 1965 1994 -7 -.12 -.19 .00 .38\* .13 .17 .11 .15 -.05 -.09 .29| .03 .05 -.09 .02 -.06 -.19 .02 .05 .04 -.22

 [B] Entire series, effect on correlation ( .513) is:

 Lower 1973< -.046 1956> -.034 1976> -.028 1984< -.022 1982> -.020 1988< -.014 Higher 2003 .064 2004 .036

 1944 to 1973 segment:

 Lower 1973< -.104 1956> -.095 1969> -.030 1951< -.026 1959> -.024 1962> -.012 Higher 1948 .121 1958 .057

 1950 to 1979 segment:

 Lower 1973< -.120 1956> -.084 1976> -.073 1951< -.030 1969> -.028 1959> -.022 Higher 1958 .082 1966 .077

 1965 to 1994 segment:

 Lower 1973< -.084 1976> -.066 1982> -.047 1969> -.026 1984< -.024 1988< -.020 Higher 1987 .067 1966 .063

 194-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1944 137 167 127 149 101 136

 1950 114 98 104 101 120 121 140 170 241 178

 1960 117 123 93 70 89 70 45 44 50 67

 1970 53 56 37 21 26 37 52 32 65 39

 1980 36 34 43 45 26 30 63 83 46 54

 1990 68 70 82 92 113 68 54 60 46 50

 2000 55 56 75 33 15 20 40 53 72 56

 2010 98

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 195-a 1931 to 2010 80 years Series 9

 [B] Entire series, effect on correlation ( .474) is:

 Lower 1962< -.057 1947< -.022 1961< -.013 1968> -.011 2008< -.011 1932< -.011 Higher 1935 .025 1987 .013

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

 1962 -6.1 SD

 195-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1931 223 185 144 151 121 151 204 239 248

 1940 233 270 252 252 236 233 261 208 196 281

 1950 264 309 269 268 238 234 194 218 203 181

 1960 185 158 94 130 149 129 120 116 142 121

 1970 151 167 130 167 137 138 82 108 142 101

 1980 121 57 70 69 55 84 100 184 179 174

 1990 243 194 185 220 238 255 177 137 151 188

 2000 140 170 174 132 154 209 360 435 313 372

 2010 354

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

 195-b 1925 to 2010 86 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

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

 1935 1964 -8 .17 -.21 .48\* .03 .03 -.22 -.19 -.15 -.05 -.07 .37|-.12 -.32 .08 .09 -.24 .26 -.15 -.16 .09 .34

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

 1980 2009 -4 -.37 -.08 .05 .27 -.21 .24 .44\* .05 .07 .07 .30| .02 - - - - - - - - -

 1981 2010 -4 -.45 -.03 .14 -.12 -.32 .19 .43\* .12 .12 .10 .35| - - - - - - - - - -

 [B] Entire series, effect on correlation ( .420) is:

 Lower 2003> -.020 2008< -.017 1940> -.016 1950< -.014 1960> -.013 1935> -.011 Higher 2010 .017 1966 .015

 1935 to 1964 segment:

 Lower 1940> -.041 1935> -.037 1950< -.036 1960> -.030 1958< -.027 1947< -.019 Higher 1956 .077 1949 .038

 1980 to 2009 segment:

 Lower 2008< -.056 1991> -.036 2007< -.030 2003> -.028 1986< -.026 1998< -.023 Higher 2004 .069 1981 .045

 1981 to 2010 segment:

 Lower 2008< -.052 2003> -.039 1991> -.030 2007< -.030 1986< -.025 1998< -.022 Higher 2004 .059 2010 .059

 195-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1925 95 137 125 189 122

 1930 133 200 167 154 126 150 133 205 261 281

 1940 267 272 207 176 208 222 212 178 169 248

 1950 179 219 201 178 172 206 126 155 150 156

 1960 178 188 154 151 133 108 87 97 113 109

 1970 149 145 114 117 82 83 67 75 108 68

 1980 74 45 61 52 40 59 49 95 112 132

 1990 147 198 231 223 172 149 136 136 117 160

 2000 156 201 199 175 157 191 202 186 179 198

 2010 230

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

 196-a 1936 to 2010 75 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 1979 10 .11 -.16 .26 -.09 -.11 -.15 .04 .11 -.18 -.07 .30|-.10 -.33 .13 .17 -.11 .30 -.14 -.18 -.01 .39\*

 1965 1994 0 .07 -.06 -.18 .02 -.13 .24 -.19 .04 -.08 -.18 .37\* .04 .09 .08 .10 .21 .13 -.02 -.10 .17 .15

 [B] Entire series, effect on correlation ( .506) is:

 Lower 1971< -.036 1956< -.030 1962> -.015 1958< -.014 1973< -.012 1978< -.009 Higher 2004 .032 1987 .020

 1950 to 1979 segment:

 Lower 1971< -.072 1962> -.039 1966> -.026 1958< -.023 1973< -.018 1978< -.014 Higher 1956 .173 1954 .031

 1965 to 1994 segment:

 Lower 1971< -.131 1973< -.043 1978< -.030 1965> -.029 1994< -.025 1974> -.015 Higher 1987 .100 1990 .039

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

 2004 -2.713 20 6

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

 1956 -6.3 SD

 196-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1936 59 145 273 273

 1940 219 323 312 277 246 271 218 264 202 233

 1950 206 217 253 262 255 212 133 184 169 165

 1960 160 176 157 126 121 147 120 106 90 94

 1970 109 75 61 52 74 68 56 52 50 42

 1980 55 43 45 80 64 73 72 104 97 58

 1990 82 52 78 66 40 37 43 45 40 62

 2000 25 36 48 24 0 31 59 74 105 102

 2010 133

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

 196-b 1941 to 2010 70 years Series 12

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

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

 1941 1970 7 -.28 -.30 -.01 .06 .21 -.19 -.05 .24 -.22 -.25 .33| .06 -.33 .39 .19 -.16 .03 .41\*-.09 -.11 .22

 [B] Entire series, effect on correlation ( .555) is:

 Lower 1959< -.086 1941< -.060 1960> -.019 1946> -.011 2010< -.009 1968> -.009 Higher 2003 .052 2004 .023

 1941 to 1970 segment:

 Lower 1941< -.120 1959< -.090 1960> -.036 1946> -.019 1968> -.017 1964< -.013 Higher 1956 .061 1962 .039

 196-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1941 66 143 211 313 338 374 341 252 337

 1950 330 349 305 262 306 299 239 320 309 211

 1960 260 266 210 192 187 219 180 178 181 147

 1970 168 186 162 148 144 129 87 69 74 48

 1980 58 41 36 73 90 133 118 174 188 95

 1990 125 115 122 120 89 110 70 78 83 105

 2000 53 61 101 31 12 41 112 187 128 106

 2010 98

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 197-a 1753 to 2010 258 years Series 13

 [\*] Early part of series cannot be checked from 1753 to 1758 -- 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

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

 1759 1788 -3 - - - - .08 .15 .14 .40\* .13 .08 .29| .20 .25 .09 -.06 .05 -.20 -.04 -.40 -.23 -.15

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

 Lower 1768> -.017 1925> -.014 1776> -.009 1788> -.009 1887> -.007 1809> -.007 Higher 1935 .008 1792 .007

 1759 to 1788 segment:

 Lower 1776> -.060 1788> -.046 1782> -.044 1771< -.025 1775< -.022 1766< -.016 Higher 1786 .055 1761 .045

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

 1767 1768 4.8 SD 1768 1769 -4.1 SD

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

 1768 +6.4 SD; 1842 +3.1 SD; 1873 -5.1 SD; 1925 +3.2 SD

 197-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1753 69 77 57 68 59 91 94

 1760 80 83 57 47 66 39 24 23 25 27

 1770 20 11 17 21 22 20 51 41 44 50

 1780 57 47 71 61 77 68 89 73 82 84

 1790 84 94 55 101 55 72 52 67 77 65

 1800 117 140 84 91 100 104 72 111 57 76

 1810 85 55 46 65 47 68 51 55 55 72

 1820 38 37 62 42 47 60 67 77 61 48

 1830 102 73 69 74 87 89 119 82 69 80

 1840 140 124 163 95 100 152 162 118 162 95

 1850 90 105 81 93 91 116 143 151 148 106

 1860 120 114 95 101 78 80 74 86 78 56

 1870 69 57 65 40 61 61 76 49 71 87

 1880 85 76 80 69 71 93 102 82 67 75

 1890 75 75 101 59 68 83 80 83 110 94

 1900 90 92 98 136 33 25 47 41 67 43

 1910 50 51 49 53 77 101 176 110 72 91

 1920 91 118 170 155 248 223 234 181 191 162

 1930 262 399 364 308 325 105 95 158 189 177

 1940 148 209 244 159 195 216 180 194 150 240

 1950 233 166 192 205 272 216 122 154 170 116

 1960 43 65 49 49 65 71 66 65 47 48

 1970 65 103 115 103 77 105 61 62 107 99

 1980 102 67 52 58 64 91 62 99 85 73

 1990 91 79 84 95 97 90 55 58 61 78

 2000 42 70 61 33 16 31 45 73 64 52

 2010 97

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

 197-b 1791 to 2010 220 years Series 14

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

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

 1950 1979 -1 -.22 -.02 .09 .02 -.13 -.04 .04 .07 .02 .53\* .44|-.41 .01 .01 -.08 .17 .03 -.09 -.06 -.02 -.24

 [B] Entire series, effect on correlation ( .628) is:

 Lower 1873> -.012 1904< -.012 1847< -.008 1930< -.008 1923> -.006 1876> -.005 Higher 1887 .010 1935 .009

 1950 to 1979 segment:

 Lower 1966> -.051 1957< -.032 1959> -.026 1976> -.022 1955> -.019 1964< -.015 Higher 1954 .033 1978 .030

 197-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1791 87 61 106 79 95 69 101 109 91

 1800 122 107 68 79 80 88 60 104 76 67

 1810 83 72 65 92 77 108 116 149 102 122

 1820 49 47 74 46 55 65 68 92 87 56

 1830 98 81 78 88 105 102 139 111 69 97

 1840 123 90 128 100 116 158 156 96 166 100

 1850 92 138 107 88 101 131 151 133 138 132

 1860 116 126 120 103 84 80 73 106 66 55

 1870 61 52 69 53 65 63 91 38 41 43

 1880 98 63 51 36 43 44 56 25 29 27

 1890 27 35 37 27 35 38 30 35 36 35

 1900 43 31 27 46 19 20 29 24 35 17

 1910 23 25 30 32 35 34 85 52 42 63

 1920 55 86 119 76 89 49 67 72 73 61

 1930 28 95 168 200 186 36 32 46 96 104

 1940 85 153 153 146 142 104 84 99 74 83

 1950 84 87 92 98 105 109 64 49 69 63

 1960 37 39 30 24 28 34 34 28 18 16

 1970 36 48 58 46 37 60 54 35 77 63

 1980 66 61 50 61 86 119 110 122 86 95

 1990 92 62 87 73 70 76 54 61 42 56

 2000 36 53 51 25 10 15 35 74 67 54

 2010 95

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

 198-a 1935 to 2010 76 years Series 15

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

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

 1935 1964 -6 .31 -.15 .12 -.17 .41\* .25 -.24 -.40 .03 .00 .26| .07 -.04 -.02 -.16 .07 -.23 .10 .11 -.31 -.01

 1950 1979 -10 .37\* .12 -.03 -.22 .21 -.11 .34 -.06 .11 .02 .29| .06 -.30 -.09 .16 -.25 -.11 -.15 .00 -.31 .34

 1965 1994 -4 .29 .18 -.28 -.09 .15 -.13 .38\* .19 .10 -.04 .01|-.21 -.30 .04 -.08 .01 .18 -.32 -.04 .00 .20

 1980 2009 0 .07 .30 -.01 .17 .07 .03 .02 .11 -.10 -.22 .34\*-.23 - - - - - - - - -

 1981 2010 0 -.01 .28 .04 -.01 .00 -.01 .06 .16 -.12 -.15 .36\* - - - - - - - - - -

 [B] Entire series, effect on correlation ( .335) is:

 Lower 1941< -.070 1981> -.035 1945< -.032 1982> -.027 1985< -.023 1959> -.017 Higher 2003 .092 1935 .074

 1935 to 1964 segment:

 Lower 1941< -.162 1945< -.070 1959> -.035 1952< -.026 1936> -.026 1960> -.025 Higher 1935 .229 1948 .060

 1950 to 1979 segment:

 Lower 1959> -.065 1952< -.048 1971< -.047 1960> -.044 1978< -.041 1979> -.024 Higher 1966 .149 1956 .084

 1965 to 1994 segment:

 Lower 1981> -.120 1982> -.091 1985< -.049 1979> -.026 1986< -.025 1978< -.018 Higher 1966 .209 1968 .036

 1980 to 2009 segment:

 Lower 1981> -.100 1982> -.074 1985< -.071 1986< -.042 1987< -.016 1994< -.013 Higher 2003 .312 2004 .034

 1981 to 2010 segment:

 Lower 1981> -.099 1982> -.074 1985< -.069 1986< -.041 1987< -.016 1994< -.012 Higher 2003 .293 2010 .034

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

 1940 1941 -4.1 SD

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

 2004 -2.713 20 6

 2005 -1.371 20 1

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

 1981 +3.3 SD; 1982 +3.9 SD; 1986 -5.2 SD

 198-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1935 9 35 55 57 97

 1940 74 39 47 105 146 84 119 142 96 159

 1950 146 178 121 170 178 158 111 120 128 184

 1960 181 159 131 136 115 101 54 66 45 52

 1970 55 45 35 40 52 54 35 25 19 23

 1980 32 41 36 19 16 7 4 10 12 15

 1990 14 13 16 17 11 18 11 34 40 75

 2000 36 45 70 10 0 0 11 29 30 18

 2010 54

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 198-b 1944 to 2010 67 years Series 16

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

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

 1944 1973 2 .06 -.32 .02 .00 .34 -.12 .08 .19 .04 -.15 .08|-.24 .51\*-.08 -.40 -.04 .22 -.20 -.17 .09 .17

 1950 1979 -4 .11 -.24 .00 .07 .08 -.03 .28\* .19 .05 -.05 .08|-.24 .18 .13 -.40 -.16 .21 -.46 -.16 .07 -.06

 1965 1994 -4 .10 -.17 -.28 .01 -.08 -.14 .43\* .22 .11 -.02 .22|-.09 -.36 .03 -.27 -.36 -.13 -.23 -.18 -.24 .16

 [B] Entire series, effect on correlation ( .403) is:

 Lower 1954< -.041 1956> -.027 1944> -.024 1964< -.019 1993< -.017 1987< -.014 Higher 2003 .213 2010 .020

 1944 to 1973 segment:

 Lower 1954< -.096 1956> -.048 1944> -.042 1964< -.042 1959> -.017 1970< -.016 Higher 1966 .075 1958 .057

 1950 to 1979 segment:

 Lower 1954< -.129 1964< -.058 1956> -.052 1950< -.023 1970< -.023 1951< -.021 Higher 1966 .096 1958 .071

 1965 to 1994 segment:

 Lower 1974> -.069 1993< -.062 1977> -.041 1985< -.028 1986< -.020 1970< -.020 Higher 1966 .104 1982 .059

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

 1986 .232 20 1 >> WARNING: Ring is not usually narrow

 2004 -2.713 20 6

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

 1954 -4.5 SD

 198-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1944 314 250 163 195 202 231

 1950 194 168 224 179 116 168 209 278 319 293

 1960 191 218 182 150 77 86 49 75 71 68

 1970 59 72 89 114 195 250 166 130 99 71

 1980 52 33 13 10 10 5 0 8 9 9

 1990 12 14 14 7 14 32 27 42 48 80

 2000 47 74 101 16 0 7 26 45 28 13

 2010 83

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 199-a 1936 to 2010 75 years Series 17

 [B] Entire series, effect on correlation ( .769) is:

 Lower 1940> -.020 1947< -.017 1939< -.015 1973< -.010 1969> -.009 1962> -.007 Higher 2003 .064 2004 .015

 199-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1936 123 180 235 170

 1940 185 212 153 176 134 173 179 137 137 218

 1950 288 248 204 171 267 267 179 321 322 202

 1960 153 196 173 143 189 154 122 131 147 181

 1970 192 244 206 129 130 161 101 109 150 116

 1980 153 112 76 115 134 154 136 195 133 117

 1990 152 111 119 112 93 93 64 95 100 97

 2000 87 86 123 34 19 58 94 113 120 164

 2010 187

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 199-b 1947 to 2010 64 years Series 18

 [B] Entire series, effect on correlation ( .781) is:

 Lower 1956> -.022 1986> -.015 2004> -.013 2000> -.010 1992< -.007 1999< -.007 Higher 2003 .068 1948 .010

 199-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1947 220 131 204

 1950 246 272 204 171 265 240 216 345 356 214

 1960 172 246 173 165 234 254 154 190 193 220

 1970 240 327 252 231 196 265 176 182 241 205

 1980 249 144 103 162 167 206 316 260 155 127

 1990 180 141 129 163 148 164 82 119 126 125

 2000 136 152 226 67 76 132 151 211 258 274

 2010 292

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 200-a 1918 to 2010 93 years Series 19

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

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

 1918 1947 0 .27 -.22 .02 -.21 -.08 -.02 .09 -.16 -.16 .16 .28\* .25 .11 -.06 .00 -.37 .14 -.30 .24 .02 .03

 1920 1949 0 .21 -.09 -.08 -.15 -.06 .00 .08 -.14 -.28 .05 .39\* .27 .20 -.04 -.14 -.18 -.09 -.13 .17 .08 -.04

 [B] Entire series, effect on correlation ( .334) is:

 Lower 1947< -.118 1918> -.034 1925> -.022 1948> -.018 2000> -.016 1926< -.014 Higher 1935 .035 2003 .026

 1918 to 1947 segment:

 Lower 1947< -.179 1918> -.065 1925> -.035 1926< -.025 1936> -.019 1929> -.013 Higher 1935 .096 1931 .054

 1920 to 1949 segment:

 Lower 1947< -.238 1925> -.041 1948> -.037 1926< -.026 1936> -.020 1929> -.013 Higher 1935 .092 1931 .048

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

 1946 1947 -4.9 SD 1947 1948 5.5 SD

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

 1947 .190 20 1 >> WARNING: Ring is not usually narrow

 2007 .604 20 2 >> WARNING: Ring is not usually narrow

 2008 .687 20 2 >> WARNING: Ring is not usually narrow

 2009 .532 20 2 >> WARNING: Ring is not usually narrow

 2010 1.408 20 2 >> WARNING: Ring is not usually narrow

 >> WARNING: Last ring in series is ABSENT

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

 1947 -7.6 SD

 200-a Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1918 261 152

 1920 179 151 124 118 138 147 104 123 172 170

 1930 186 243 245 193 150 85 152 194 180 164

 1940 110 164 146 122 104 150 162 0 130 184

 1950 187 263 226 221 277 133 121 125 185 120

 1960 74 163 131 156 191 193 117 107 92 81

 1970 121 137 71 92 75 89 44 57 107 59

 1980 97 56 60 104 94 102 85 127 143 110

 1990 180 195 138 89 56 55 36 34 60 78

 2000 101 82 62 9 4 5 19 0 0 0

 2010 0

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 200-b 1927 to 2010 84 years Series 20

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

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

 1950 1979 0 .09 -.02 -.32 .18 .00 -.06 -.03 .06 .06 .03 .34\*-.19 -.02 .20 -.25 .19 .10 .26 -.28 .10 .19

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

 Lower 1957< -.042 1996< -.023 1961< -.017 2007< -.016 2000> -.015 1956> -.015 Higher 1935 .029 2003 .024

 1950 to 1979 segment:

 Lower 1957< -.123 1961< -.051 1956> -.045 1977> -.029 1971< -.017 1970< -.013 Higher 1979 .048 1954 .047

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

 2004 -2.713 20 6

 2007 .604 20 2 >> WARNING: Ring is not usually narrow

 2008 .687 20 2 >> WARNING: Ring is not usually narrow

 2009 .532 20 2 >> WARNING: Ring is not usually narrow

 2010 1.408 20 2 >> WARNING: Ring is not usually narrow

 >> WARNING: Last ring in series is ABSENT

 200-b Ring measurements

 Annual values

 Date 0 1 2 3 4 5 6 7 8 9

 1927 94 102 135

 1930 198 200 259 214 219 110 114 182 193 154

 1940 105 186 148 177 154 205 189 198 160 253

 1950 244 324 269 246 309 227 192 99 170 134

 1960 123 88 76 91 141 149 87 61 57 41

 1970 45 49 32 54 43 50 27 54 88 36

 1980 63 50 44 85 71 63 60 108 101 68

 1990 82 62 77 72 63 66 27 43 57 76

 2000 61 47 47 13 0 8 20 0 0 0

 2010 0

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PART 7: DESCRIPTIVE STATISTICS: 58\_BKE\_Corr3-30 15:51 Wed 16 Mar 2011 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 ()

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

 1 191-a 1874 2010 137 10 4 .469 1.45 3.89 .761 .788 .246 2.76 .597 -.089 1

 2 191-b 1903 2010 108 8 1 .575 1.11 3.11 .661 .860 .231 2.79 .422 -.034 1

 3 192-a 1759 2010 252 17 2 .590 .82 3.09 .571 .829 .268 2.61 .341 -.035 1

 4 192-b 1863 2010 148 10 0 .621 .74 3.67 .490 .856 .244 2.88 .492 -.084 1

 5 193-a 1795 2010 216 15 2 .560 .69 2.12 .344 .802 .260 2.68 .412 -.035 1

 6 193-b 1898 2010 113 8 0 .616 1.28 3.39 .709 .839 .240 2.46 .320 .036 1

 7 194-a 1880 2010 131 9 1 .557 .83 2.20 .509 .820 .248 2.92 .472 -.020 1

 8 194-b 1944 2010 67 5 3 .513 .76 2.41 .444 .842 .275 2.84 .621 .029 1

 9 195-a 1931 2010 80 6 0 .474 1.88 4.35 .747 .841 .185 2.44 .341 .000 1

 10 195-b 1925 2010 86 6 3 .420 1.53 2.81 .557 .832 .180 2.70 .379 -.035 1

 11 196-a 1936 2010 75 5 2 .506 1.22 3.23 .838 .919 .277 2.40 .344 -.005 1

 12 196-b 1941 2010 70 5 1 .555 1.64 3.74 .955 .899 .263 2.51 .419 -.032 1

 13 197-a 1753 2010 258 17 1 .588 .94 3.98 .587 .839 .246 2.56 .361 -.020 1

 14 197-b 1791 2010 220 15 1 .628 .74 2.00 .369 .748 .267 2.87 .545 -.015 1

 15 198-a 1935 2010 76 5 5 .335 .65 1.84 .541 .885 .394 2.65 .550 .009 1

 16 198-b 1944 2010 67 5 3 .403 1.01 3.19 .901 .907 .464 2.59 .379 -.076 2

 17 199-a 1936 2010 75 5 0 .769 1.53 3.22 .595 .708 .250 2.65 .412 .085 1

 18 199-b 1947 2010 64 5 0 .781 1.97 3.56 .638 .537 .255 2.60 .424 -.066 2

 19 200-a 1918 2010 93 7 2 .334 1.19 2.77 .648 .740 .348 2.40 .328 -.043 1

 20 200-b 1927 2010 84 6 1 .546 1.08 3.24 .781 .883 .345 2.67 .464 -.052 1

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

 Total or mean: 2420 169 32 .555 1.05 4.35 .589 .818 .267 2.92 .429 -.027

 - = [ COFECHA 58BKECOF ] = -