

## Supplementary Material for

Karen B. Arabas, Bryan Black, Leigh Lentile, Jim Speer, Jodi Sparks, 2008.  
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Supplementary Table 1. Descriptive statistics and results from the segment testing conducted with the program COFECHA (Holmes 1983) for the 35 measured ponderosa pine series.

Series	Begin Year	End Year	Length	No. of Segments Tested	No. of Flagged Segments	Correlation with Master	Mean Sensitivity
TPP01B	1602	2004	403	16	0	0.50	0.23
TPP01A	1615	2004	390	16	1	0.45	0.23
TPP06B	1668	2004	337	14	4	0.43	0.26
TPP10A	1682	2004	323	13	2	0.48	0.27
TPP08A	1681	2003	323	13	3	0.51	0.21
TPP08B	1687	2004	318	13	3	0.48	0.21
UPP03B	1697	2004	308	13	1	0.52	0.26
UPP08A	1700	2004	305	12	0	0.60	0.25
TPP10B	1701	2004	304	12	0	0.58	0.23
TPP04A	1710	2005	296	12	3	0.44	0.32
UPP03A	1725	2004	280	11	1	0.51	0.22
UPP08B	1735	2004	270	11	1	0.57	0.31
UPP07A	1744	2004	261	11	0	0.55	0.32
TPP04B	1670	1925	256	11	2	0.45	0.31
TPP06A	1751	2004	254	10	0	0.56	0.24
TPP09B	1786	2004	219	9	0	0.68	0.24
TPP05A	1787	2004	218	9	1	0.56	0.25
TPP09A	1792	2004	213	9	0	0.55	0.25
TPP07A	1802	2004	203	8	1	0.52	0.19
UPP10B	1811	2004	194	8	1	0.41	0.26
TPP05B	1811	2004	194	8	0	0.53	0.25
TPP07B	1816	2003	188	8	0	0.68	0.17
UPP02B	1819	2004	186	8	0	0.61	0.27
UPP05B	1828	2004	177	7	0	0.66	0.20
UPP10A	1830	2004	175	7	3	0.45	0.23
TPP03B	1834	2004	171	7	2	0.42	0.27
UPP02A	1836	2004	169	7	0	0.56	0.24
TPP03A	1836	2004	169	7	0	0.52	0.26
UPP01A	1850	2004	155	6	0	0.55	0.28
UPP04B	1856	2004	149	6	0	0.53	0.29
UPP01B	1870	2004	135	3	0	0.58	0.22
UPP05A	1882	2004	123	5	0	0.74	0.25
UPP04A	1885	2004	120	5	0	0.58	0.24
UPP06B	1906	2004	99	4	1	0.44	0.20
UPP06A	1906	2004	99	4	2	0.41	0.23
	total or mean			326	32	0.525	0.249

Supplementary Table 2. Descriptive statistics and results from the segment testing conducted with the program COFECHA (Holmes 1983) for the 39 measured Douglas-fir series.

Series	Begin Year	End Year	Length	No. of Segments Tested	No. of Flagged Segments	Correlation with Master	Mean Sensitivity
UDF11A	1678	2004	327	12	1	0.56	0.23
UDF03A	1704	2003	300	12	2	0.60	0.18
TDF05A	1735	2004	270	11	1	0.50	0.21
UDF08B	1744	2004	261	11	3	0.54	0.22
TDF05B	1761	2004	244	10	0	0.61	0.21
UDF09B	1761	2004	244	10	2	0.42	0.20
UDF08A	1763	2004	242	10	0	0.66	0.19
UDF11B	1767	2004	238	10	0	0.63	0.23
UDF02B	1770	2004	235	10	0	0.62	0.20
UDF03B	1791	2004	214	9	2	0.57	0.19
TDF06B	1792	2004	213	9	0	0.61	0.23
UDF09A	1795	2004	210	9	0	0.56	0.20
UDF04B	1803	2004	202	8	2	0.44	0.22
UDF04A	1809	2004	196	8	0	0.62	0.25
UDF02A	1813	2004	192	8	0	0.57	0.18
UDF01A	1819	2004	186	8	0	0.71	0.25
UDF07A	1820	2004	185	8	1	0.61	0.18
TDF03B	1826	2004	179	7	0	0.67	0.19
TDF07B	1832	2004	173	7	1	0.53	0.22
TDF07A	1833	2004	172	7	0	0.51	0.19
UDF01B	1834	2004	171	7	0	0.68	0.26
UDF07B	1835	2004	170	7	0	0.55	0.22
TDF06C	1838	2004	167	7	0	0.57	0.26
TDF03A	1839	2004	166	7	0	0.57	0.18
UDF10A	1847	2004	158	7	0	0.58	0.19
TDF10B	1848	2004	157	7	3	0.43	0.20
TDF07B	1853	2004	152	6	0	0.54	0.24
TDF06A	1856	2004	149	6	0	0.72	0.22
UDF10B	1856	2004	149	6	0	0.61	0.21
TDF09A	1862	2004	143	6	0	0.61	0.20
TDF02B	1867	2004	138	6	0	0.62	0.22
TDF01B	1869	2004	136	6	0	0.72	0.20
TDF09B	1869	2004	136	6	0	0.58	0.18
TDF02A	1869	2004	136	6	0	0.67	0.21
TDF08A	1870	2004	135	6	0	0.67	0.18
UDF12A	1873	2004	132	6	0	0.61	0.16
TDF01A	1874	2004	131	6	0	0.70	0.18
UDF12B	1876	2004	129	5	0	0.43	0.17
TDF11A	1910	2004	95	4	0	0.71	0.28
total or mean				301	18	0.586	0.208

Supplementary Table 3 – Correlation coefficient matrix for ponderosa pine from the program

COFECHA (Holmes 1983) comparing 50-year segments (lagged 25 years) with the a chronology generated from the remaining series (Grissino-Mayer 2001). All bolded coefficients are statistically significant ( $p < 0.01$ ).

Series	Fifty-year tested segments (italicized correlations are flagged segments)													
	1650 to 1699	1675 to 1724	1700 to 1749	1725 to 1774	1750 to 1799	1775 to 1824	1800 to 1849	1825 to 1874	1850 to 1899	1875 to 1924	1900 to 1949	1925 to 1974	1950 to 1999	1975 to 2024
TPP01A	<b>0.41</b>	<b>0.36</b>	0.24	<b>0.48</b>	<b>0.51</b>	<b>0.39</b>	<b>0.36</b>	<b>0.34</b>	<b>0.51</b>	<b>0.60</b>	<b>0.55</b>	<b>0.49</b>	<b>0.48</b>	<b>0.50</b>
TPP01B	<b>0.42</b>	<b>0.45</b>	0.21	<b>0.54</b>	<b>0.49</b>	<b>0.46</b>	<b>0.54</b>	<b>0.61</b>	<b>0.63</b>	<b>0.59</b>	<b>0.57</b>	<b>0.52</b>	<b>0.54</b>	<b>0.55</b>
TPP04B	<b>0.36</b>	0.31	0.21	<b>0.54</b>	<b>0.64</b>	<b>0.41</b>	<b>0.50</b>	<b>0.55</b>	<b>0.37</b>	<b>0.44</b>	<b>0.44</b>			
TPP06B	<i>0.25</i>	0.24	0.12	<b>0.38</b>	<b>0.33</b>	<b>0.33</b>	<b>0.50</b>	<b>0.51</b>	<b>0.59</b>	<b>0.62</b>	<b>0.49</b>	<b>0.47</b>	<b>0.56</b>	<b>0.57</b>
UPP03B		<b>0.52</b>	<b>0.45</b>	<b>0.38</b>	<i>0.30</i>	<b>0.35</b>	<b>0.50</b>	<b>0.53</b>	<b>0.59</b>	<b>0.63</b>	<b>0.66</b>	<b>0.63</b>	<b>0.58</b>	<b>0.62</b>
TPP08A		<b>0.39</b>	<b>0.33</b>	<b>0.45</b>	<b>0.50</b>	<b>0.59</b>	<b>0.62</b>	<b>0.56</b>	<b>0.57</b>	<b>0.59</b>	<b>0.63</b>	<b>0.45</b>	<b>0.35</b>	<b>0.41</b>
TPP08B		0.24	<b>0.33</b>	<b>0.48</b>	<b>0.42</b>	<b>0.34</b>	<b>0.35</b>	<b>0.38</b>	<b>0.67</b>	<b>0.75</b>	<b>0.55</b>	<b>0.35</b>	<b>0.55</b>	<b>0.49</b>
TPP10A		0.27	<b>0.40</b>	<b>0.51</b>	<b>0.43</b>	0.30	<b>0.41</b>	<b>0.48</b>	<b>0.60</b>	<b>0.69</b>	<b>0.61</b>	<b>0.58</b>	<b>0.48</b>	<b>0.45</b>
TPP04A			<b>0.43</b>	<b>0.55</b>	<b>0.52</b>	<b>0.42</b>	<b>0.58</b>	<b>0.54</b>	<b>0.47</b>	<b>0.57</b>	<b>0.67</b>	<b>0.37</b>	<i>0.20</i>	0.18
TPP10B			<b>0.43</b>	<b>0.43</b>	<b>0.52</b>	<b>0.63</b>	<b>0.69</b>	<b>0.63</b>	<b>0.61</b>	<b>0.59</b>	<b>0.61</b>	<b>0.62</b>	<b>0.62</b>	<b>0.61</b>
UPP08A			<b>0.57</b>	<b>0.60</b>	<b>0.53</b>	<b>0.48</b>	<b>0.57</b>	<b>0.59</b>	<b>0.49</b>	<b>0.64</b>	<b>0.60</b>	<b>0.60</b>	<b>0.72</b>	<b>0.78</b>
UPP03A				<b>0.34</b>	<i>0.23</i>	<b>0.38</b>	<b>0.48</b>	<b>0.41</b>	<b>0.63</b>	<b>0.68</b>	<b>0.64</b>	<b>0.62</b>	<b>0.71</b>	<b>0.69</b>
UPP08B				<b>0.57</b>	<b>0.55</b>	<b>0.50</b>	<b>0.55</b>	<b>0.59</b>	<b>0.67</b>	<b>0.78</b>	<b>0.76</b>	<b>0.65</b>	<b>0.40</b>	<i>0.30</i>
UPP07A				<b>0.51</b>	<b>0.44</b>	<b>0.42</b>	<b>0.67</b>	<b>0.63</b>	<b>0.56</b>	<b>0.53</b>	<b>0.52</b>	<b>0.58</b>	<b>0.59</b>	<b>0.61</b>
TPP06A					<b>0.48</b>	<b>0.44</b>	<b>0.50</b>	<b>0.51</b>	<b>0.69</b>	<b>0.61</b>	<b>0.46</b>	<b>0.58</b>	<b>0.64</b>	<b>0.72</b>
TPP05A						<i>0.29</i>	<b>0.43</b>	<b>0.51</b>	<b>0.65</b>	<b>0.77</b>	<b>0.66</b>	<b>0.50</b>	<b>0.55</b>	<b>0.68</b>
TPP09A						<b>0.37</b>	<b>0.41</b>	<b>0.40</b>	<b>0.64</b>	<b>0.76</b>	<b>0.63</b>	<b>0.62</b>	<b>0.67</b>	<b>0.60</b>
TPP09B						<b>0.65</b>	<b>0.59</b>	<b>0.53</b>	<b>0.74</b>	<b>0.81</b>	<b>0.70</b>	<b>0.64</b>	<b>0.66</b>	<b>0.69</b>
TPP05B							<b>0.72</b>	<b>0.66</b>	<b>0.39</b>	<b>0.38</b>	<b>0.40</b>	<b>0.47</b>	<b>0.57</b>	<b>0.64</b>
TPP07A							<b>0.43</b>	<b>0.13</b>	<b>0.47</b>	<b>0.75</b>	<b>0.72</b>	<b>0.58</b>	<b>0.43</b>	<b>0.55</b>
TPP07B							<b>0.62</b>	<b>0.61</b>	<b>0.61</b>	<b>0.74</b>	<b>0.84</b>	<b>0.67</b>	<b>0.65</b>	<b>0.74</b>
UPP10B							<b>0.39</b>	<b>0.33</b>	<i>0.29</i>	<b>0.36</b>	<b>0.45</b>	<b>0.43</b>	<b>0.42</b>	<b>0.47</b>
UPP02B							<b>0.61</b>	<b>0.64</b>	<b>0.55</b>	<b>0.67</b>	<b>0.60</b>	<b>0.50</b>	<b>0.53</b>	<b>0.55</b>
TPP03A								<b>0.41</b>	<b>0.61</b>	<b>0.47</b>	<b>0.49</b>	<b>0.61</b>	<b>0.46</b>	<b>0.56</b>
TPP03B								<b>0.43</b>	<b>0.53</b>	<b>0.47</b>	<b>0.40</b>	<i>0.31</i>	<i>0.22</i>	<b>0.40</b>
UPP10A								<b>0.35</b>	<i>0.26</i>	<b>0.58</b>	<b>0.70</b>	<b>0.43</b>	0.23	<i>0.33</i>
UPP02A								<b>0.50</b>	<b>0.40</b>	<b>0.56</b>	<b>0.50</b>	<b>0.46</b>	<b>0.49</b>	<b>0.50</b>
UPP05B								<b>0.49</b>	<b>0.63</b>	<b>0.77</b>	<b>0.77</b>	<b>0.60</b>	<b>0.51</b>	<b>0.63</b>
UPP01A									<b>0.53</b>	<b>0.61</b>	<b>0.52</b>	<b>0.52</b>	<b>0.61</b>	<b>0.55</b>
UPP01B									<b>0.40</b>	<b>0.56</b>	<b>0.62</b>	<b>0.63</b>	<b>0.59</b>	<b>0.64</b>
UPP04B									<b>0.54</b>	<b>0.59</b>	<b>0.55</b>	<b>0.52</b>	<b>0.54</b>	<b>0.57</b>
UPP05A										<b>0.82</b>	<b>0.75</b>	<b>0.66</b>	<b>0.58</b>	<b>0.68</b>
UPP04A										<b>0.55</b>	<b>0.56</b>	<b>0.57</b>	<b>0.67</b>	<b>0.61</b>
UPP06A											<i>0.27</i>	<i>0.33</i>	<b>0.47</b>	<b>0.58</b>
UPP06B											<b>0.46</b>	<b>0.40</b>	<b>0.48</b>	<b>0.43</b>
Average	0.36	0.35	0.37	0.48	0.46	0.43	0.52	0.49	0.54	0.62	0.58	0.53	0.52	0.55

Supplementary Table 4 – Correlation coefficient matrix for Douglas-fir from the program COFECHA (Holmes 1983) comparing 50-year segments (lagged 25 years) with the chronology generated from the remaining series (Grissino-Mayer 2001). All bolded coefficients are statistically significant ( $p < 0.01$ ).

Series	Fifty-year tested segments (italicized correlations are flagged segments)										
	1725 to 1774	1750 to 1799	1775 to 1824	1800 to 1849	1825 to 1874	1850 to 1899	1875 to 1924	1900 to 1949	1925 to 1974	1950 to 1999	1975 to 2024
TDF05A	0.05	<b>0.46</b>	<b>0.63</b>	<b>0.61</b>	<b>0.45</b>	<b>0.43</b>	<b>0.72</b>	<b>0.74</b>	<b>0.68</b>	<b>0.59</b>	<b>0.58</b>
UDF11A	0.24	<b>0.40</b>	<b>0.56</b>	<b>0.69</b>	<b>0.74</b>	<b>0.67</b>	<b>0.71</b>	<b>0.61</b>	<b>0.54</b>	<b>0.73</b>	<b>0.69</b>
UDF03A	0.13	<b>0.51</b>	<b>0.74</b>	<b>0.85</b>	<b>0.79</b>	<b>0.58</b>	<b>0.68</b>	<b>0.77</b>	<b>0.67</b>	<b>0.65</b>	<b>0.67</b>
UDF08B	<i>0.25</i>	0.22	<i>0.29</i>	<b>0.53</b>	<b>0.53</b>	<b>0.55</b>	<b>0.74</b>	<b>0.75</b>	<b>0.67</b>	<b>0.78</b>	<b>0.75</b>
TDF05B		<b>0.51</b>	<b>0.72</b>	<b>0.68</b>	<b>0.42</b>	<b>0.57</b>	<b>0.70</b>	<b>0.64</b>	<b>0.54</b>	<b>0.63</b>	<b>0.63</b>
UDF09B		0.14	<i>0.31</i>	<b>0.42</b>	<b>0.57</b>	<b>0.38</b>	<b>0.52</b>	<b>0.51</b>	<b>0.42</b>	<b>0.55</b>	<b>0.59</b>
UDF08A		<b>0.55</b>	<b>0.71</b>	<b>0.67</b>	<b>0.57</b>	<b>0.59</b>	<b>0.68</b>	<b>0.75</b>	<b>0.66</b>	<b>0.73</b>	<b>0.72</b>
UDF11B		<b>0.60</b>	<b>0.65</b>	<b>0.75</b>	<b>0.70</b>	<b>0.61</b>	<b>0.66</b>	<b>0.61</b>	<b>0.52</b>	<b>0.66</b>	<b>0.65</b>
UDF02B		<b>0.59</b>	<b>0.56</b>	<b>0.71</b>	<b>0.51</b>	<b>0.58</b>	<b>0.74</b>	<b>0.58</b>	<b>0.51</b>	<b>0.79</b>	<b>0.77</b>
TDF06B			<b>0.50</b>	<b>0.47</b>	<b>0.50</b>	<b>0.66</b>	<b>0.80</b>	<b>0.81</b>	<b>0.55</b>	<b>0.56</b>	<b>0.69</b>
UDF03B			<i>0.26</i>	<i>0.27</i>	<b>0.44</b>	<b>0.57</b>	<b>0.61</b>	<b>0.77</b>	<b>0.79</b>	<b>0.81</b>	<b>0.83</b>
UDF09A			<b>0.44</b>	<b>0.36</b>	<b>0.37</b>	<b>0.69</b>	<b>0.69</b>	<b>0.64</b>	<b>0.56</b>	<b>0.58</b>	<b>0.66</b>
UDF04A				<b>0.65</b>	<b>0.58</b>	<b>0.57</b>	<b>0.70</b>	<b>0.75</b>	<b>0.50</b>	<b>0.56</b>	<b>0.50</b>
UDF04B				<b>0.40</b>	<b>0.41</b>	<b>0.56</b>	<b>0.65</b>	<b>0.53</b>	<i>0.32</i>	<b>0.41</b>	<i>0.28</i>
UDF02A				<b>0.49</b>	<b>0.52</b>	<b>0.50</b>	<b>0.77</b>	<b>0.58</b>	<b>0.40</b>	<b>0.60</b>	<b>0.66</b>
UDF01A				<b>0.69</b>	<b>0.70</b>	<b>0.61</b>	<b>0.73</b>	<b>0.79</b>	<b>0.68</b>	<b>0.73</b>	<b>0.71</b>
UDF07A				<b>0.46</b>	<b>0.57</b>	<b>0.53</b>	<b>0.59</b>	<b>0.64</b>	<b>0.69</b>	<b>0.73</b>	<b>0.71</b>
TDF03A					<b>0.54</b>	<b>0.53</b>	<b>0.50</b>	<b>0.65</b>	<b>0.68</b>	<b>0.62</b>	<b>0.61</b>
TDF03B					<b>0.74</b>	<b>0.68</b>	<b>0.65</b>	<b>0.73</b>	<b>0.64</b>	<b>0.59</b>	<b>0.59</b>
TDF06C					<b>0.34</b>	<b>0.54</b>	<b>0.68</b>	<b>0.58</b>	<b>0.58</b>	<b>0.66</b>	<b>0.69</b>
TDF07A					<b>0.44</b>	<b>0.52</b>	<b>0.55</b>	<b>0.52</b>	<b>0.57</b>	<b>0.60</b>	<b>0.63</b>
TDF07B					<b>0.35</b>	<b>0.51</b>	<b>0.71</b>	<b>0.68</b>	<b>0.56</b>	<b>0.69</b>	<b>0.72</b>
TDF10B					<b>0.55</b>	<b>0.56</b>	<b>0.62</b>	<b>0.45</b>	0.22	<i>0.28</i>	<i>0.33</i>
UDF01B					<b>0.56</b>	<b>0.56</b>	<b>0.73</b>	<b>0.73</b>	<b>0.64</b>	<b>0.73</b>	<b>0.73</b>
UDF07B					<b>0.56</b>	<b>0.54</b>	<b>0.55</b>	<b>0.51</b>	<b>0.59</b>	<b>0.62</b>	<b>0.60</b>
UDF10A					<b>0.49</b>	<b>0.51</b>	<b>0.69</b>	<b>0.70</b>	<b>0.48</b>	<b>0.58</b>	<b>0.57</b>
TDF01A						<b>0.69</b>	<b>0.69</b>	<b>0.73</b>	<b>0.72</b>	<b>0.70</b>	<b>0.70</b>
TDF01B						<b>0.73</b>	<b>0.75</b>	<b>0.72</b>	<b>0.63</b>	<b>0.76</b>	<b>0.77</b>
TDF02A						<b>0.70</b>	<b>0.70</b>	<b>0.70</b>	<b>0.61</b>	<b>0.70</b>	<b>0.71</b>
TDF02B						<b>0.61</b>	<b>0.73</b>	<b>0.73</b>	<b>0.62</b>	<b>0.54</b>	<b>0.52</b>
TDF06A						<b>0.63</b>	<b>0.74</b>	<b>0.77</b>	<b>0.69</b>	<b>0.76</b>	<b>0.79</b>
TDF07B						<b>0.35</b>	<b>0.46</b>	<b>0.69</b>	<b>0.70</b>	<b>0.67</b>	<b>0.65</b>
TDF08A						<b>0.70</b>	<b>0.75</b>	<b>0.72</b>	<b>0.66</b>	<b>0.73</b>	<b>0.72</b>
TDF09A						<b>0.62</b>	<b>0.60</b>	<b>0.48</b>	<b>0.53</b>	<b>0.74</b>	<b>0.70</b>
TDF09B						<b>0.60</b>	<b>0.61</b>	<b>0.59</b>	<b>0.52</b>	<b>0.61</b>	<b>0.63</b>
UDF10B						<b>0.70</b>	<b>0.72</b>	<b>0.59</b>	<b>0.57</b>	<b>0.67</b>	<b>0.66</b>
UDF12A						<b>0.64</b>	<b>0.67</b>	<b>0.66</b>	<b>0.58</b>	<b>0.60</b>	<b>0.63</b>
UDF12B							<b>0.48</b>	<b>0.50</b>	<b>0.38</b>	<b>0.42</b>	<b>0.38</b>
TDF11A								<b>0.64</b>	<b>0.68</b>	<b>0.75</b>	<b>0.74</b>
Average	0.30	0.17	0.45	0.53	0.57	0.54	0.58	0.66	0.65	0.58	0.64

Supplementary Table 5. Correlations of Palmer Drought Severity Index (PDSI), temperature and precipitation with ring width index. Correlations are significant ( $p < 0.05$ ) at  $r = 0.19$ ,  $n = 111$  observations for all correlations.

	PDSI		Precipitation		Temperature	
	ponderosa	Douglas-fir	ponderosa	Douglas-fir	ponderosa	Douglas-fir
May prev	0.32	0.36	0.20	0.05	-0.20	0.02
Jun prev	0.31	0.45	0.09	0.37	-0.10	-0.26
Jul prev	0.29	0.45	0.06	0.16	-0.12	-0.29
Aug prev	0.33	0.43	0.23	0.08	-0.18	-0.23
Sep prev	0.41	0.42	0.25	0.08	-0.18	-0.12
Oct prev	0.32	0.43	0.07	0.22	0.19	0.05
Nov prev	0.29	0.42	0.08	0.20	0.14	0.16
Dec prev	0.26	0.34	0.04	0.00	0.23	0.12
Jan	0.20	0.35	-0.09	0.09	0.02	-0.07
Feb	0.22	0.35	0.08	0.13	0.01	-0.06
Mar	0.19	0.25	0.07	-0.03	0.01	-0.08
Apr	0.11	0.22	-0.08	-0.01	0.08	0.08
May	0.24	0.31	0.21	0.14	-0.04	0.00
Jun	0.30	0.41	0.13	0.29	-0.22	-0.33
Jul	0.30	0.37	0.15	-0.01	-0.26	-0.23
Aug	0.26	0.29	-0.04	-0.17	0.03	-0.06
Sep	0.29	0.30	0.11	0.07	-0.05	-0.07
Oct	0.20	0.31	0.04	0.13	0.07	-0.01
Nov	0.21	0.29	0.11	0.13	0.08	0.04
Dec	0.15	0.23	-0.07	-0.04	-0.03	-0.13