**Table 1.** Characteristics of sampled plot. Lat = latitude; Long = longitude. Dbh and height of all trees, Basal Area (BA), Density and SRD (Size ratio proportional to distance) are computed for all trees within a 10-m radius of focal trees (see methods). Temp.: annual average of mean monthly minimun and maximum temperatures. Values shown here correspond to site averages. Standard deviations are shown in parentheses. Different letters indicate statistically significant differences between sites (Kruskal-Wallis test followed by Dunn’s test, p<0.05). Stands were monospecific, hence all results correspond to oak data.

|  |  |  |  |  |  |  | ***Cored trees*** | | | | ***Stand competition*** | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Site** | **Lat (°)** | **Long (°)** | **Elevation (m)** | **Slope (°)** | **Prec. (mm)** | **Temp. (° C)** | **# trees (# cores)** | **Dbh (cm)** | **Height (m)** | **Age (years)** | **Dbh all (cm)** | **Height all (m)** | **BA (m**2 **ha**-1**)** | **Density (trees ha**-1**)** | **SRD** |
| CA-High | 36.97 | -3.42 | 1846 - 1884 | 12.11 (3.28) | 731 | 3.4-13.8 | 15 (30) | 69.8 (20.5) a | 15.4 (1.8) a | 161.0 (32.2) a | 34.1 (24.3) a | 10.8 (4.4) a | 39.13 (24.31) a | 348.0 (147.1) a | 0.91 (0.63) a |
| CA-Low | 36.96 | -3.42 | 1691 - 1751 | 12.86 (2.98) | 658 | 4.7-15.6 | 15 (30) | 45.9 (8.6) a | 12.6 (1.6) b | 148.5 (16.5) a | 21.7 (14.4) b | 9.0 (2.8) b | 18.02 (7.11) ab | 409.6 (226.0) a | 0.89 (0.44) a |
| SJ | 37.13 | -3.37 | 1322 - 1474 | 27.33 (5.59) | 555 | 4.9-16.35 | 20 (48) | 31.9 (3.7) b | 11.8 (2.3) b | 72.6 (11.1) b | 20.6 (8.1) b | 9.7 (3.6) ab | 11.64 (5.47) b | 339.0 (130.3) a | 1.11 (0.52) a |

##### 

**Table 2.** Characteristics of the mean tree ring chronologies. Values of length between parentheses indicate number of years replicated with more than five series. RW = mean annual ring width (standard deviation in parenthesis). MS = mean sensitivity. AR(1) = mean autocorrelation of raw series. Rbt = mean correlation between series. EPS = mean expressed population signal. EPS and Rbt were calculated for the mean residual chronologies of growth indices.

| **Site** | **First year** | **Last year** | **Length (years)** | **# trees** | **# cores** | **RW (mm)** | **MS** | **AR(1)** | **Rbt** | **EPS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA-Low | 1836 | 2016 | 181 (164) | 15 | 30 | 1.253 (0.781) | 0.208 | 0.799 | 0.520 | 0.897 |
| CA-High | 1819 | 2016 | 198 (188) | 15 | 30 | 1.500 (0.879) | 0.203 | 0.827 | 0.522 | 0.907 |
| SJ | 1921 | 2016 | 96 (90) | 20 | 48 | 1.725 (1.207) | 0.319 | 0.692 | 0.637 | 0.959 |

##### 

**Table 3.** Robust two-way ANOVAs of the resilience metrics of greenness (EVI) and tree-growth (BAI) for the two drought events (in 2005 and 2012) and site.

|  |  |  | **Resistance** | |  | **Recovery** | |  | **Resilience** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Factor** |  | **F** | **p** |  | **F** | **p** |  | **F** | **p** |
| EVI | Drought event |  | 799.900 | *< 0.001* |  | 312.000 | *< 0.001* |  | 207.200 | *< 0.001* |
| Site |  | 153.200 | *< 0.001* |  | 105.400 | *< 0.001* |  | 29.800 | *< 0.001* |
| Drought event:Site |  | 234.700 | *< 0.001* |  | 364.300 | *< 0.001* |  | 6.100 | 0.014 |
| BAI | Drought event |  | 6.000 | 0.019 |  | 29.500 | *< 0.001* |  | 44.300 | *< 0.001* |
| Site |  | 59.300 | *< 0.001* |  | 53.100 | *< 0.001* |  | 1.300 | 0.534 |
| Drought event\*Site |  | 32.200 | *< 0.001* |  | 4.400 | 0.134 |  | 30.000 | *< 0.001* |

##### 

**Table S1.** Robust measures of central tendency of resilience indices for greenness (EVI) grouped by drought events, site and interaction. Measures of central tendency are M-estimators based on Huber’s Psi (see material and methods). 95 % confidence intervals using 3000 bootstrap are included between parentheses. *Total* corresponds to the average of 2005 and 2012.

|  |  | **2005** | | |  | **2012** | | |  | **Total** | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Oak populations** |  | **Resistance** | **Recovery** | **Resilience** |  | **Resistance** | **Recovery** | **Resilience** |  | **Resistance** | **Recovery** | **Resilience** |
| *Northern slope* |  | 0.819 | 1.169 | 0.955 |  | 0.947 | 1.042 | 0.986 |  | 0.884 | 1.102 | 0.970 |
|  | (0.814 - 0.824) | (1.161 - 1.177) | (0.951 - 0.960) |  | (0.942 - 0.952) | (1.036 - 1.047) | (0.980 - 0.990) |  | (0.878 - 0.889) | (1.096 - 1.108) | (0.967 - 0.974) |
| *Southern slope* |  | 0.902 | 1.066 | 0.962 |  | 0.939 | 1.071 | 1.004 |  | 0.921 | 1.069 | 0.983 |
|  | (0.896 - 0.907) | (1.058 - 1.074) | (0.957 - 0.966) |  | (0.934 - 0.944) | (1.067 - 1.075) | (1.000 - 1.008) |  | (0.917 - 0.925) | (1.065 - 1.073) | (0.980 - 0.986) |
| *All* |  | 0.858 | 1.120 | 0.958 |  | 0.943 | 1.057 | 0.995 |  |  |  |  |
|  | (0.854 - 0.863) | (1.113 - 1.126) | (0.955 - 0.962) |  | (0.940 - 0.947) | (1.054 - 1.060) | (0.991 - 0.998) |  |  |  |  |

##### 

**Table S2.** Robust measures of central tendency of resilience indices for tree-growth (BAI) grouped by drought events, site and interaction. Measures of central tendency are M-estimators based on Huber’s Psi (see material and methods). 95 % confidence intervals using 3000 bootstrap are included between parentheses. *Total* corresponds to the average of 2005 and 2012.

|  |  | **2005** | | |  | **2012** | | |  | **Total** | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sites** |  | **Resistance** | **Recovery** | **Resilience** |  | **Resistance** | **Recovery** | **Resilience** |  | **Resistance** | **Recovery** | **Resilience** |
| *CA-High* |  | 0.892 | 0.887 | 0.790 |  | 0.753 | 1.107 | 0.813 |  | 0.816 | 0.996 | 0.798 |
|  | ( 0.809 - 0.975) | ( 0.800 - 0.973) | ( 0.691 - 0.888) |  | ( 0.686 - 0.820) | ( 1.026 - 1.188) | ( 0.741 - 0.885) |  | ( 0.755 - 0.876) | ( 0.917 - 1.075) | ( 0.744 - 0.851) |
| *CA-Low* |  | 0.901 | 0.832 | 0.730 |  | 0.926 | 0.952 | 0.876 |  | 0.921 | 0.897 | 0.817 |
|  | ( 0.813 - 0.989) | ( 0.733 - 0.932) | ( 0.612 - 0.849) |  | ( 0.900 - 0.953) | ( 0.889 - 1.015) | ( 0.839 - 0.913) |  | ( 0.883 - 0.958) | ( 0.843 - 0.951) | ( 0.755 - 0.879) |
| *SJ* |  | 0.445 | 1.112 | 0.489 |  | 0.769 | 1.446 | 1.031 |  | 0.612 | 1.282 | 0.769 |
|  | ( 0.375 - 0.516) | ( 1.000 - 1.224) | ( 0.421 - 0.556) |  | ( 0.684 - 0.853) | ( 1.322 - 1.569) | ( 0.930 - 1.132) |  | ( 0.539 - 0.685) | ( 1.179 - 1.386) | ( 0.652 - 0.886) |
| *All* |  | 0.721 | 0.946 | 0.653 |  | 0.819 | 1.161 | 0.911 |  |  |  |  |
|  | ( 0.644 - 0.798) | ( 0.879 - 1.013) | ( 0.585 - 0.721) |  | ( 0.776 - 0.863) | ( 1.081 - 1.240) | ( 0.865 - 0.957) |  |  |  |  |

##### 

**Table S3.** Drought events for the 1901-2016 period for Sierra Nevada ranked according to drought severity calculated from the SPEI index (12 months scale). See methods for details.

| **Duration  (months)** | **Intensity** | **Severity** | **Lowest  SPEI** | **Months** | **Year** |
| --- | --- | --- | --- | --- | --- |
| 11 | -1.957 | 21.524 | -2.585 | Jan - Nov | 1995 |
| 11 | -1.581 | 17.392 | -2.024 | Nov - Sep | 1913-1914 |
| 9 | -1.823 | 16.409 | -2.427 | May - Jan | 1945-1946 |
| 9 | -1.764 | 15.880 | -2.056 | Dec - Aug | 1998-1999 |
| 8 | -1.482 | 11.859 | -1.654 | Feb - Sep | 1983 |
| 6 | -1.728 | 10.367 | -1.906 | Mar - Aug | 2012 |
| 5 | -1.905 | 9.527 | -2.300 | Jan - May | 1925 |
| 5 | -1.522 | 7.611 | -1.571 | May - Sep | 2005 |
| 5 | -1.493 | 7.463 | -1.537 | May - Sep | 1985 |
| 5 | -1.385 | 6.926 | -1.444 | Apr - Aug | 1991 |
| 4 | -1.714 | 6.855 | -1.833 | May - Aug | 1931 |
| 4 | -1.363 | 5.453 | -1.441 | May - Aug | 1927 |

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