**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 Material and 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. Length values in parentheses indicate the 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 | 0.5200625 | 0.897 |
| CA-High | 1819 | 2016 | 198 (188) | 15 | 30 | 1.500 (0.879) | 0.203 | 0.827 | 0.5222143 | 0.907 |
| SJ | 1921 | 2016 | 96 (90) | 20 | 48 | 1.725 (1.207) | 0.319 | 0.692 | 0.6365208 | 0.959 |

**Table S1.** 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 |  | 799.9 | *< 0.001* |  | 312.0 | *< 0.001* |  | 207.2 | *< 0.001* |
| Site |  | 153.2 | *< 0.001* |  | 105.4 | *< 0.001* |  | 29.8 | *< 0.001* |
| Drought event:Site |  | 234.7 | *< 0.001* |  | 364.3 | *< 0.001* |  | 6.1 | 0.014 |
| BAI | Drought event |  | 6.0 | 0.019 |  | 29.5 | *< 0.001* |  | 44.3 | *< 0.001* |
| Site |  | 59.3 | *< 0.001* |  | 53.1 | *< 0.001* |  | 1.3 | 0.534 |
| Drought event\*Site |  | 32.2 | *< 0.001* |  | 4.4 | 0.134 |  | 30.0 | *< 0.001* |

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**Table S2.** Robust measures of central tendency of resilience indices for greenness (EVI) and 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).In parentheses are the 95% confidence intervals using 3000 bootstraps. *Total* corresponds to the average of 2005 and 2012.

|  |  |  | **2005** | | | | **2012** | | |  | **Total** | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Sites** |  | **Resistance** | **Recovery** | **Resilience** |  | **Resistance** | **Recovery** | **Resilience** |  | **Resistance** | **Recovery** | **Resilience** |
| ***EVI*** | *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) |  |  |  |  |
| ***BAI*** | *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 Material and methods for details.

| **Duration  (months)** | **Intensity** | **Severity** | **Lowest  SPEI** | **Months** | **Year** |
| --- | --- | --- | --- | --- | --- |
| 11 | -1.956698 | 21.523675 | -2.584560 | Jan - Nov | 1995 |
| 11 | -1.581066 | 17.391722 | -2.024293 | Nov - Sep | 1913-1914 |
| 9 | -1.823176 | 16.408580 | -2.426940 | May - Jan | 1945-1946 |
| 9 | -1.764423 | 15.879810 | -2.056112 | Dec - Aug | 1998-1999 |
| 8 | -1.482431 | 11.859452 | -1.654098 | Feb - Sep | 1983 |
| 6 | -1.727906 | 10.367437 | -1.905962 | Mar - Aug | 2012 |
| 5 | -1.905323 | 9.526613 | -2.299627 | Jan - May | 1925 |
| 5 | -1.522194 | 7.610968 | -1.570877 | May - Sep | 2005 |
| 5 | -1.492554 | 7.462772 | -1.537452 | May - Sep | 1985 |
| 5 | -1.385205 | 6.926027 | -1.443902 | Apr - Aug | 1991 |
| 4 | -1.713627 | 6.854507 | -1.832637 | May - Aug | 1931 |
| 4 | -1.363374 | 5.453497 | -1.440673 | May - Aug | 1927 |

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