Percolla MI, Fickle JC, Rodriguez-Zaccaro FD, Pratt RB, Jacobsen AL. Hydraulic function and conduit structure in the xylem of five oak species. IAWA J.

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Table S1. Soil analyses results from samples collected within study sites along an elevational transect in the southern Sierra Nevada Mountains.

Site	Texture	pH	Salinity (dS/m)	P (mg/kg)	K (mg/kg)	N (mg/kg)	Zn (mg/kg)	Fe (mg/kg)	Cu (mg/kg)	Mn (mg/kg)	S (mg/kg)	Organic matter (%)
1	Loam/Sandy loam	6.10	0.31	22.87	269.37	4.60	0.89	18.10	0.60	11.16	1.40	1.90
2	Loam	6.37	0.37	16.16	261.33	3.27	1.53	45.13	0.80	30.73	2.50	5.13
3	Loamy sand/Loam	5.47	0.17	14.70	168.33	0.93	2.59	40.00	0.45	13.83	1.13	4.87
4	Loam	6.43	0.26	31.33	283.33	0.72	1.73	29.57	0.72	5.49	1.30	6.10
5	Loam/Organic matter	6.13	0.23	66.83	265.00	5.00	1.72	38.30	0.44	5.19	3.33	10.07

Percolla MI, Fickle JC, Rodriguez-Zaccaro FD, Pratt RB, Jacobsen AL. Hydraulic function and conduit structure in the xylem of five oak species. IAWA J.

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Table S2. The mean area of a leaf for five oak (*Quercus*) species from high and low elevation sites for each species along a transect in the southern Sierra Nevada Mountains of California, USA. Comparisons between high and low sites for a species are presented (Dist.), with n.s. indicating no difference and * indicating a difference ($P < 0.05$) between high and low sites. Results are also reported for a comparison of species values (Spp.), with different letters indicate significant differences among species.

Species	Dist.	N	Mean leaf area (cm^2)	Dist.	Spp.
Q. chrysolepis	High	6	4.09 ± 0.53	n.s.	B
	Low	6	4.24 ± 0.76		
Q. douglasii	High	6	7.68 ± 3.03	n.s.	B
	Low	6	3.31 ± 0.47		
Q. garryana	High	6	5.38 ± 0.44	*	B
	Low	6	10.03 ± 1.26		
Q. kelloggii	High	6	40.81 ± 3.38	*	A
	Low	6	21.85 ± 2.43		
Q. wislizeni	High	6	2.37 ± 0.19	n.s.	B
	Low	6	2.02 ± 0.37		

Percolla MI, Fickle JC, Rodriguez-Zaccaro FD, Pratt RB, Jacobsen AL. Hydraulic function and conduit structure in the xylem of five oak species. IAWA J.

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Table S3. Correlation matrix showing the Pearson correlation coefficient above and the P-value below for all functional and structural traits measured in the present study. Values in bold indicate significant correlations.

	P_{50}	P_{90}	K_s	K_{leaf}	SLA	Vessel element (%)	Tracheid (%)	Fiber (%)	Mean vessel lumen diameter	Maximum vessel lumen diameter	Mean vessel length	Pit membrane area	Tracheid diameter
P_{90}	**0.975** **<0.001**												
K_s	**0.728** **0.017**	**0.683** **0.029**											
K_{leaf}	0.115 0.753	0.037 0.918	0.130 0.720										
SLA	**0.700** **0.024**	**0.722** **0.019**	**0.783** **0.007**	0.092 0.801									
Vessel element (%)	0.384 0.273	0.382 0.276	**0.663** **0.037**	-0.043 0.907	**0.730** **0.016**								
Tracheid (%)	0.071 0.846	0.133 0.714	0.281 0.431	-0.465 0.175	0.557 0.095	0.607 0.063							
Fiber (%)	-0.128 0.725	-0.183 0.613	-0.362 0.304	0.421 0.226	-0.618 0.057	**-0.708** **0.022**	**-0.991** **<0.001**						
Mean vessel lumen diameter	**0.713** **0.021**	**0.753** **0.012**	**0.718** **0.019**	0.190 0.600	**0.969** **<0.001**	**0.673** **0.033**	0.412 0.237	-0.480 0.160					
Maximum vessel lumen diameter	**0.731** **0.016**	**0.758** **0.011**	**0.776** **0.008**	0.181 0.617	**0.983** **<0.001**	**0.679** **0.031**	0.415 0.233	-0.484 0.157	**0.985** **<0.001**				
Mean vessel length	-0.174 0.630	-0.139 0.702	-0.415 0.233	-0.475 0.165	**-0.645** **0.044**	-0.337 0.341	-0.233 0.518	0.264 0.462	-0.619 0.056	**-0.658** **0.039**			
Pit membrane area	0.130 0.720	0.067 0.854	-0.119 0.743	0.121 0.739	-0.466 0.174	-0.560 0.092	**-0.840** **0.002**	**0.841** **0.002**	-0.390 0.266	-0.356 0.312	0.284 0.426		
Tracheid diameter	0.156 0.668	0.123 0.735	0.450 0.192	0.476 0.165	0.405 0.246	-0.027 0.941	0.085 0.816	-0.071 0.846	0.348 0.324	0.412 0.237	**-0.765** **0.010**	-0.062 0.865	
Tracheid length	-0.582 0.077	-0.582 0.078	-0.177 0.625	-0.531 0.115	-0.478 0.163	-0.305 0.392	-0.014 0.970	0.064 0.861	-0.583 0.077	-0.518 0.125	0.235 0.513	0.193 0.594	0.024 0.949

SUPPLEMENTAL ONLINE MATERIAL

Supplemental Online Material Figure S1

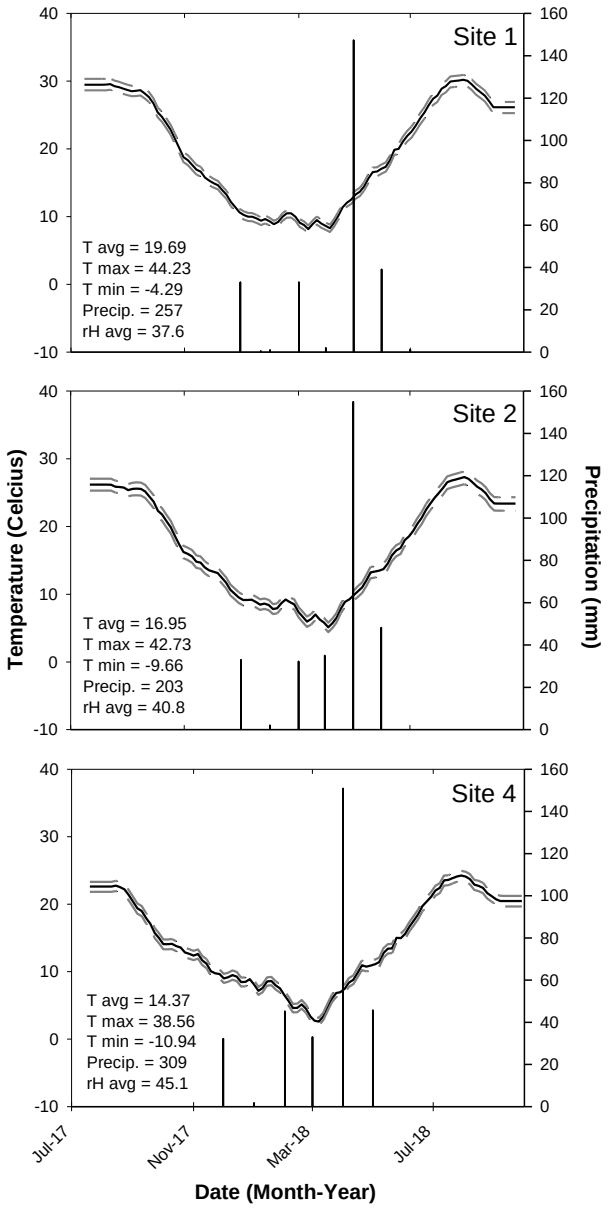

Figure S1. Weather data from the studied period from three sites along the experimental transect in the southern Sierra Nevada, California, USA. The lines around the mean temperature are standard deviations. Selected climate parameters from the study period are included in the lower left corner of each panel.

Percolla MI, Fickle JC, Rodriguez-Zaccaro FD, Pratt RB, Jacobsen AL. Hydraulic function and conduit structure in the xylem of five oak species. IAWA J.

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Supplemental Online Material Figure S2

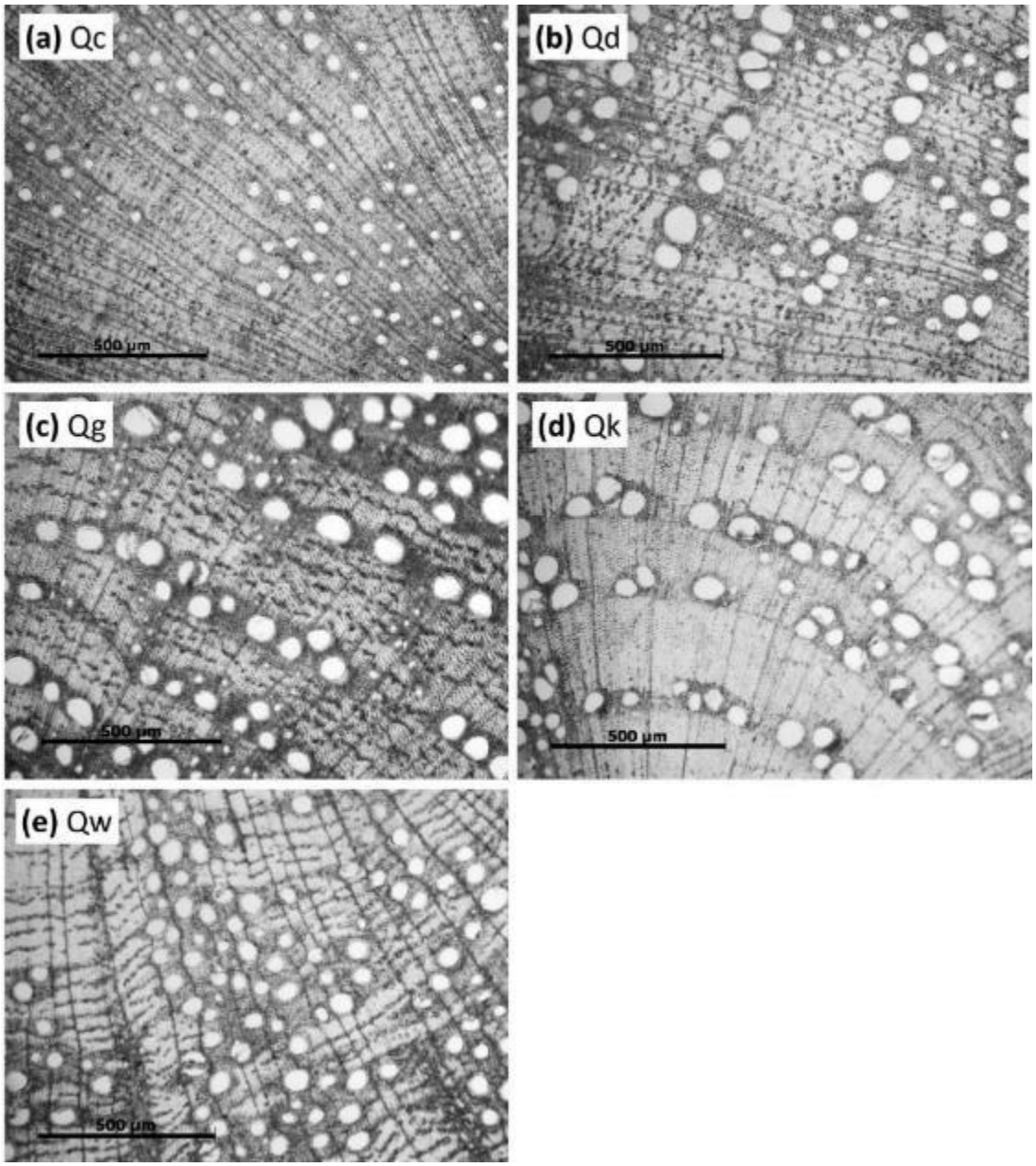

Figure S2. Representative micrographs of stem cross sections for five oak (*Quercus*) species: *Q. chrysolepis* (Qc), *Q. douglassii* (Qd), *Q. garryana* (Qg), *Q. kelloggii* (Qk), and *Q. wislizeni* (Qw). The scale bar in each panel is 500 micrometers in length.

Percolla MI, Fickle JC, Rodriguez-Zaccaro FD, Pratt RB, Jacobsen AL. Hydraulic function and conduit structure in the xylem of five oak species. IAWA J.

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Supplemental Online Material Figure S3

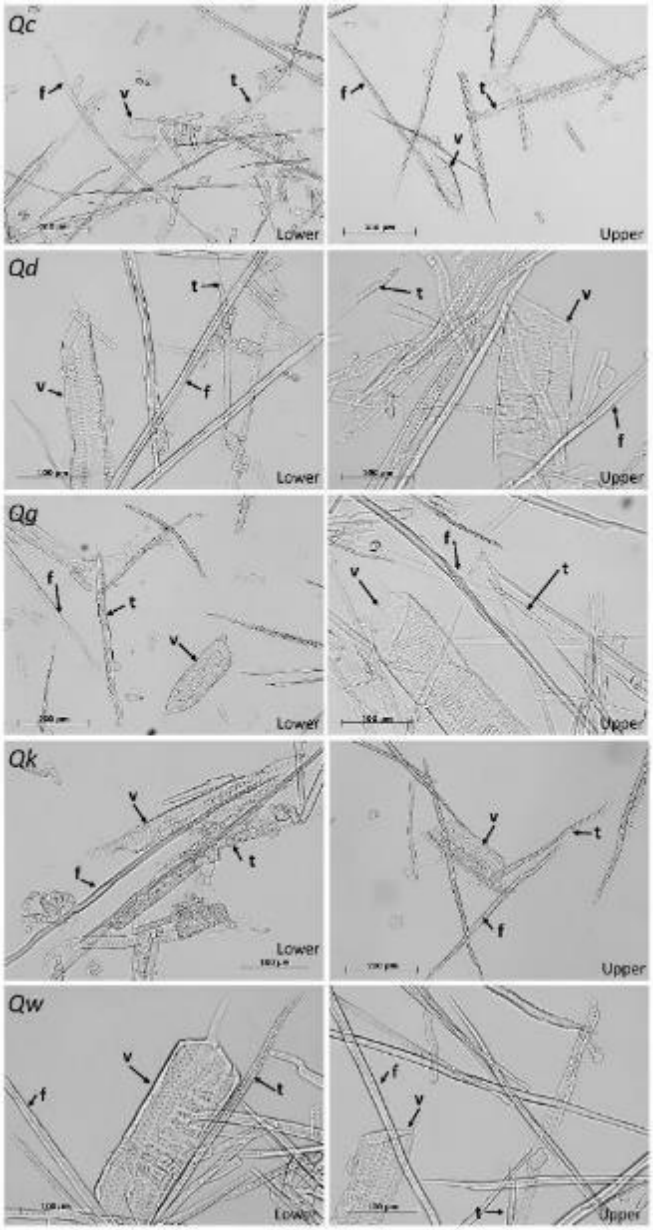

Figure S3. Representative micrographs of stem xylem macerations of five oak (*Quercus*) species from their low (lower) and high (upper) distributions along an elevation gradient in the southern Sierra Nevada Mountains of California, USA. The five species include *Q. chrysolepis* (Qc), *Q. douglassii* (Qd), *Q. garryana* (Qg), *Q. kelloggii* (Qk), and *Q. wislizeni* (Qw). A scale bar is included in the lower left corner of each panel. Within each panel a representative vessel element (v), tracheid (t), and fiber (f) are identified.

Percolla MI, Fickle JC, Rodriguez-Zaccaro FD, Pratt RB, Jacobsen AL. Hydraulic function and conduit structure in the xylem of five oak species. IAWA J.

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Supplemental Online Material Figure S4

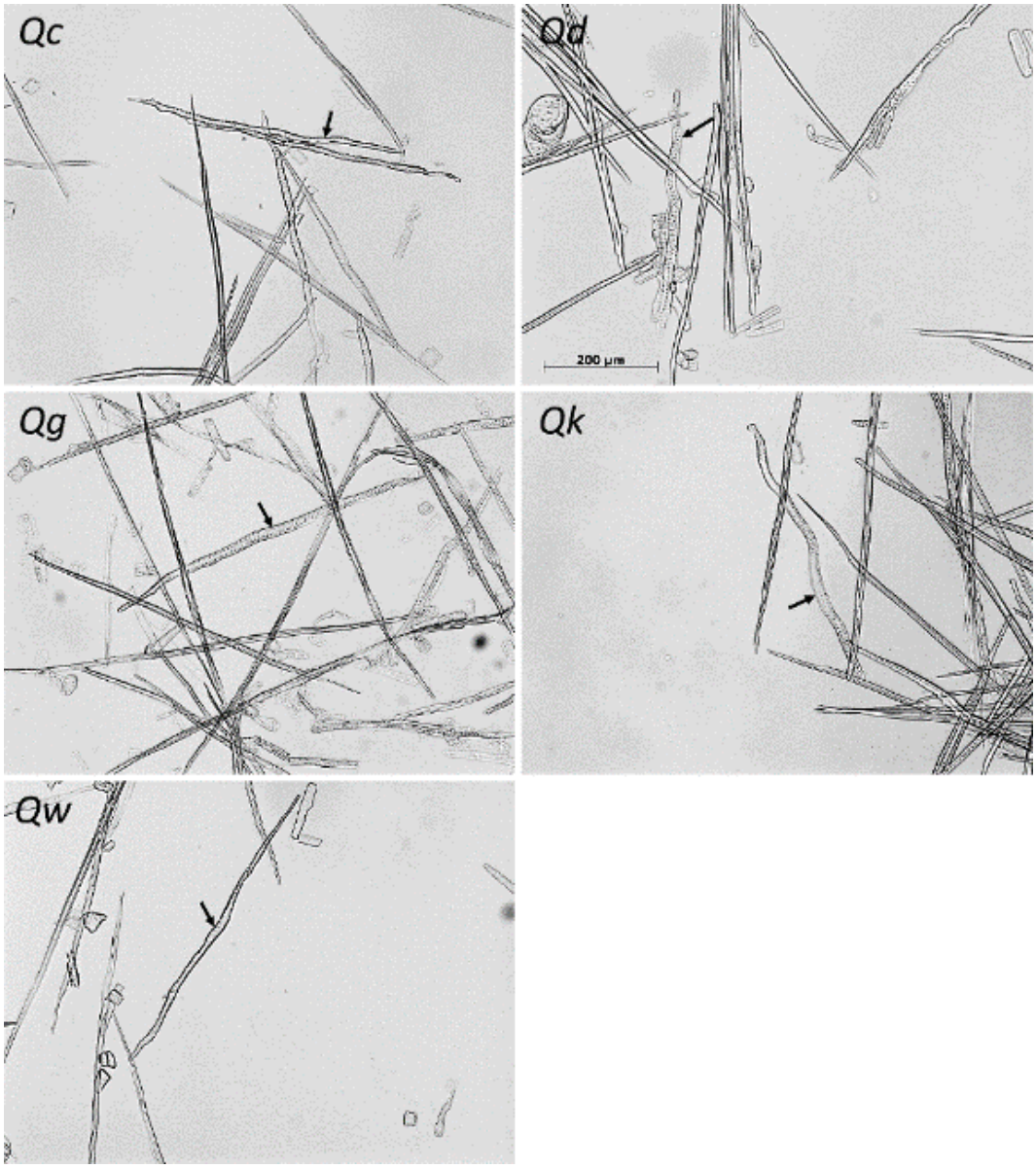

Figure S4. Representative micrographs of stem xylem macerations five oak (*Quercus*) species: *Q. chrysolepis* (Qc), *Q. douglassii* (Qd), *Q. garryana* (Qg), *Q. kelloggii* (Qk), and *Q. wislizeni* (Qw). Micrographs were taken of tracheids for measures of tracheid length and diameter. All micrographs were taken at the same magnification and a scale bar is included in the lower left corner of the upper right panel (Qd). Within each panel a representative tracheid is indicated with an arrow.

Percolla MI, Fickle JC, Rodriguez-Zaccaro FD, Pratt RB, Jacobsen AL. Hydraulic function and conduit structure in the xylem of five oak species. IAWA J.

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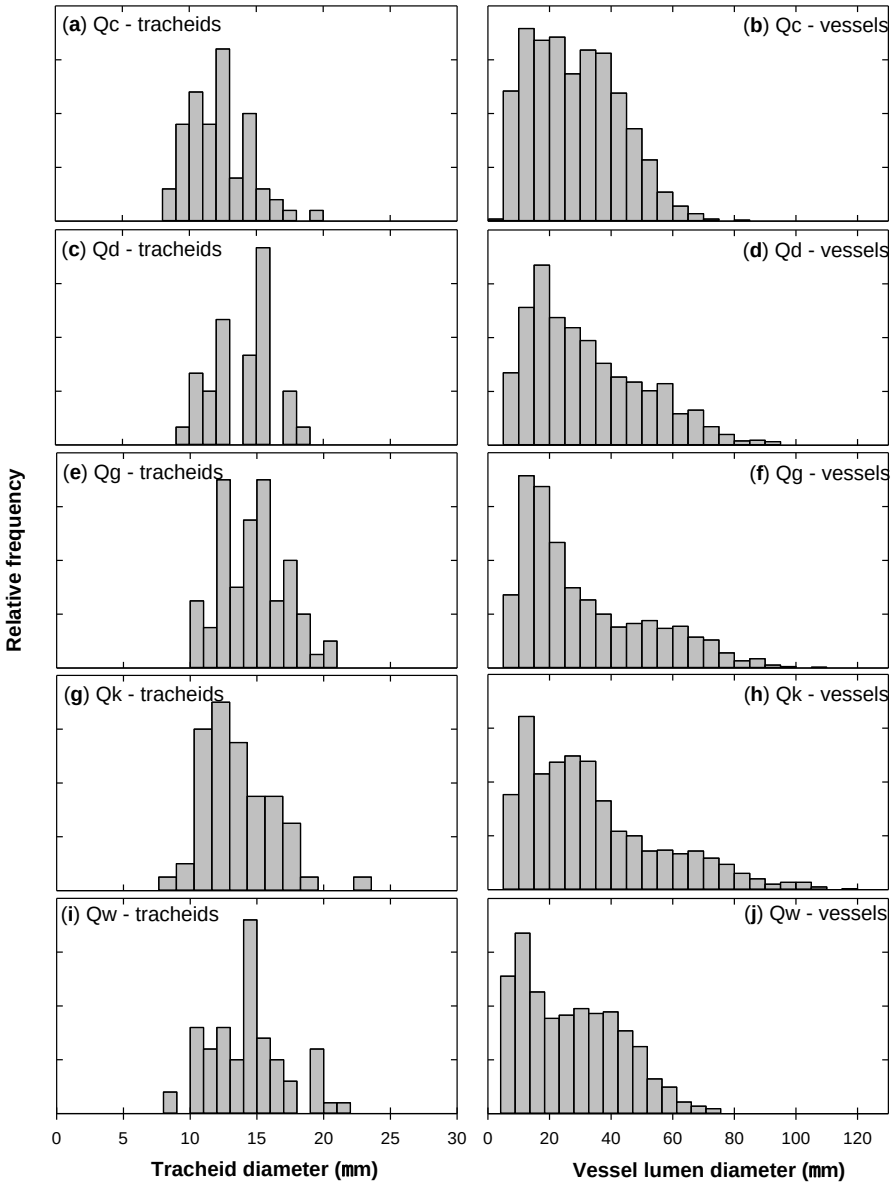

Figure S5. Histograms of tracheid and vessel lumen diameters of five oak (*Quercus*) species: *Q. chrysolepis* (Qc), *Q. douglassii* (Qd), *Q. garryana* (Qg), *Q. kelloggii* (Qk), and *Q. wislizeni* (Qw).

Percolla MI, Fickle JC, Rodriguez-Zaccaro FD, Pratt RB, Jacobsen AL. Hydraulic function and conduit structure in the xylem of five oak species. IAWA J.

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Supplemental Online Material Figure S5

Figure S6. Oaks occurring at the lowest elevation site showed signs of stress, with many individuals having branch dieback and some dead individuals. This was observed in both lower elevation species, *Q. douglassii* (a and b) and *Q. wislizeni* (c).