1   **Supplementary Information**

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3   **Table S1:** Mean δ^2H and $\delta^{18}O$ values (in ‰) of water extracted from sapwood (SW), inner bark

4   (Bark) and heartwood (HW) of the control trees and for $\delta^{18}O$ also of the experimental (exp.)

5   trees of Ironbark (IB) and Red Gum (RG) for the northern (N) and southern (S) side of the tree

6   stems and their mean. The differences between north (N) and south (S) and between trees are

7   also given.

Trees	SW N	SW S	Diff N-S	SW mean	Bark N	Bark S	Diff N-S	Bark mean	HW N	HW S	Diff N-S	HW mean
IB control tree δ^2H	-20.35	-23.75	3.40	**-22.05**	-29.81	-31.89	2.08	**-30.85**	-29.96	-33.96	4.00	**-31.96**
RG control tree δ^2H	-18.22	-17.68	-0.54	**-17.95**	-22.72	-31.36	8.64	**-27.04**	-27.40	-21.74	-5.66	**-24.57**
diff. IB-RG control δ^2H	*-2.13*	*-6.07*	*3.94*	***-4.10***	*-7.09*	*-0.53*	*-6.56*	***-3.81***	*-2.56*	*-12.22*	*9.66*	***-7.39***
IB control tree $\delta^{18}O$	-2.96	-2.04	-0.91	**-2.50**	-4.47	-4.24	-0.23	**-4.35**	-6.14	-7.14	1.00	**-6.64**
IB exp. trees $\delta^{18}O$	-2.18	-2.00	-0.18	**-2.09**	-5.24	-4.39	-0.85	**-4.81**	-5.05	-4.78	-0.26	**-4.92**
IB diff. control-exp. $\delta^{18}O$	*-0.77*	*-0.04*	*-0.73*	***-0.41***	*0.77*	*0.15*	*0.62*	***0.46***	*-1.09*	*-2.35*	*1.26*	***-1.72***
RG control tree $\delta^{18}O$	-2.37	-2.86	0.49	**-2.62**	-3.76	-4.69	0.93	**-4.23**	-4.86	-4.29	-0.57	**-4.57**
RG exp. trees $\delta^{18}O$	-2.08	-2.03	-0.05	**-2.06**	-3.78	-5.46	1.68	**-4.62**	-5.23	-6.00	0.77	**-5.62**
RG diff. control-exp. $\delta^{18}O$	*-0.29*	*-0.83*	*0.54*	***-0.56***	*0.01*	*0.77*	*-0.75*	***0.39***	*0.37*	*1.71*	*-1.34*	***1.04***
diff. IB-RG control tree $\delta^{18}O$	*-0.58*	*0.82*	*-1.40*	***0.12***	*-0.70*	*0.45*	*-1.16*	***-0.13***	*-1.28*	*-2.85*	*1.56*	***-2.07***
diff. IB-RG exp. trees $\delta^{18}O$	*-0.10*	*0.03*	*-0.14*	***-0.03***	*-1.46*	*1.07*	*-2.53*	***-0.20***	*0.18*	*1.22*	*-1.04*	*0.70*

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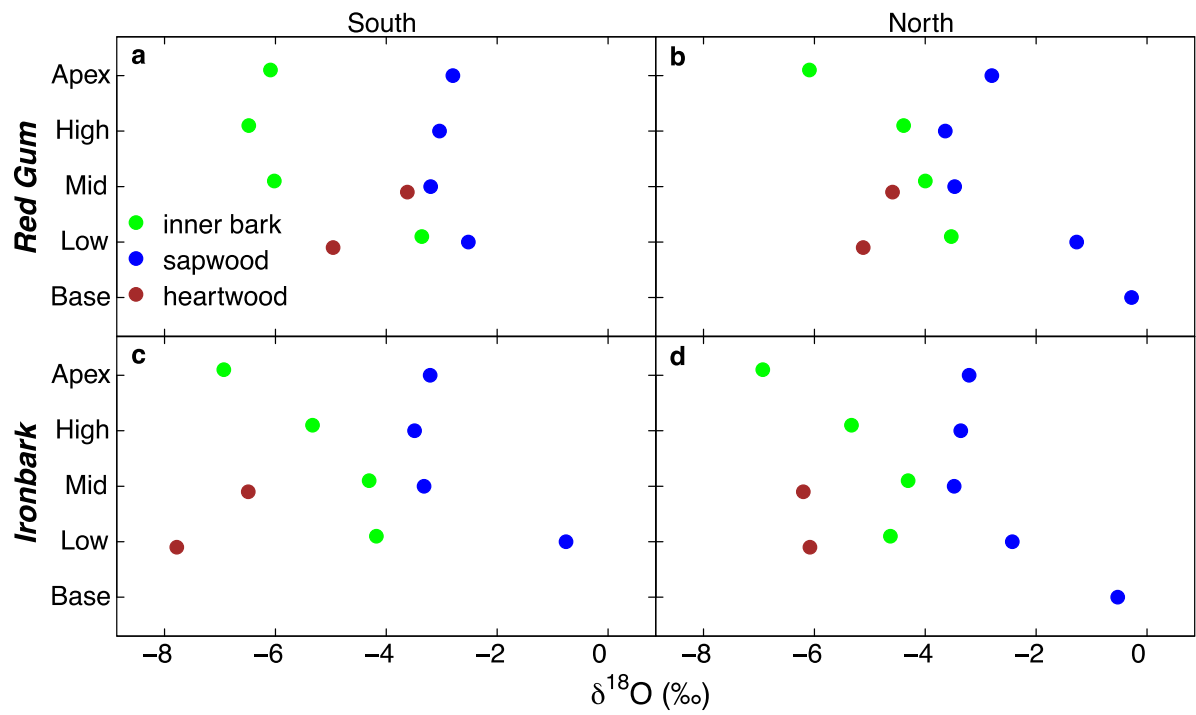**Figure S1:** Distribution of natural $\delta^{18}O$ values in water of sapwood, heartwood and inner bark of the two control trees for all sampling positions in the stems.

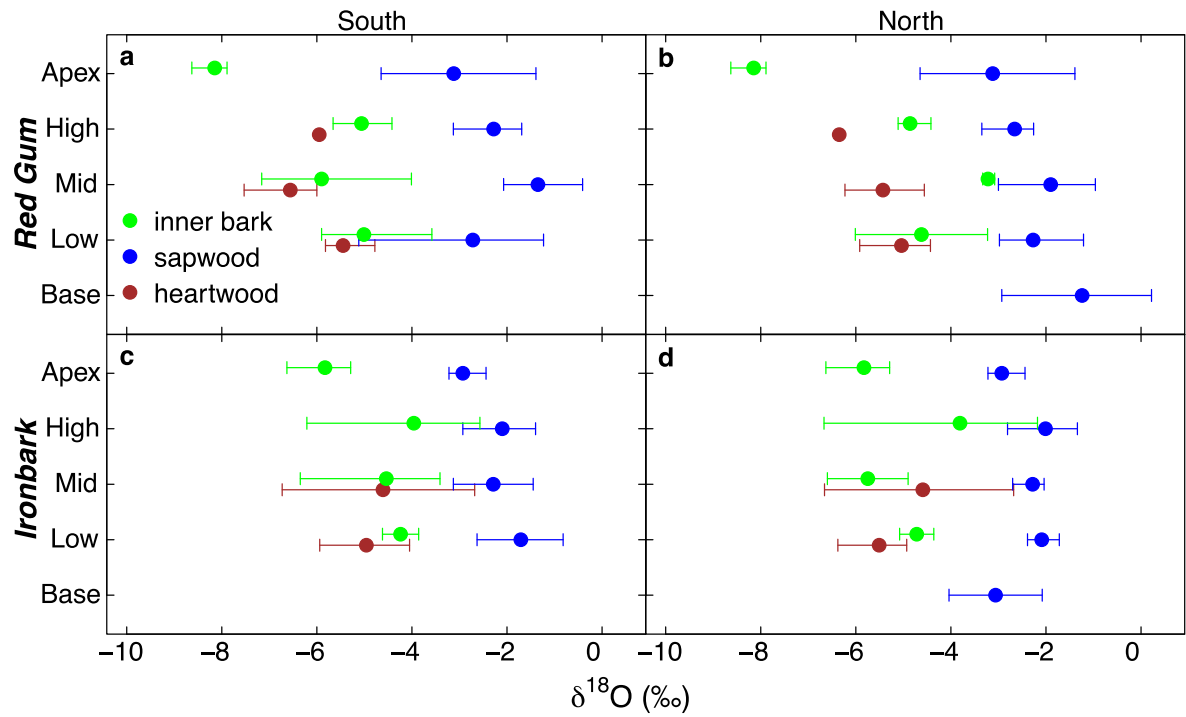**Figure S2: N**atural distribution of δ^{18}O values in water of sapwood, heartwood and bark given as mean of all three experimental trees per species for all sampling positions in the stems. Error bars indicate minimum and maximum values.