

## Supplemental materials

**Table S1. Species included in neighborhood analyses as either focal trees or neighbors.** In the main text and the supplement, all species are referred to by their four-letter code presented in this table. Some species were not modeled as focal trees but did appear as neighbors in the models for other species.

Species name	Code	Role in analyses
<i>Abies amabilis</i>	ABAM	Focal and neighbor
<i>Abies lasiocarpa</i>	ABLA	Neighbor only
<i>Chamaecyparis nootkatensis</i>	CANO	Focal and neighbor
<i>Pinus contorta</i>	PICO	Neighbor only
<i>Pinus monticola</i>	PIMO	Neighbor only
<i>Pseudotsuga menziesii</i>	PSME	Focal and neighbor
<i>Taxus brevifolia</i>	TABR	Neighbor only
<i>Thuja plicata</i>	THPL	Focal and neighbor
<i>Tsuga heterophylla</i>	TSHE	Focal and neighbor
<i>Tsuga mertensiana</i>	TSME	Focal and neighbor

**Table S2. Summary of focal species' abundances, sizes, and densities across the sampled forest plots.** The "Number of plots" column indicates the number of sampled plots in which each focal species occurred. The remaining columns summarize the abundance, size and density of each species, represented as the mean across the plots in which the species occurred, with standard deviation in parentheses. Standard deviations are large because the abundance of trees varied dramatically between plots as a result of their elevational distributions. For DBH values, a mean DBH was calculated for each species in each plot and values in this table reflect the mean and standard deviation of these within-plot means. The contribution of each tree to density was calculated using its area at breast height. Proportional densities represent the proportion of total tree density constituted by the indicated focal species.

Focal Species	Number of plots	Number of trees	Mean DBH (cm)	Density (m <sup>2</sup> /ha)	Proportional density
<b>ABAM</b>	14	124 (161)	24.7 (12.7)	11.3 (11.0)	0.24 (0.23)
<b>CANO</b>	7	44 (58)	51.7 (40.0)	6.9 (7.5)	0.16 (0.17)
<b>PSME</b>	10	35 (40)	120.1 (66.9)	17.6 (13.7)	0.36 (0.21)
<b>THPL</b>	9	17 (15)	87.4 (58.1)	8.4 (6.2)	0.16 (0.10)
<b>TSHE</b>	13	107 (56)	35.7 (12.9)	15.0 (7.9)	0.32 (0.18)
<b>TSME</b>	4	32 (36)	46.2 (26.1)	7.3 (8.5)	0.18 (0.20)

**Table S3. AIC Likelihood model selection results.** For each focal species by training set combination, we fit four likelihood models differing in the structure of the crowding effect. Values in this table represent  $\Delta AICc$  values for each of the four models, with the bolded '0's indicating the best model for each focal species by training set combination.

Focal species	Training set	No interactions	Equivalent interactions	Intraspecific vs. inter-specific interactions	Species-specific interactions
ABAM	1	186.32	15.24	<b>0</b>	9.35
	2	164.8	27.34	<b>0</b>	0.11
	3	162.53	30.82	<b>0</b>	10.48
	4	172.36	30.95	8.89	<b>0</b>
CANO	1	36.85	24.72	<b>0</b>	1.54
	2	51.27	19.93	<b>0</b>	9.22
	3	36.99	19.22	<b>0</b>	2.03
	4	39.1	16.46	<b>0</b>	11.54
PSME	1	63.59	<b>0</b>	5.31	5.18
	2	58.33	0.71	<b>0</b>	5.57
	3	63.81	0.75	3.44	<b>0</b>
	4	47.68	2.29	<b>0</b>	7.88
THPL	1	35.14	8.7	10.17	<b>0</b>
	2	51.19	26.76	11.75	<b>0</b>
	3	26.86	7.07	1.5	<b>0</b>
	4	55.22	26.67	27.23	<b>0</b>
TSHE	1	184.94	112.62	93.65	<b>0</b>
	2	148.56	97.88	85.81	<b>0</b>
	3	152.34	78.72	66.52	<b>0</b>
	4	187.18	106.54	95.36	<b>0</b>
TSME	1	5.77	13.75	<b>0</b>	6.1
	2	14.63	20.83	<b>0</b>	5.9
	3	15.83	10.25	<b>0</b>	7.26
	4	6.86	13.7	<b>0</b>	3.43

**Table S4. Fitted parameter values for AIC likelihood models of ABAM.** Values shown reflect the final model resulting from AICc model selection for each training set. NA values indicate that the parameter was not included in the final model structure.

Parameter	Training 1	Training 2	Training 3	Training 4
X0	5.647184	4.782863	5.570202	5.209209
Xb	1.296231	1.130307	1.247898	1.200916
gmax	4.898073	5.053127	5.013657	4.564527
pet_a	4.199276	4.398411	4.455179	4.593256
pet_b	1.191779	1.04632	1.23811	1.504272
C	0.77787	0.423502	0.256277	0.361589
$\alpha$	0.794951	0.727756	0.516272	0.35993
$\beta$	1.368613	0.967788	1.068217	0.996048
$\lambda_{con}$	0.10418	0.096067	0.251779	NA
$\lambda_{het}$	0.183867	0.162946	0.522093	NA
$\lambda_{ABAM}$	NA	NA	NA	0.134526
$\lambda_{ABLA}$	NA	NA	NA	NA
$\lambda_{CANO}$	NA	NA	NA	0.526799
$\lambda_{OTHR}$	NA	NA	NA	0.096021
$\lambda_{PICO}$	NA	NA	NA	NA
$\lambda_{PIMO}$	NA	NA	NA	NA
$\lambda_{PSME}$	NA	NA	NA	0.988057
$\lambda_{TABR}$	NA	NA	NA	0.062519
$\lambda_{THPL}$	NA	NA	NA	0.908878
$\lambda_{TSHE}$	NA	NA	NA	0.349803
$\lambda_{TSME}$	NA	NA	NA	0.696702
$\sigma$	0.891298	0.874871	0.88144	0.861362

**Table S5. Fitted parameter values for AIC likelihood models of CANO.** Values shown reflect the final model resulting from AICc model selection for each training set. NA values indicate that the parameter was not included in the final model structure.

Parameter	Training 1	Training 2	Training 3	Training 4
X0	16.31197	22.46111	19.58499	12.44248
Xb	1.896297	2.36642	1.848483	2.02088
gmax	3.351031	4.942072	3.581512	3.205381
pet_a	3.727071	3.308012	3.413579	4.453424
pet_b	1.830967	0.747256	1.854592	2.930325
C	0.091332	0.190015	0.038554	0.015167
$\alpha$	1.830106	0.594843	1.198453	1.521665
$\beta$	0.562342	0.748868	0.527449	0.125047
$\lambda_{con}$	0.13695	0.565522	0.672332	0.575118
$\lambda_{het}$	0.000868	0.008808	0.02458	0.007078
$\lambda_{ABAM}$	NA	NA	NA	NA
$\lambda_{ABLA}$	NA	NA	NA	NA
$\lambda_{CANO}$	NA	NA	NA	NA
$\lambda_{OTHR}$	NA	NA	NA	NA
$\lambda_{PICO}$	NA	NA	NA	NA
$\lambda_{PIMO}$	NA	NA	NA	NA
$\lambda_{PSME}$	NA	NA	NA	NA
$\lambda_{TABR}$	NA	NA	NA	NA
$\lambda_{THPL}$	NA	NA	NA	NA
$\lambda_{TSHE}$	NA	NA	NA	NA
$\lambda_{TSME}$	NA	NA	NA	NA
$\sigma$	0.699108	0.620747	0.744168	0.697623

**Table S6. Fitted parameter values for AIC likelihood models of PSME.** Values shown reflect the final model resulting from AICc model selection for each training set. NA values indicate that the parameter was not included in the final model structure.

Parameter	Training 1	Training 2	Training 3	Training 4
X0	29.05303	29.51337	16.63528	25.60949
Xb	2.735194	2.331625	1.860527	2.681528
gmax	5.731953	6.11598	4.647375	5.539137
pet_a	4.557838	4.389105	4.093686	4.548516
pet_b	1.721984	1.827088	2.301967	1.177249
C	0.017006	0.031851	0.034251	0.091242
$\alpha$	0.8687	0.695544	0.700755	0.961487
$\beta$	0.291482	0.278451	0.437992	0.133593
$\lambda_{con}$	NA	0.787429	NA	0.107496
$\lambda_{het}$	NA	0.624314	NA	0.096926
$\lambda_{ABAM}$	NA	NA	0.458198	NA
$\lambda_{ABLA}$	NA	NA	0.122873	NA
$\lambda_{CANO}$	NA	NA	NA	NA
$\lambda_{OTHR}$	NA	NA	0.044155	NA
$\lambda_{PICO}$	NA	NA	0.050529	NA
$\lambda_{PIMO}$	NA	NA	0.419464	NA
$\lambda_{PSME}$	NA	NA	0.756168	NA
$\lambda_{TABR}$	NA	NA	NA	NA
$\lambda_{THPL}$	NA	NA	0.335739	NA
$\lambda_{TSHE}$	NA	NA	0.78104	NA
$\lambda_{TSME}$	NA	NA	NA	NA
$\sigma$	0.889206	0.84796	0.869906	0.984844

**Table S7. Fitted parameter values for AIC likelihood models of THPL.** Values shown reflect the final model resulting from AICc model selection for each training set. NA values indicate that the parameter was not included in the final model structure.

Parameter	Training 1	Training 2	Training 3	Training 4
X0	9.992893	23.44913	9.988668	7.549333
Xb	1.818457	1.791436	1.475075	2.207433
gmax	6.63176	7.102305	6.480974	6.661364
pet_a	5.299065	4.885047	5.117365	5.673229
pet_b	1.242201	1.432689	1.896622	1.70106
C	0.066707	0.022204	0.014774	0.084291
$\alpha$	0.671227	1.539787	1.259407	0.98542
$\beta$	0.406334	0.629883	0.102811	0.629119
$\lambda_{con}$	NA	NA	NA	NA
$\lambda_{het}$	NA	NA	NA	NA
$\lambda_{ABAM}$	0.210538	0.283883	0.267641	0.097394
$\lambda_{ABLA}$	NA	NA	NA	NA
$\lambda_{CANO}$	NA	NA	NA	NA
$\lambda_{OTHR}$	0.190251	0.435897	0.340124	0.178892
$\lambda_{PICO}$	NA	NA	NA	NA
$\lambda_{PIMO}$	NA	NA	NA	NA
$\lambda_{PSME}$	0.83859	0.828972	0.916601	0.724695
$\lambda_{TABR}$	NA	NA	NA	NA
$\lambda_{THPL}$	0.984868	0.993763	0.558268	0.740402
$\lambda_{TSHE}$	0.030303	0.015027	0.091588	0.050796
$\lambda_{TSME}$	NA	NA	NA	NA
$\sigma$	1.527451	1.52001	1.315754	1.224182

**Table S8. Fitted parameter values for AIC likelihood models of TSHE.** Values shown reflect the final model resulting from AICc model selection for each training set. NA values indicate that the parameter was not included in the final model structure.

Parameter	Training 1	Training 2	Training 3	Training 4
X0	15.25017	12.71974	6.366752	24.08188
Xb	2.301613	1.977892	1.662411	2.754767
gmax	4.517549	4.53113	3.445734	5.228501
pet_a	5.329706	4.980551	5.002725	5.470161
pet_b	2.685357	2.945408	2.743225	2.562391
C	0.122307	0.036658	0.176239	0.104756
$\alpha$	0.869691	0.960747	0.863298	1.004421
$\beta$	1.125491	0.514917	1.11789	1.016064
$\lambda_{con}$	NA	NA	NA	NA
$\lambda_{het}$	NA	NA	NA	NA
$\lambda_{ABAM}$	0.018176	0.070921	0.014686	0.085824
$\lambda_{ABLA}$	NA	NA	NA	NA
$\lambda_{CANO}$	0.548442	0.784716	0.722251	0.793071
$\lambda_{OTHR}$	0.282171	0.066991	0.066905	0.021081
$\lambda_{PICO}$	0.257224	0.800655	0.314535	0.435677
$\lambda_{PIMO}$	0.306511	0.311458	0.333223	0.658512
$\lambda_{PSME}$	0.861707	0.748909	0.674588	0.823778
$\lambda_{TABR}$	0.432688	0.921135	0.018978	0.250154
$\lambda_{THPL}$	0.667487	0.328821	0.317018	0.407334
$\lambda_{TSHE}$	0.422378	0.357736	0.165325	0.367659
$\lambda_{TSME}$	NA	NA	NA	NA
$\sigma$	1.268121	1.22943	1.251041	1.256734

**Table S9. Fitted parameter values for AIC likelihood models of TSME.** Values shown reflect the final model resulting from AICc model selection for each training set. NA values indicate that the parameter was not included in the final model structure.

Parameter	Training 1	Training 2	Training 3	Training 4
X0	20.1121	6.746346	10.33789	11.09961
Xb	2.974753	2.230119	2.933228	2.478097
gmax	2.426373	2.064813	2.2206	2.382811
pet_a	3.785202	3.445726	3.058415	3.013445
pet_b	2.664246	2.764165	2.799773	2.952137
C	0.071646	0.01912	0.033805	0.037185
$\alpha$	2.500453	2.215656	2.137544	2.025811
$\beta$	1.294959	1.441635	1.638055	1.186808
$\lambda_{con}$	0.116883	0.991576	0.81256	0.548381
$\lambda_{het}$	0.011666	0.006159	0.108582	0.029573
$\lambda_{ABAM}$	NA	NA	NA	NA
$\lambda_{ABLA}$	NA	NA	NA	NA
$\lambda_{CANO}$	NA	NA	NA	NA
$\lambda_{OTHR}$	NA	NA	NA	NA
$\lambda_{PICO}$	NA	NA	NA	NA
$\lambda_{PIMO}$	NA	NA	NA	NA
$\lambda_{PSME}$	NA	NA	NA	NA
$\lambda_{TABR}$	NA	NA	NA	NA
$\lambda_{THPL}$	NA	NA	NA	NA
$\lambda_{TSHE}$	NA	NA	NA	NA
$\lambda_{TSME}$	NA	NA	NA	NA
$\sigma$	0.533293	0.582348	0.483584	0.507845

**Table S10. Estimated coefficients for regularized regression models of ABAM.** Positive coefficients indicate that focal tree growth was positively associated with the indicated variable. The “Neighbor species:” variables are binary and therefore a positive coefficient indicates that focal tree growth was greater when the Neighbor was of that species. The coefficients of some variables were reduced to zero through regularization, indicating that they do not have a strong effect on focal tree growth.

Independent Variable	Training 1	Training 2	Training 3	Training 4
Neighbor species: ABAM	0.001387	0.000975	0.0011	0.001032
Neighbor species: CANO	0	0	0	-3.69E-05
Neighbor species: OTHR	0	0	0	2.95E-05
Neighbor species: PSME	-0.0009	-0.00111	-0.00126	-0.00141
Neighbor species: TABR	0	0	0	0
Neighbor species: THPL	-0.00058	-5.80E-06	-0.00052	-0.00061
Neighbor species: TSHE	0	0	0	0
Neighbor species: TSME	-0.00032	-0.00026	-0.0004	-0.00023
Neighbor size	0.00039	0.000172	0.000418	0.000647
Neighbor proximity	0	0	5.48E-06	9.28E-05
Local density: ABAM	0	0	0	0
Local density: CANO	-0.00517	-0.00576	-0.00509	-0.00525
Local density: OTHR	-0.00086	-0.00037	-0.00085	0
Local density: PSME	-0.00083	-0.00033	-0.00028	-0.00111
Local density: TABR	-0.00419	-0.00755	-0.00617	-0.00634
Local density: THPL	0	0	-0.00095	-0.00114
Local density: TSHE	0.008367	0.008489	0.008838	0.009301
Local density: TSME	-0.00166	-0.00168	-0.00124	-0.00147
Local density: All species	-0.00111	-0.00091	0	-0.00045
PET	0.004492	0.005472	0.006743	0.005741

**Table S11. Estimated coefficients for regularized regression models of CANO.** Positive coefficients indicate that focal tree growth was positively associated with the indicated variable. The “Neighbor species:” variables are binary and therefore a positive coefficient indicates that focal tree growth was greater when the Neighbor was of that species. The coefficients of some variables were reduced to zero through regularization, indicating that they do not have a strong effect on focal tree growth.

Independent Variable	Training 1	Training 2	Training 3	Training 4
Neighbor species: ABAM	0	0	0	0
Neighbor species: CANO	0	0	0	0
Neighbor species: OTHR	0	0.002186	0.002229	0.001159
Neighbor species: TSHE	0	0	0	0
Neighbor species: TSME	0	0	0	0
Neighbor size	0	0	0	0
Neighbor proximity	0	0	0	0
Local density: ABAM	-0.00063	0	0	0
Local density: CANO	-0.00819	-0.01013	-0.01119	-0.01049
Local density: OTHR	0	0	0.000631	0.001404
Local density: TSHE	0.001136	0.000435	0	0.001029
Local density: TSME	0.000331	0	0	0
Local density: All species	0	0	0	0
PET	0.00235	0.001789	0.002703	0.00343

**Table S12. Estimated coefficients for regularized regression models of PSME.** Positive coefficients indicate that focal tree growth was positively associated with the indicated variable. The “Neighbor species:” variables are binary and therefore a positive coefficient indicates that focal tree growth was greater when the Neighbor was of that species. The coefficients of some variables were reduced to zero through regularization, indicating that they do not have a strong effect on focal tree growth.

Independent Variable	Training 1	Training 2	Training 3	Training 4
Neighbor species: ABAM	-0.00038	-0.00014	-0.00024	0
Neighbor species: ABLA	0	0	0	0
Neighbor species: OTHR	0.000449	0	0	0.000211
Neighbor species: PICO	8.01E-05	0	0	0
Neighbor species: PIMO	0.000202	0	0	4.11E-05
Neighbor species: PSME	0	0	0	0
Neighbor species: THPL	0	0	0	0
Neighbor species: TSHE	-4.66E-05	0	0	0
Neighbor size	0	0	0	0
Neighbor proximity	0	0	0	0
Local density: ABAM	-0.00081	-0.00116	-0.00195	-0.00075
Local density: ABLA	-0.00081	0	0.00089	0
Local density: OTHR	0.001114	0.000693	0.000446	0.000541
Local density: PICO	0.012849	0.012966	0.010673	0.014151
Local density: PIMO	0.008998	0.008083	0.007458	0.004956
Local density: PSME	0	0	0	0
Local density: THPL	0.002596	0.002899	0.002923	0.002573
Local density: TSHE	-0.00028	-0.00082	-0.00134	-0.00164
Local density: All species	-0.00551	-0.00497	-0.00553	-0.00419
PET	0.002586	0.002183	0.001461	0.000514

**Table S13. Estimated coefficients for regularized regression models of THPL.** Positive coefficients indicate that focal tree growth was positively associated with the indicated variable. The “Neighbor species:” variables are binary and therefore a positive coefficient indicates that focal tree growth was greater when the Neighbor was of that species. The coefficients of some variables were reduced to zero through regularization, indicating that they do not have a strong effect on focal tree growth.

Independent Variable	Training 1	Training 2	Training 3	Training 4
Neighbor species: ABAM	0	0	0	0.000117
Neighbor species: OTHR	0	0	0	0
Neighbor species: PSME	-0.00076	-0.00027	-0.00038	0
Neighbor species: THPL	0	0	0	0
Neighbor species: TSHE	0	0.000113	0	0
Neighbor size	0	0	0	0
Neighbor proximity	0	0	0	0
Local density: ABAM	0	0	0.001481	0.000169
Local density: OTHR	0.001395	0.003349	0.003272	0.003685
Local density: PSME	0	-0.00565	-7.14E-05	0
Local density: THPL	0	-0.00605	0	0
Local density: TSHE	0.000217	0.002504	-0.00078	0
Local density: All species	-0.00844	0	-0.00694	-0.00554
PET	0.004381	0.001116	0	0.00059

**Table S14. Estimated coefficients for regularized regression models of TSHE.** Positive coefficients indicate that focal tree growth was positively associated with the indicated variable. The “Neighbor species:” variables are binary and therefore a positive coefficient indicates that focal tree growth was greater when the Neighbor was of that species. The coefficients of some variables were reduced to zero through regularization, indicating that they do not have a strong effect on focal tree growth.

Independent Variable	Training 1	Training 2	Training 3	Training 4
Neighbor species: ABAM	0	0	0	0
Neighbor species: CANO	-0.00029	-0.00061	-0.00044	-0.00087
Neighbor species: OTHR	0	0	0	0
Neighbor species: PICO	0	0	0	0
Neighbor species: PIMO	0	0	0	0
Neighbor species: PSME	-0.00084	-0.00105	-0.00102	-0.0003
Neighbor species: TABR	0	0	0	0
Neighbor species: THPL	-0.00056	-0.00025	-0.00043	-6.91E-05
Neighbor species: TSHE	0	0	0	0
Neighbor size	0	0	0	0
Neighbor proximity	0	0	0	0
Local density: ABAM	0.016833	0.014725	0.016444	0.012713
Local density: CANO	0	0	0	0
Local density: OTHR	0	-0.00045	0	0
Local density: PICO	0.00413	0.000991	0.000203	0
Local density: PIMO	-0.00343	0	-0.00013	0
Local density: PSME	-0.01013	-0.00818	-0.00949	-0.01179
Local density: TABR	0.000579	0.001252	0.001889	0.000582
Local density: THPL	0	0	0	0
Local density: TSHE	-0.00522	-0.00561	-0.00453	-0.00573
Local density: All species	-0.00495	-0.00564	-0.00563	-0.0051
PET	0.011216	0.009063	0.011029	0.01117

**Table S15. Estimated coefficients for regularized regression models of TSME.** Positive coefficients indicate that focal tree growth was positively associated with the indicated variable. The “Neighbor species:” variables are binary and therefore a positive coefficient indicates that focal tree growth was greater when the Neighbor was of that species. The coefficients of some variables were reduced to zero through regularization, indicating that they do not have a strong effect on focal tree growth.

<b>Independent Variable</b>	<b>Training 1</b>	<b>Training 2</b>	<b>Training 3</b>	<b>Training 4</b>
<b>Neighbor species: ABAM</b>	0	0	0	0
<b>Neighbor species: CANO</b>	0	-0.00031	-0.00038	-0.00022
<b>Neighbor species: OTHR</b>	0	0	0	0
<b>Neighbor species: TSME</b>	0	0	0	0
<b>Neighbor size</b>	0	0	0	0
<b>Neighbor proximity</b>	0	0	0	0
<b>Local density: ABAM</b>	0	0	0	0
<b>Local density: CANO</b>	0	-0.0023	-0.01193	-0.00152
<b>Local density: OTHR</b>	0.003089	0.001238	0	0.001754
<b>Local density: TSME</b>	-0.00799	-0.00915	-0.01324	-0.00752
<b>Local density: All species</b>	-0.00537	-0.00289	-0.00052	-0.00585
<b>PET</b>	0	0	0	0



**Table S16. Is focal growth higher in the presence of conspecific or heterospecific neighbors?** For the AIC likelihood model, values are the optimized heterospecific interaction coefficient ( $\lambda_{het}$ ) minus the optimized conspecific interaction coefficient ( $\lambda_{con}$ ), both taken from the best fitting conspecific vs. heterospecific interactions model. For the regularized regression model, the direction of the effect is shown (see main text Table 1 for details). For both model types, positive values indicate that focal growth was higher in the presence of conspecific neighbors. For each regularized regression model, the sign of any effect indicated was observed in all of the 100 models that were run. NA values for the regularized regression indicate that the model did not focal trees to grow substantially faster in the presence of conspecific or heterospecific neighbors. Note that this table provides the numerical output underlying main text Table 2.

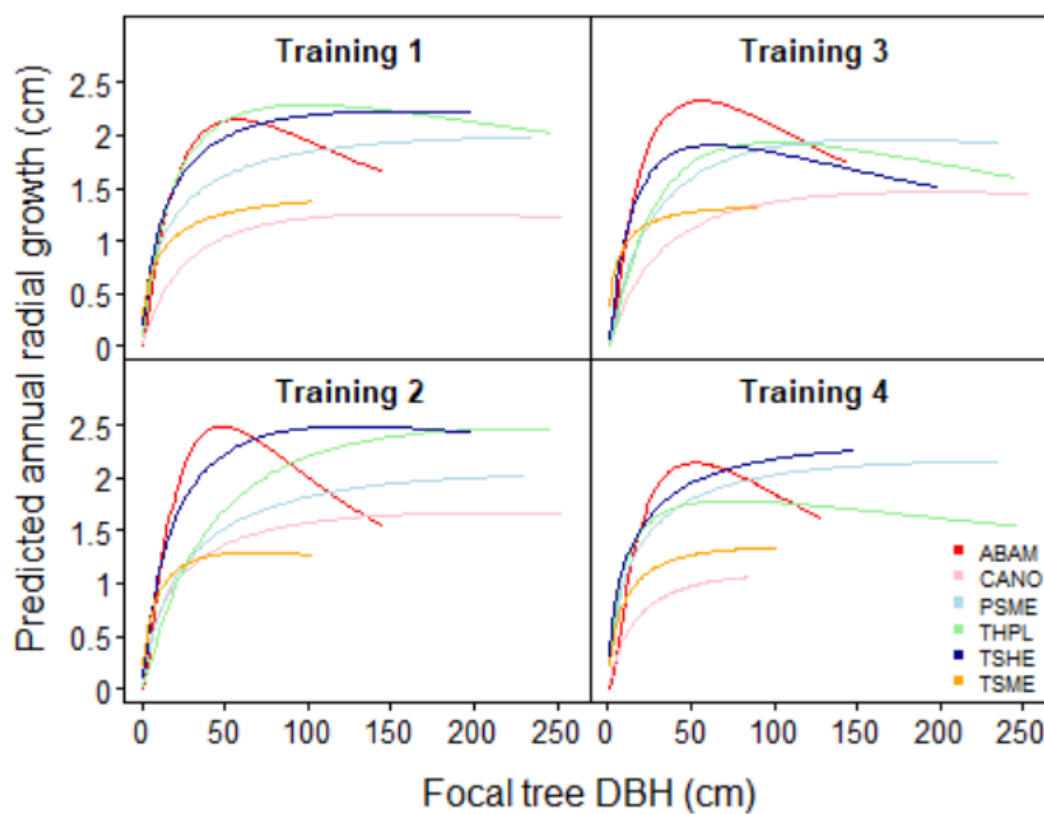
Focal Species	AIC Likelihood				Regularized Regression			
	1	2	3	4	1	2	3	4
ABAM	0.08	0.07	0.27	0.47	+	+	+	+
CANO	-0.14	-0.56	-0.65	-0.57	-	-	-	-
PSME	0.07	-0.16	-0.09	-0.01	NA	NA	NA	NA
THPL	-0.23	-0.25	0	-0.65	NA	-	NA	NA
TSHE	-0.32	-0.4	-0.11	-0.44	-	-	-	-
TSME	-0.11	-0.99	-0.7	-0.52	-	-	-	-

**Table S17.** Amount of variance in the training and test datasets explained by the AIC likelihood (L-AIC), CV likelihood (L-CV) and regularized regression (RR) models. Sample size reflects the number of focal trees in the training set. Values in the six rightmost columns are coefficients of determination, which are the proportion of variance around the mean tree growth value explained by the model. The maximum possible value for a coefficient of determination is 1 (all variance explained) but negative values can exist when a model is applied to unseen test data if there is more unexplained variation around model predictions than exists around the mean growth value in the test data.

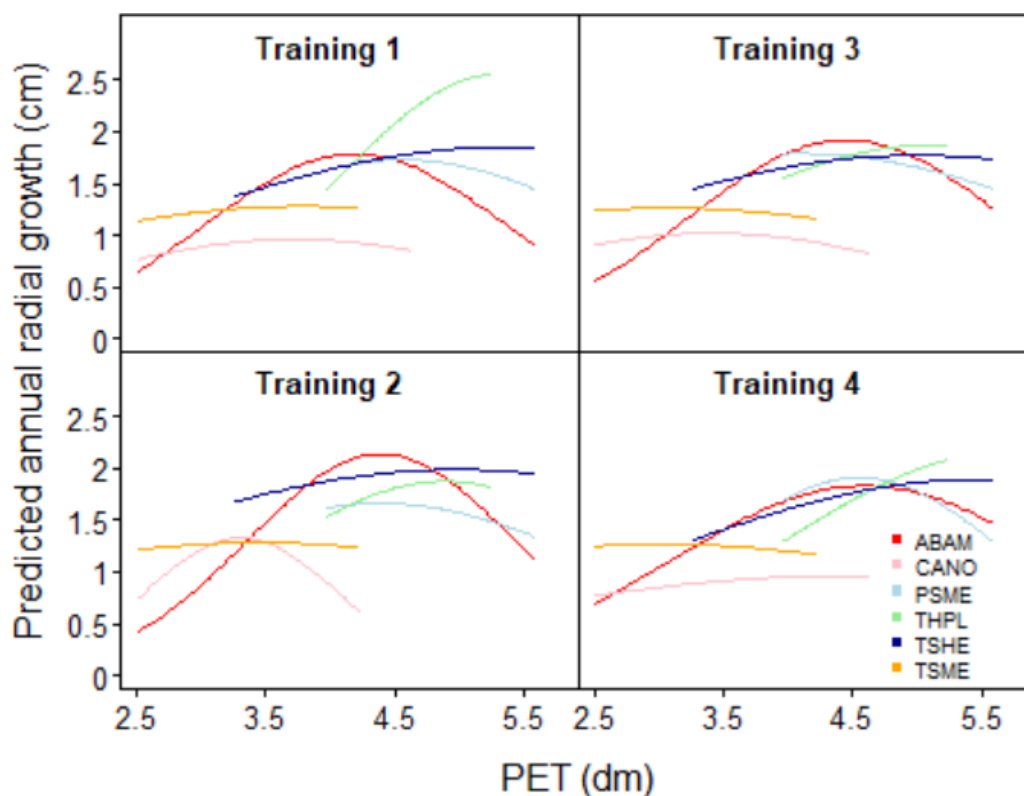
Focal species	Training set	Sample size	Training fit			Test fit		
			L-AIC	L-CV	RR	L-AIC	L-CV	RR
ABAM	1	1297	0.38	0.38	0.15	0.4	0.4	0.21
	2	1307	0.41	0.41	0.19	0.32	0.32	0.12
	3	1310	0.39	0.4	0.18	0.38	0.36	0.13
	4	1303	0.39	0.39	0.16	0.39	0.39	0.18
CANO	1	230	0.28	0.12	0.18	0.22	-0.06	0.25
	2	227	0.34	0.34	0.21	-0.01	-0.01	0.24
	3	233	0.25	0.25	0.25	0.28	0.28	0.16
	4	234	0.22	0.22	0.26	0.24	0.24	0.08
PSME	1	267	0.34	0.34	0.63	0.31	0.3	0.58
	2	264	0.35	0.37	0.64	0.29	0.3	0.61
	3	259	0.37	0.11	0.65	0.4	0.2	0.57
	4	251	0.34	0.34	0.59	0.31	0.31	0.7
THPL	1	112	0.51	0.51	0.17	0.5	0.5	0.01
	2	117	0.57	0.57	0.19	0.17	0.17	0.06
	3	120	0.45	0.45	0.17	0.55	0.55	-0.02
	4	119	0.6	0.6	0.15	0.28	0.28	0.1
TSHE	1	1043	0.3	0.3	0.27	0.25	0.25	0.18
	2	1045	0.27	0.27	0.23	0.34	0.34	0.27
	3	1043	0.28	0.21	0.24	0.26	0.18	0.25
	4	1054	0.31	0.31	0.24	0.23	0.23	0.23
TSME	1	97	0.24	0.24	0.24	0.29	0.26	-0.04
	2	96	0.28	0.28	0.15	-0.03	-0.03	0.34
	3	89	0.3	0.04	0.26	0.07	0.03	-0.1
	4	96	0.24	0.07	0.21	0.17	-0.16	0.1

**Table S18. CV Likelihood model selection results.** For each focal species by training set combination, four likelihood models differing in the structure of the crowding effect were fitted. Values in this table represent mean square error values for each of the four models, averaged across the 10 folds used in cross-validation. Bolded values indicate the best model (lowest mean square error) for each focal species by training set combination.

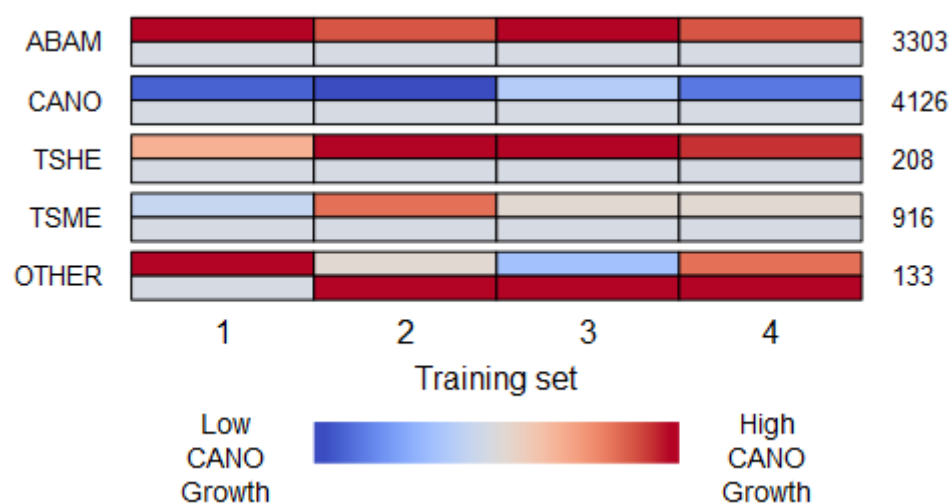
Focal species	Training set	No interactions	Equivalent interactions	Intraspecific vs. inter-specific interactions	Species-specific interactions
ABAM	1	0.82	0.76	<b>0.74</b>	0.78
	2	0.72	0.81	<b>0.65</b>	0.67
	3	0.76	0.71	0.70	<b>0.65</b>
	4	0.90	0.88	0.87	<b>0.84</b>
CANO	1	<b>0.34</b>	0.46	0.44	0.40
	2	0.37	0.20	<b>0.19</b>	0.21
	3	0.51	0.39	<b>0.32</b>	0.36
	4	0.64	0.62	<b>0.41</b>	0.48
PSME	1	1.30	1.08	<b>0.94</b>	0.96
	2	0.90	0.58	0.62	<b>0.53</b>
	3	<b>1.02</b>	1.05	1.07	1.10
	4	0.96	0.84	<b>0.75</b>	0.76
THPL	1	2.99	2.24	1.96	<b>1.40</b>
	2	2.91	1.70	1.60	<b>1.22</b>
	3	1.35	1.03	0.96	<b>0.87</b>
	4	3.46	4.27	2.70	<b>1.21</b>
TSHE	1	2.12	2.03	1.98	<b>1.89</b>
	2	2.01	1.87	1.87	<b>1.65</b>
	3	1.72	<b>1.59</b>	1.59	1.64
	4	2.24	2.13	2.06	<b>1.91</b>
TSME	1	0.11	0.10	0.09	<b>0.08</b>
	2	0.29	0.27	<b>0.23</b>	0.25
	3	<b>0.25</b>	0.35	0.31	0.34
	4	<b>0.68</b>	0.73	0.80	0.88



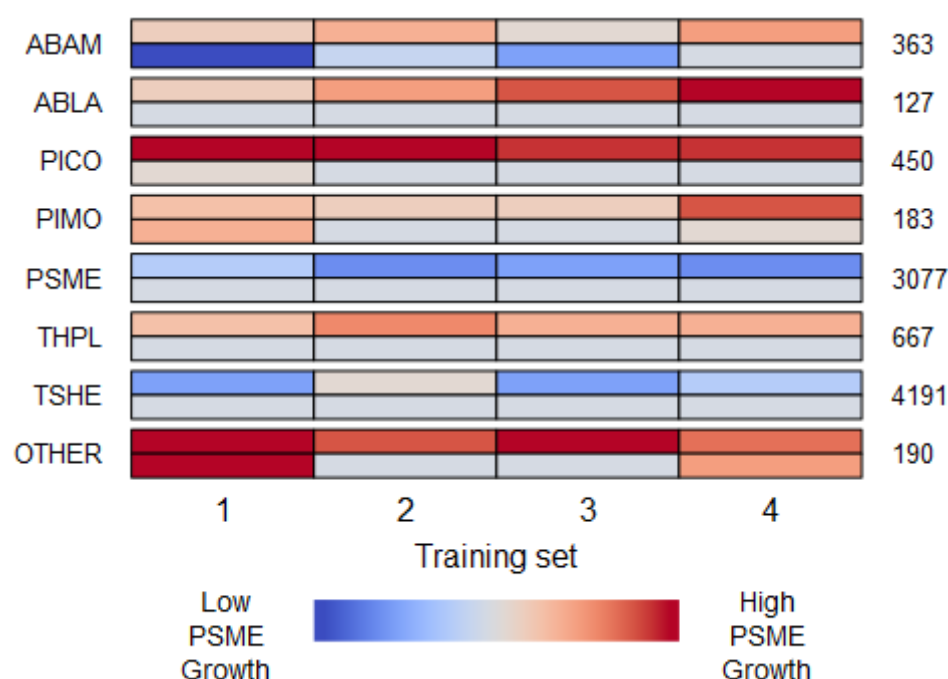
**Figure S1.** Fitted relationships between focal tree size and growth for the AIC likelihood models. Each line reflects the best AIC likelihood model for the indicated focal species by training set combination.



**Figure S2.** Fitted relationships between potential evapotranspiration (PET) and growth for the AIC likelihood models. Each line reflects the best AIC likelihood model for the indicated focal species by training set combination.

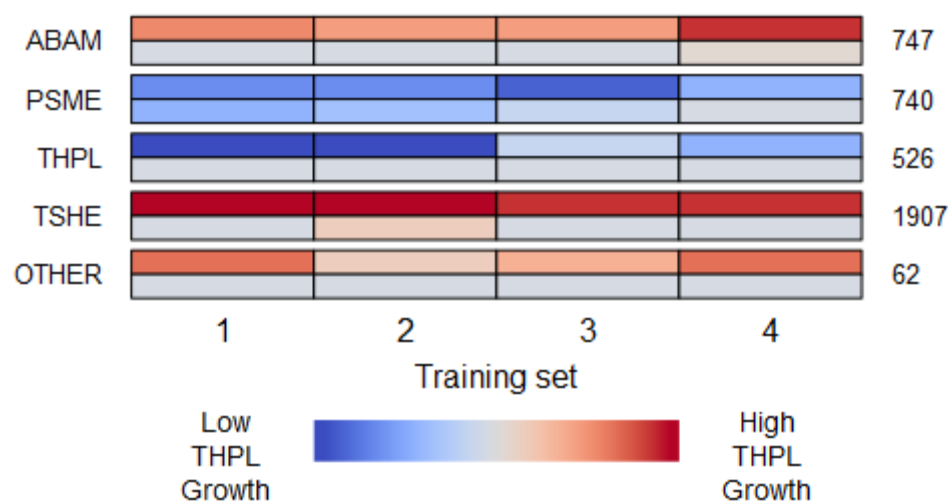


**Figure S3.** Which neighbor species are associated with highest/lowest growth of CANO focals? For each neighbor species there are two rows of colored bars. The top row of bars shows the likelihood model results and the bottom row shows the regularized regression model results. Each row of bars is divided into four sections, to show the results according to the models fit to each of the four training sets. The color of the bars indicates the growth rate of CANO in the presence of the neighbor species that row represents (see inset legend). The numbers on the right of the figure indicate the number of neighbors of each species averaged across training sets.



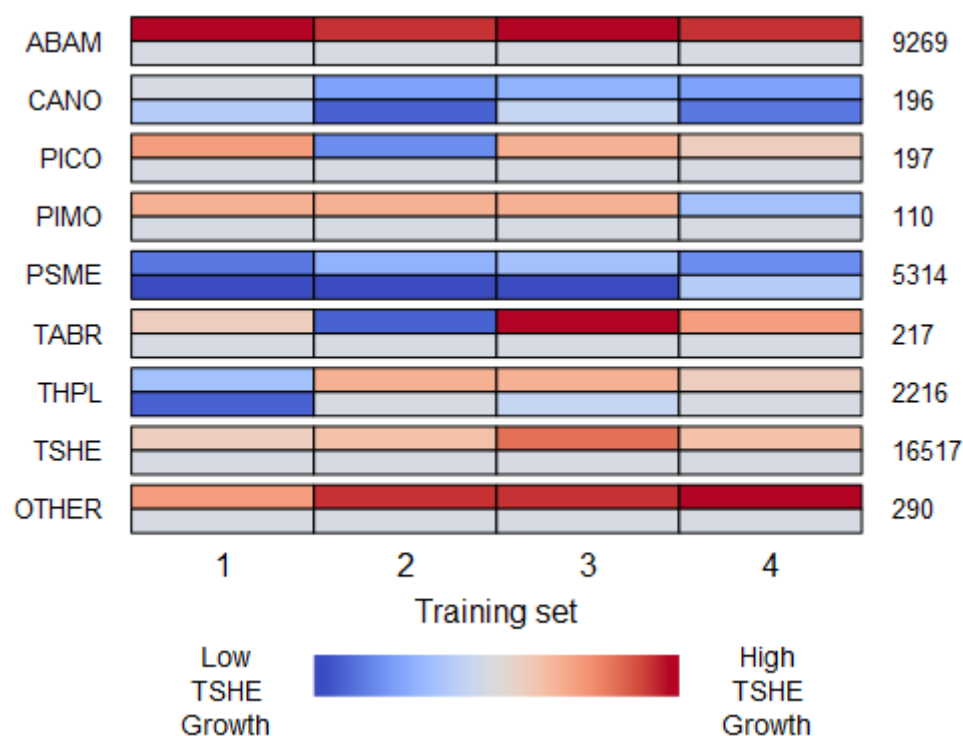
**Figure S4. Which neighbor species are associated with highest/lowest growth of PSME focals?**

For each neighbor species there are two rows of colored bars. The top row of bars shows the likelihood model results and the bottom row shows the regularized regression model results. Each row of bars is divided into four sections, to show the results according to the models fit to each of the four training sets. The color of the bars indicates the growth rate of PSME in the presence of the neighbor species that row represents (see inset legend). The numbers on the right of the figure indicate the number of neighbors of each species averaged across training sets.



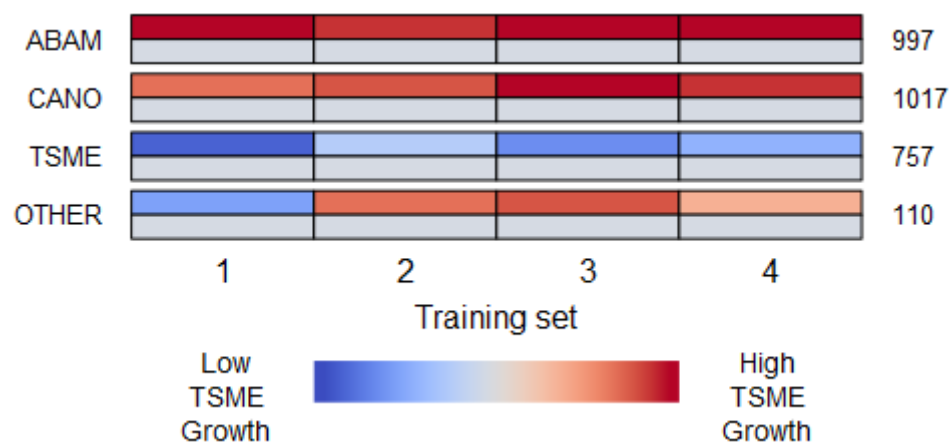
**Figure S5. Which neighbor species are associated with highest/lowest growth of THPL focals?**

For each neighbor species there are two rows of colored bars. The top row of bars shows the likelihood model results and the bottom row shows the regularized regression model results. Each row of bars is divided into four sections, to show the results according to the models fit to each of the four training sets. The color of the bars indicates the growth rate of THPL in the presence of the neighbor species that row represents (see inset legend). The numbers on the right of the figure indicate the number of neighbors of each species averaged across training sets.



**Figure S6. Which neighbor species are associated with highest/lowest growth of TSHE focals?**

For each neighbor species there are two rows of colored bars. The top row of bars shows the likelihood model results and the bottom row shows the regularized regression model results. Each row of bars is divided into four sections, to show the results according to the models fit to each of the four training sets. The color of the bars indicates the growth rate of TSHE in the presence of the neighbor species that row represents (see inset legend). The numbers on the right of the figure indicate the number of neighbors of each species averaged across training sets..



**Figure S7. Which neighbor species are associated with highest/lowest growth of TSME focals?**

For each neighbor species there are two rows of colored bars. The top row of bars shows the likelihood model results and the bottom row shows the regularized regression model results. Each row of bars is divided into four sections, to show the results according to the models fit to each of the four training sets. The color of the bars indicates the growth rate of TSME in the presence of the neighbor species that row represents (see inset legend). The numbers on the right of the figure indicate the number of neighbors of each species averaged across training sets.