

Supplementary material

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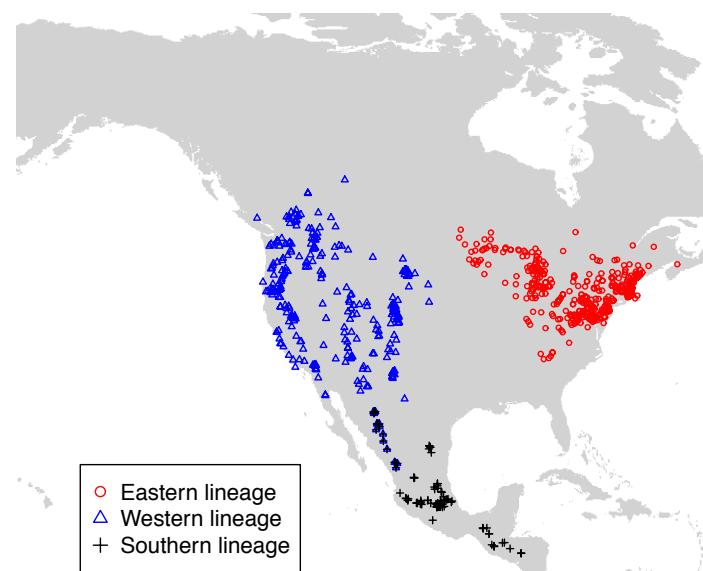
Figure A7 Maps of climatic suitability predicted by Boosted Regression Tree models for *Dendroctonus* lineages.

Figure A8 Geographic representation of mismatches between classical species models and the aggregated predictions that combine the outputs of conspecific lineage models.

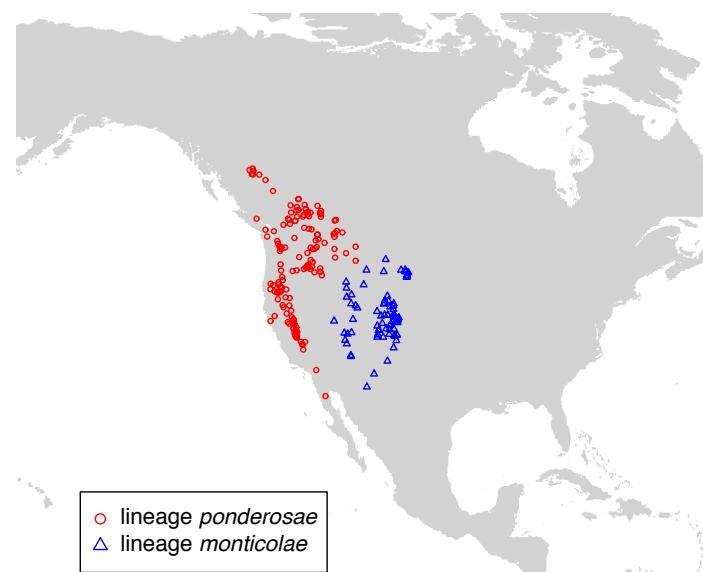
Appendix 1

Figure A1: Pooled occurrences of *Dendroctonus* conspecific lineages

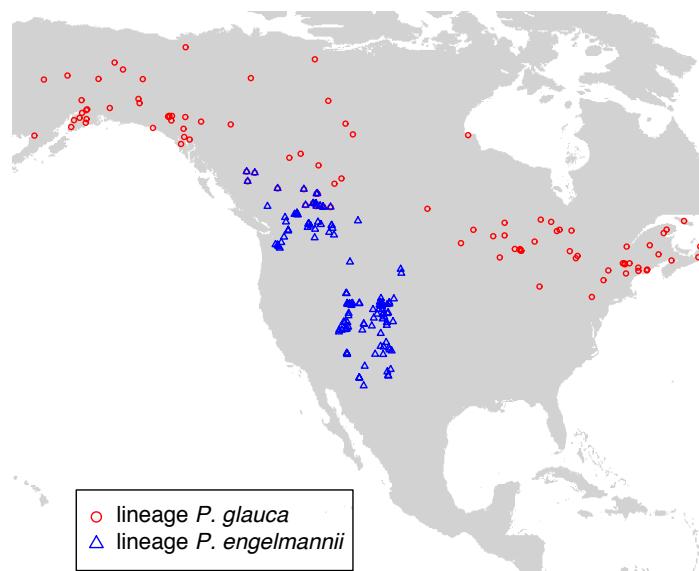
(a) *Dendroctonus valens*



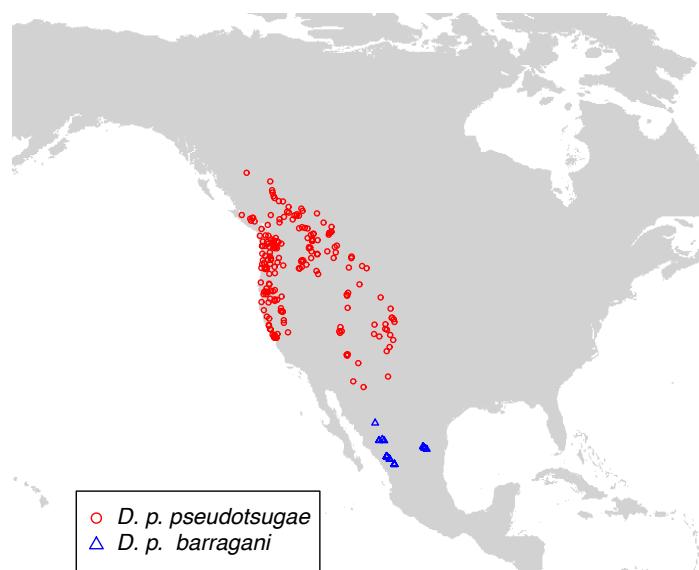
(b) *Dendroctonus ponderosae*



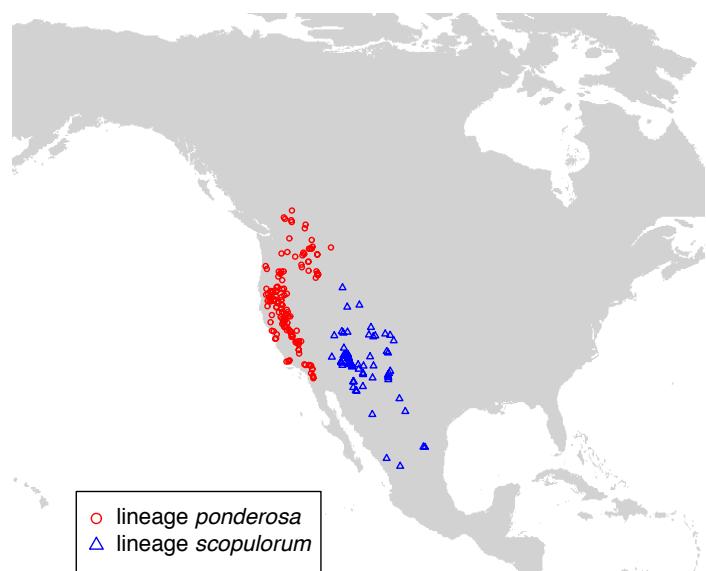
(c) *Dendroctonus rufipennis*



(d) *Dendroctonus pseudotsugae*



(e) *Dendroctonus brevicomis*



Appendix 2. Background area where pseudo-absences were generated when investigating niche divergence among conspecific lineages.

(a) *Dendroctonus valens*

- Eastern lineage: Eastern America (latitude between 23°N and 72 °N/longitude between 95°W and 50°W)
- Western lineage: Western America (latitude between 30°N and 72 °N/longitude between 150°W and 92°W)
- Southern lineage: Mexico and Central America (latitude between 12°N and 30 °N/longitude between 150°W and 82°W)

(b) *Dendroctonus ponderosae*

- Lineage monticola : Western America (latitude between 25°N and 72 °N/longitude between 115°W and 100°W)
lineage ponderosae : Western America (latitude between 30°N and 72 °N/longitude between 150°W and 110°W)

(c) *Dendroctonus rufipennis*

- lineage *P. glauca*: Northern America (latitude between 35°N and 72 °N/longitude between 150°W and 72°W)
- lineage *P. engelmannii*: North-Western America (latitude between 30°N and 55 °N/longitude between 150°W and 100°W)

(d) *Dendroctonus pseudotsugae*

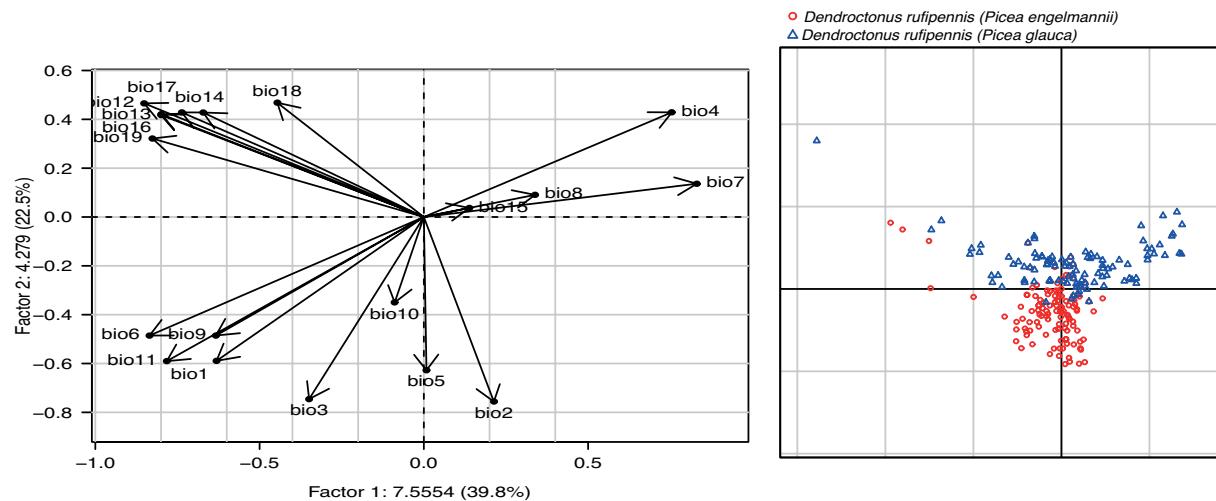
- D. p. pseudotsugae* : Western America (latitude between 30°N and 72 °N/longitude between 150°W and 92°W)
- D. p. barragani* : Mexico and Central America (latitude between 17°N and 30 °N/longitude between 150°W and 82°W)

(e) *Dendroctonus brevicomis*

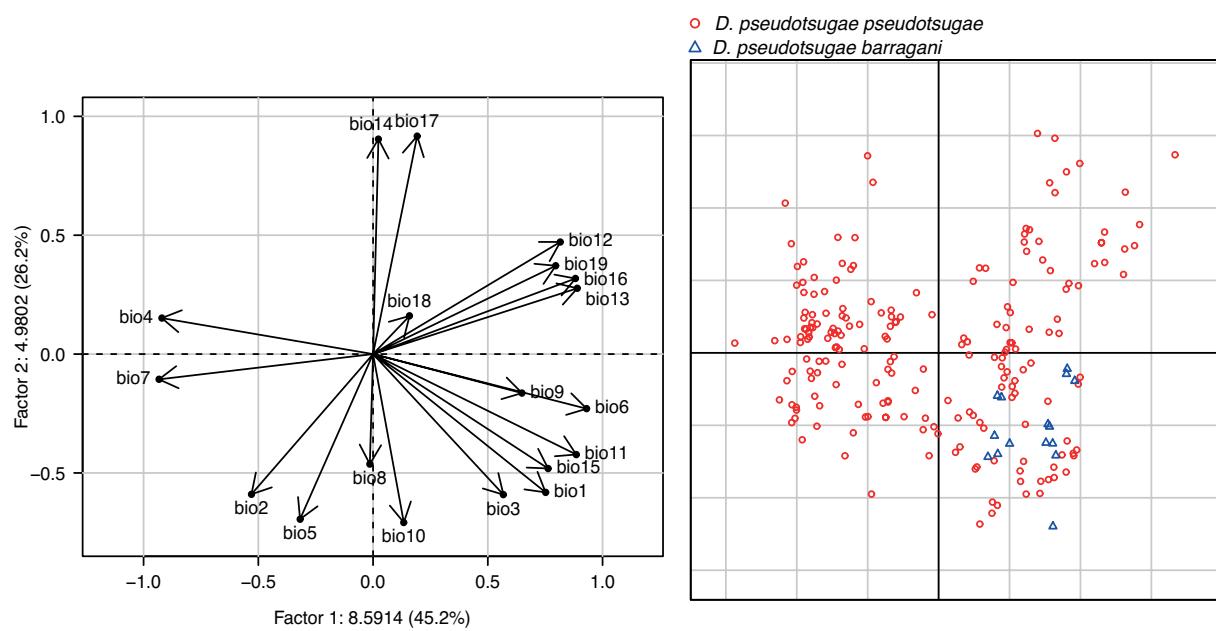
- lineage *P. p. scopolorum*: Western America (latitude between 25°N and 72 °N/longitude between 114°W and 100°W)
- lineage *P. p. ponderosae*: Western America (latitude between 30°N and 72 °N/longitude between 150°W and 113°W)

Figure A3: Principal component analysis of climatic data extracted from occurrences of *Dendroctonus rufipennis*, *D. pseudotsugae* and *D. brevicomis* lineages

(a) *Dendroctonus rufipennis*



(b) *Dendroctonus pseudotsugae*



(c) *Dendroctonus brevicomis*

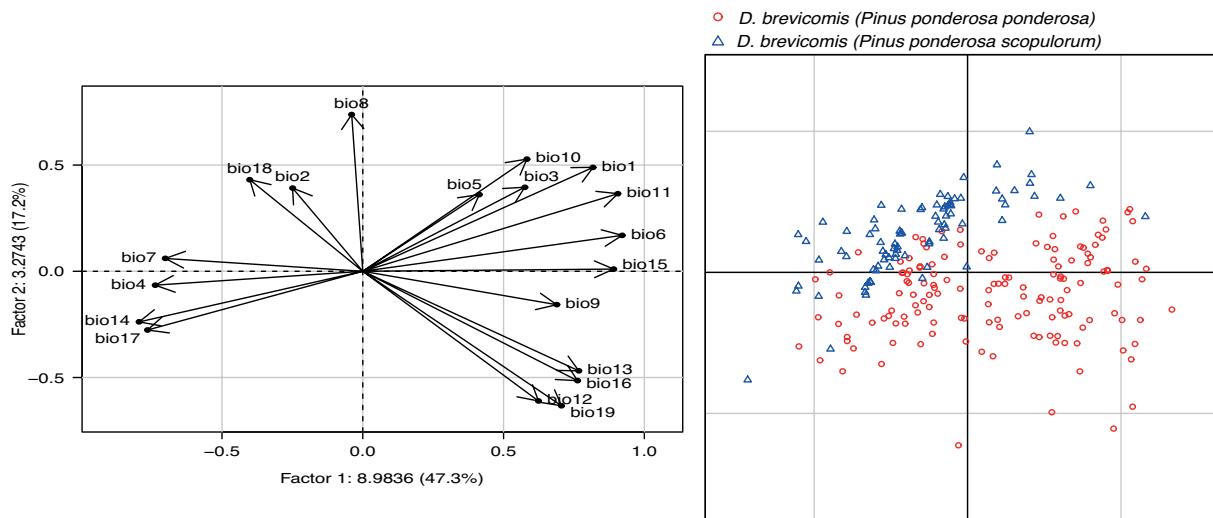
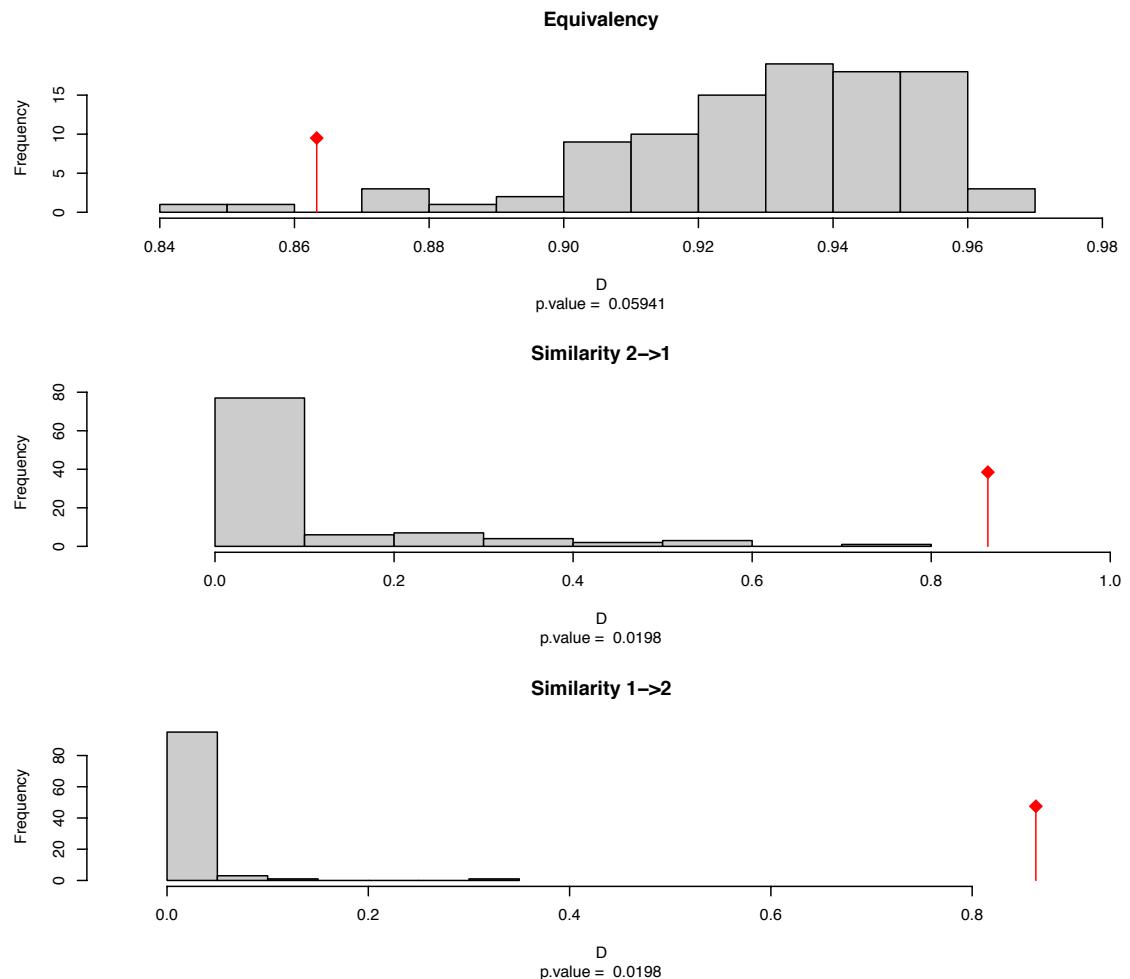
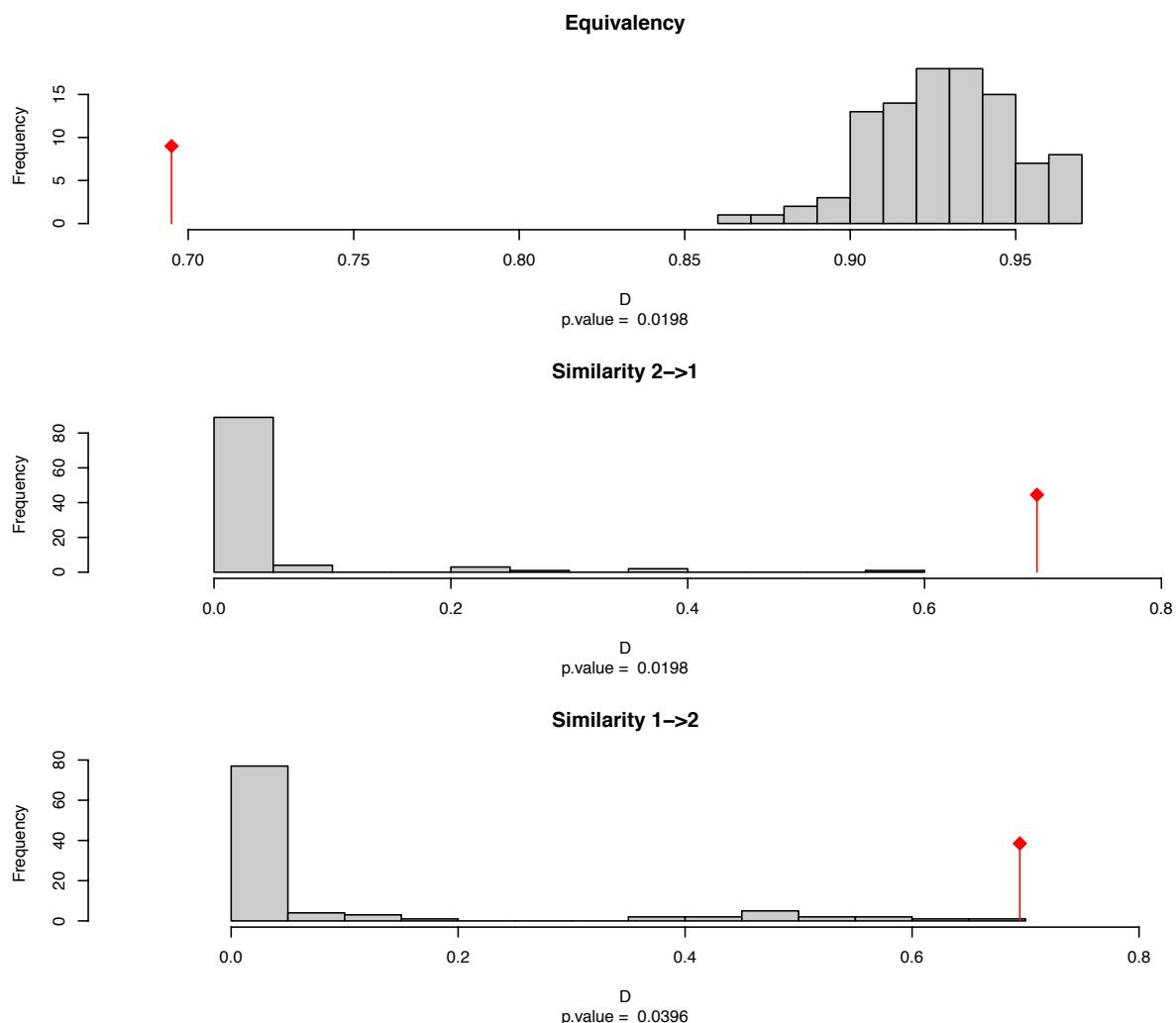


Figure A4: Niche similarity and equivalency tests based on Schoener's D index performed with MaxEnt algorithm.

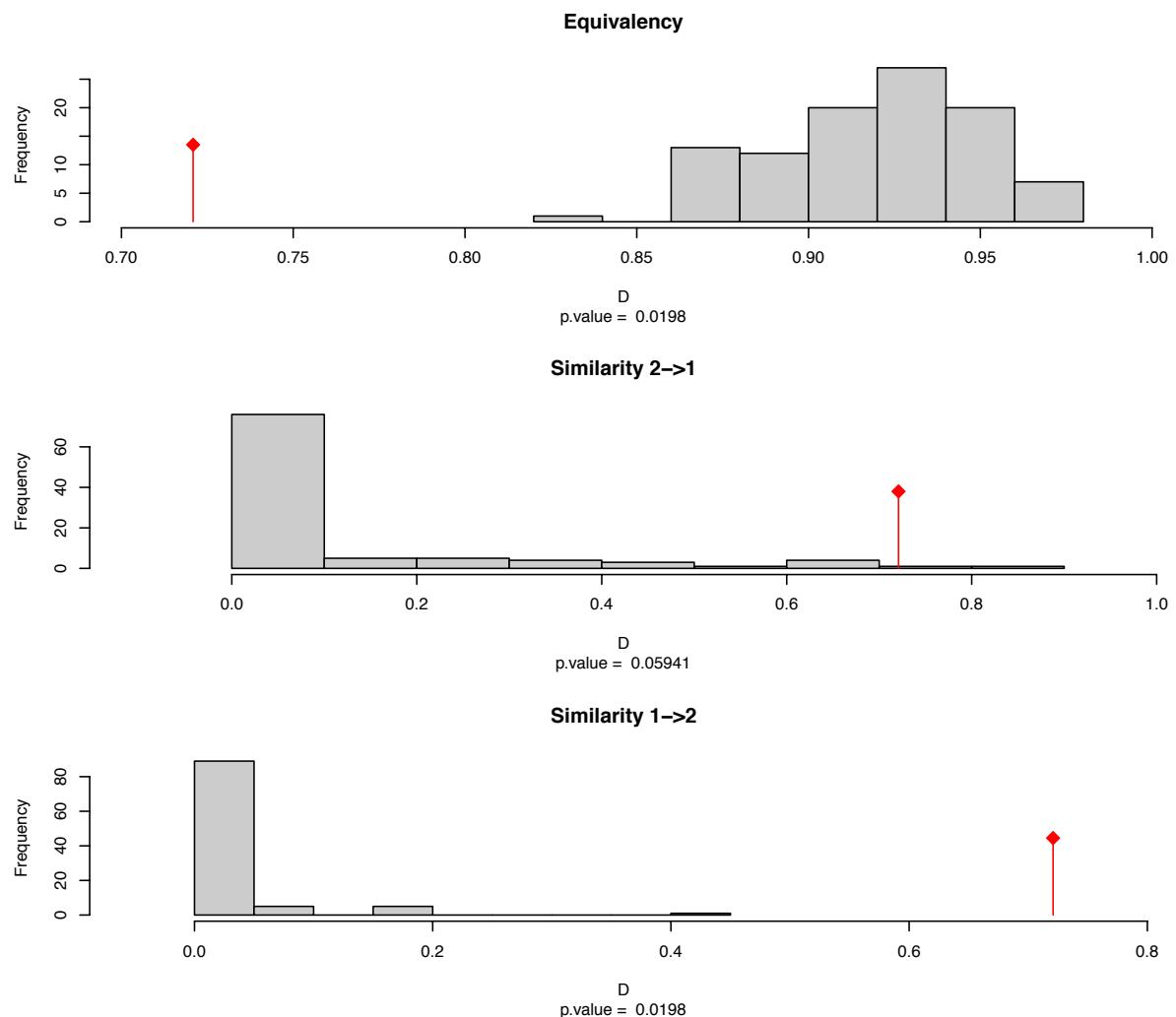
(a) *Dendroctonus valens*: lineage Eastern America vs lineage Western America



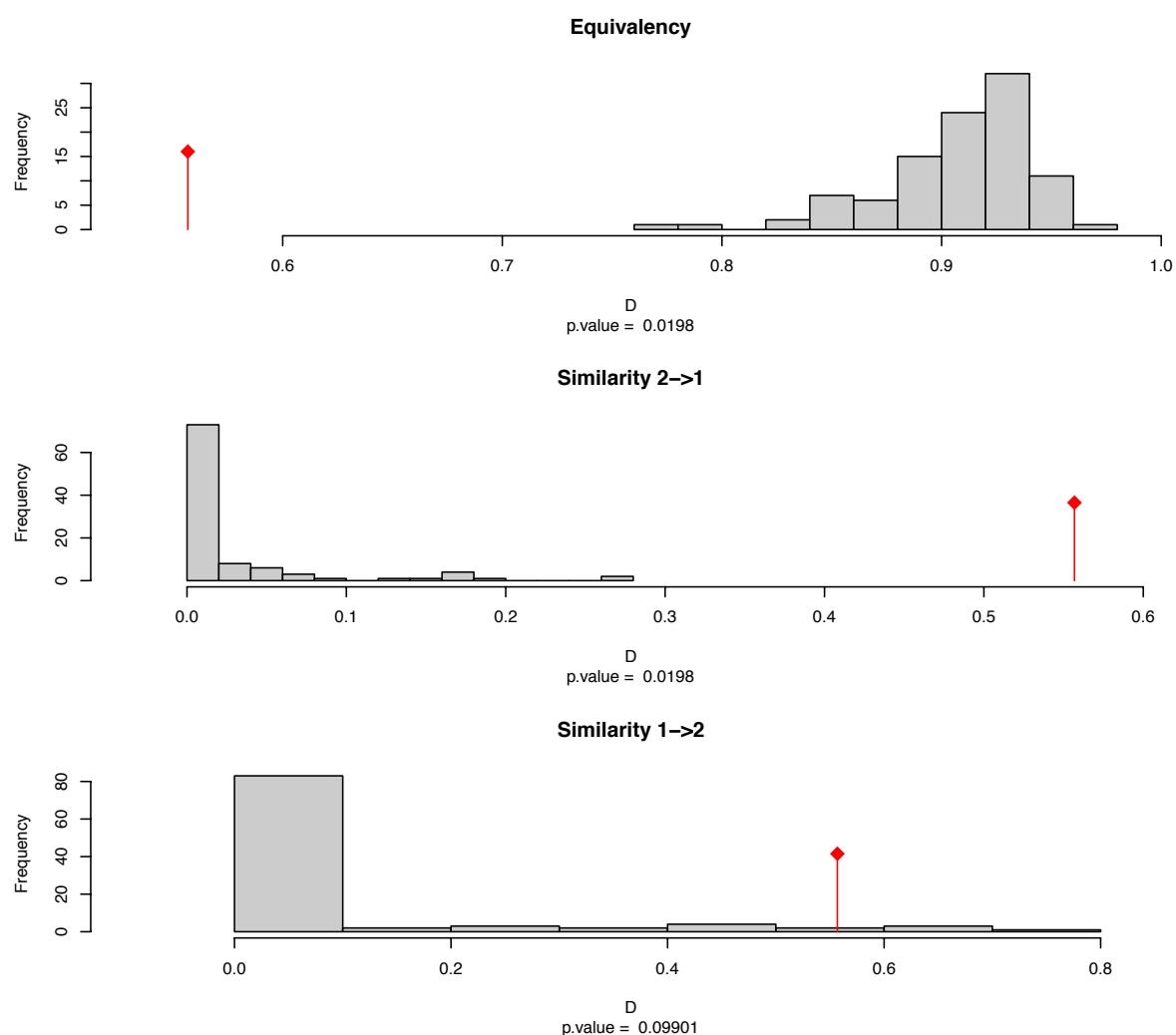
(b) *Dendroctonus valens*: lineage Eastern America vs southern lineage



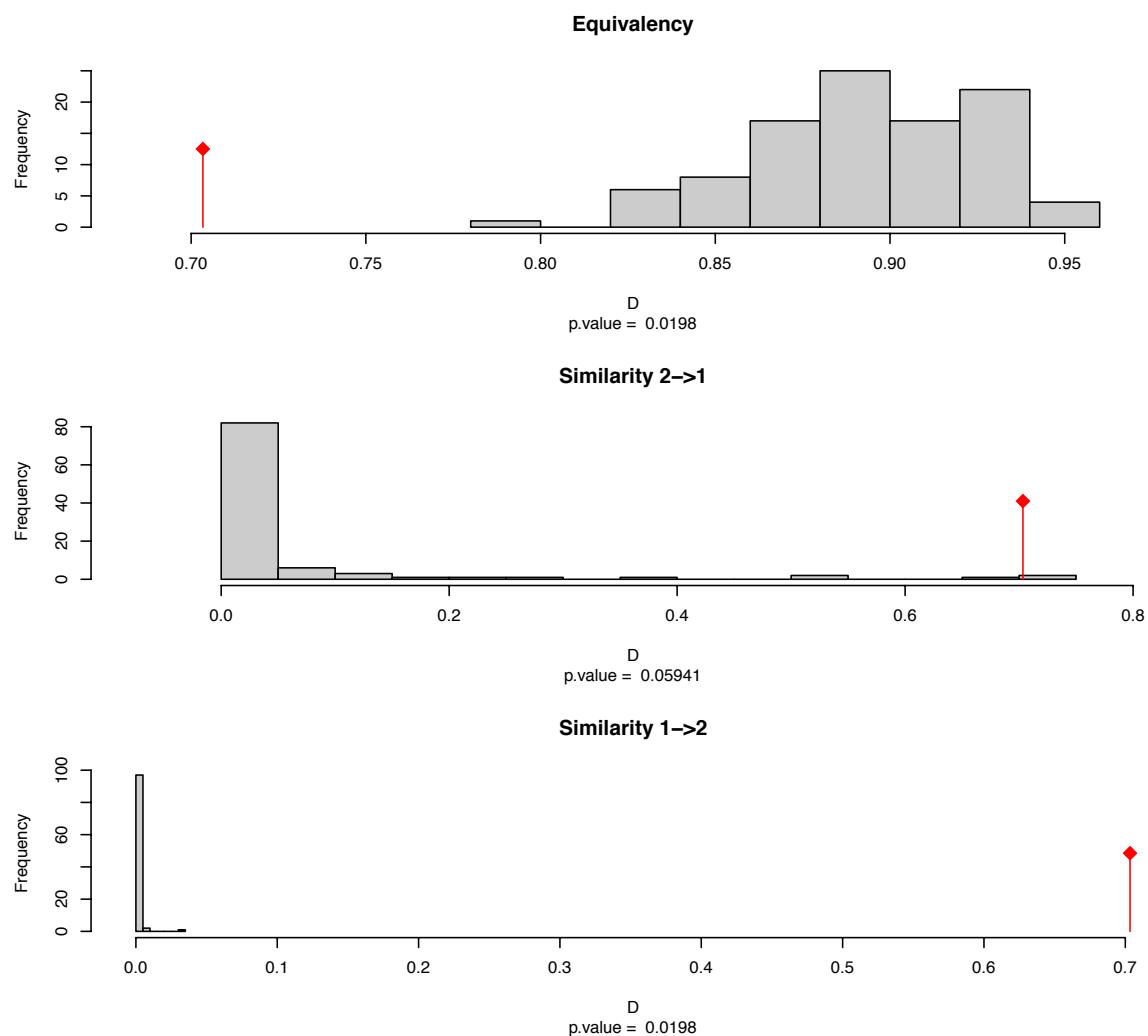
(c) *Dendroctonus valens*: lineage Western America vs southern lineage



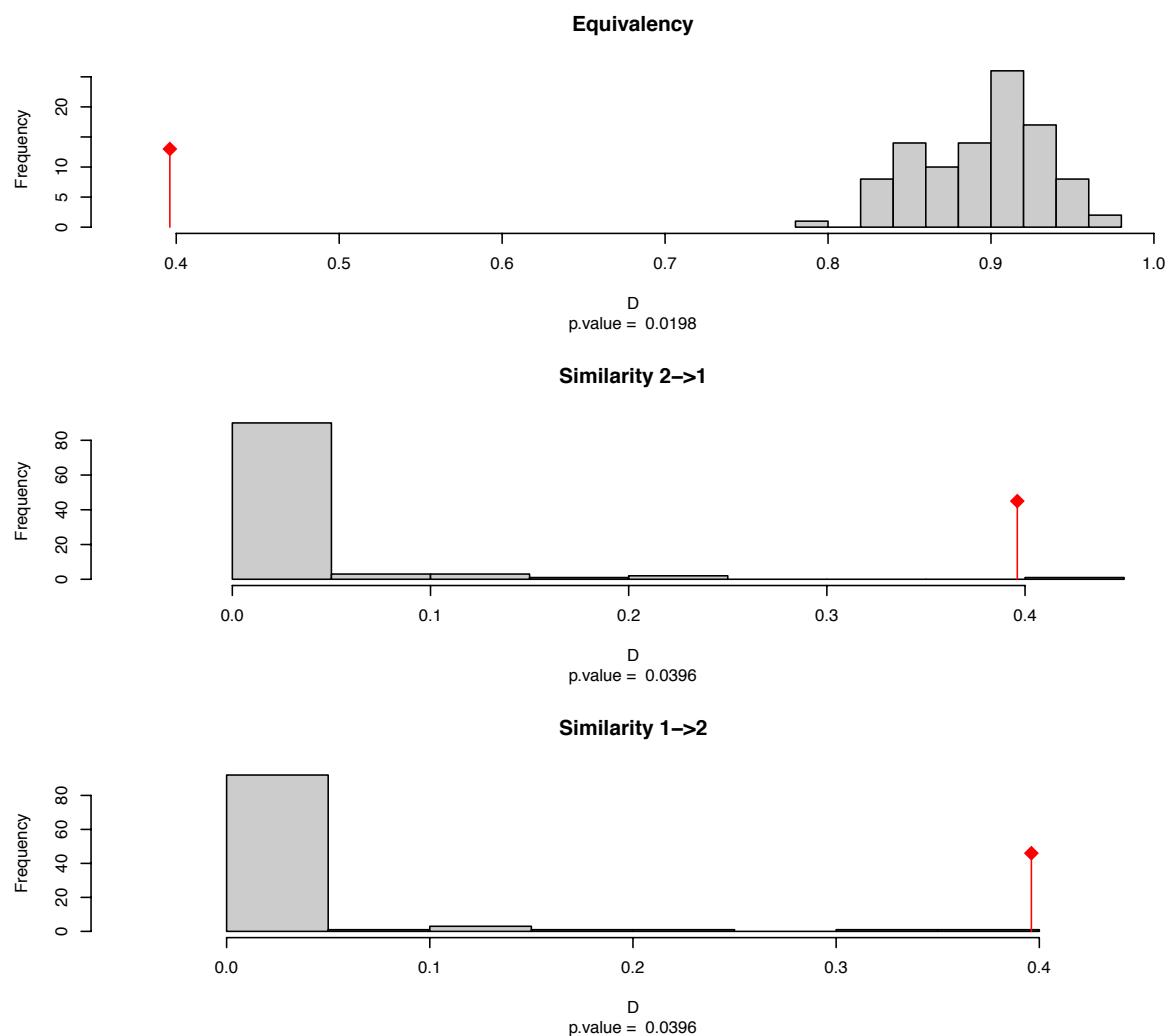
(d) *Dendroctonus ponderosae*



(e) *Dendroctonus rufipennis*



(f) *Dendroctonus pseudotsugae*



(g) *Dendroctonus brevicomis*

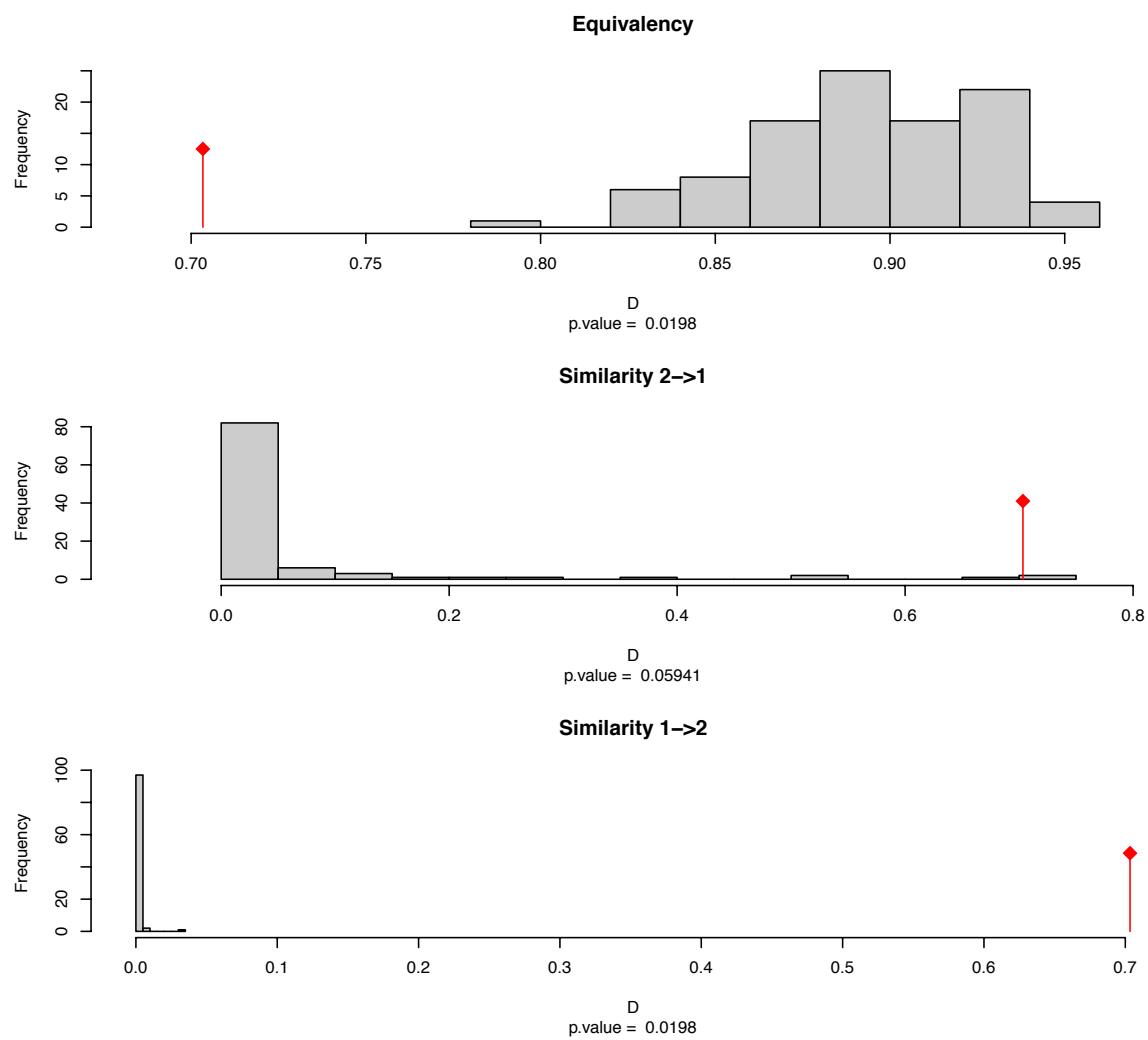


Table A5 Boyce Index calculated for each model

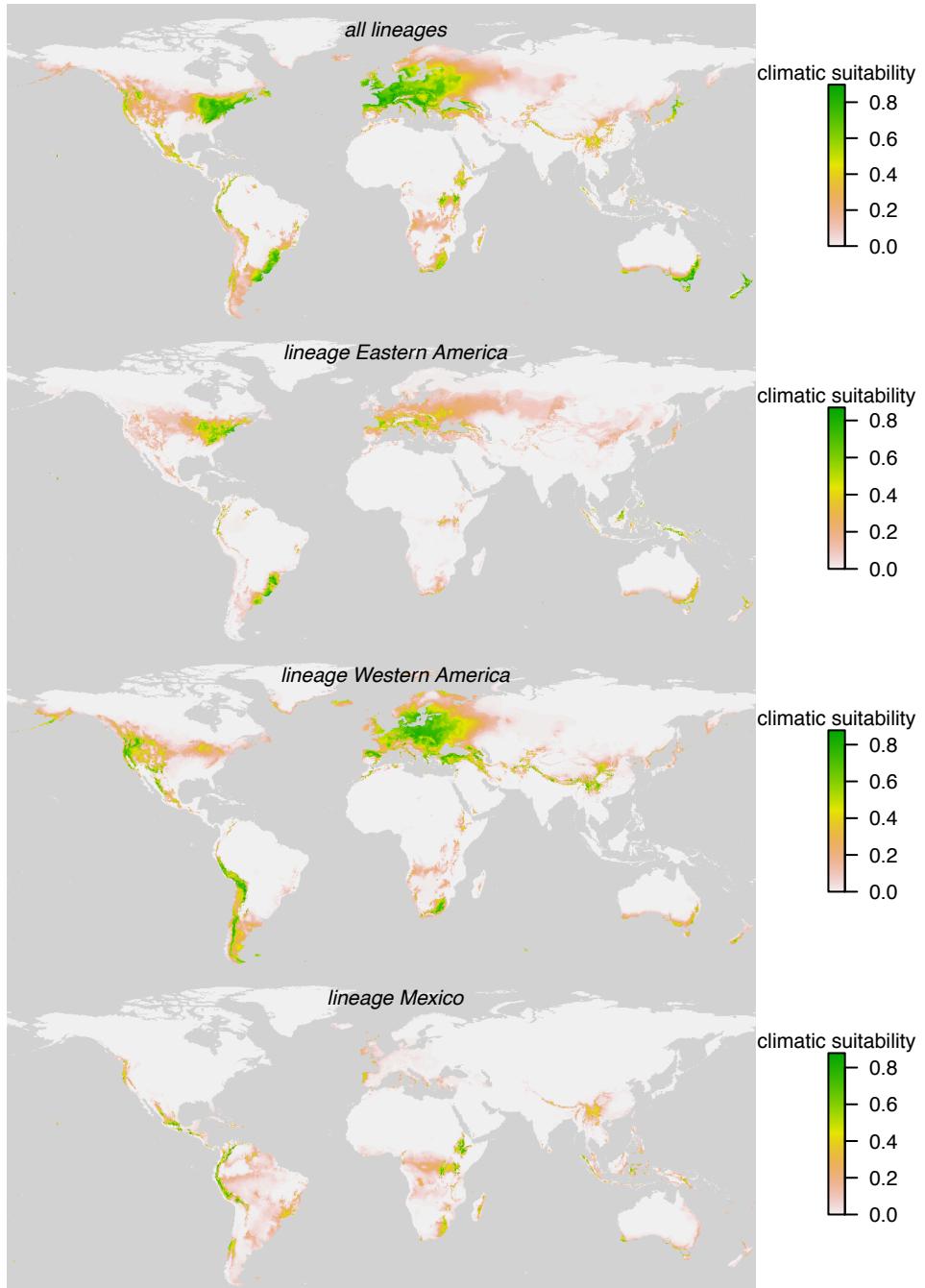
Tanonomic entity					BRT					
	model1	model2	model3	model4	model5	model6	model7	model8	model9	model10
D. brevicomis all lineages	0.651	0.756	0.536	0.733	0.84	0.809	0.728	0.668	0.815	0.689
D. brevicomis lineage P. p. scopulorum	0.864	0.418	0.507	0.485	0.847	0.82	0.623	0.68	0.616	0.666
D. brevicomis lineage P. p. ponderosae	0.351	0.52	0.626	0.167	0.518	0.382	0.334	0.71	0.565	0.717
D. pseudotsugaes all lineages	0.704	0.711	0.558	0.58	0.577	0.447	0.758	0.798	0.622	0.029
D. pseudotsugaes pseudotsugae	0.621	0.69	0.719	0.443	0.496	0.608	0.655	0.74	0.715	0.741
D. pseudotsugaes barragani	0.223	-0.559	-0.365	-0.44	-0.05	0.099	0.5	-0.538	0.292	0.45
D. rufipennis all lineages	0.854	0.883	0.534	0.925	0.906	0.652	0.642	0.674	0.625	0.839
D. rufipennis lineage P. glauca	0.816	0.681	0.703	0.701	0.836	0.68	0.899	0.821	0.712	0.754
D. rufipennis lineage P. engelmannii	0.716	0.74	0.683	0.824	0.797	0.718	0.675	0.525	0.85	0.589
D. ponderosae all lineages	0.708	0.688	0.9	0.88	0.843	0.803	0.749	0.781	0.843	0.789
D. ponderosae lineage moticola	0.864	0.418	0.507	0.485	-0.14	0.566	0.618	0.263	0.728	0.666
D. ponderosae lineage ponderosae	0.589	0.552	0.523	0.293	0.757	0.613	0.38	0.412	0.507	0.434
D. valens all lineages	0.862	0.851	0.941	0.749	0.9	0.868	0.873	0.772	0.896	0.878
D. valens eastern lineage	0.819	0.805	0.902	0.917	0.794	0.854	0.863	0.894	0.857	0.853
D. valens western lineage	0.734	0.741	0.633	0.839	0.74	0.917	0.826	0.724	0.837	0.86
D. valens southern lineage	0.618	0.389	0.565	0.283	0.564	0.388	0.52	0.564	0.378	0.641
	model1	model2	model3	model4	model5	model6	model7	model8	model9	model10
D. brevicomis all lineages	0.635	0.603	0.363	0.651	0.675	0.754	0.355	0.121	0.395	0.789
D. brevicomis lineage P. p. scopulorum	0.406	0.468	0.314	0.327	0.291	0.449	0.639	0.558	0.736	0.125
D. brevicomis lineage P. p. ponderosae	0.24	0.58	0.561	0.759	0.792	0.834	0.65	0.615	0.465	0.452
D. pseudotsugaes all lineages	0.865	0.738	0.857	0.69	0.776	0.861	0.843	0.562	0.843	0.898
D. pseudotsugaes pseudotsugae	0.828	0.498	0.502	0.362	0.822	0.711	0.575	0.842	0.905	0.678
D. pseudotsugaes barragani	0.608	0.669	0.537	0.244	0.246	0.454	0.479	0.531	0.567	0.478
D. rufipennis all lineages	0.71	0.701	0.486	0.633	0.801	0.844	0.806	0.898	0.596	0.77

D. rufipennis lineage P. glauca	0.253	0.576	-0.238	0.437	0.404	0.115	0.542	0.533	0.241	0.2
D. rufipennis lineage P. engelmannii	0.639	0.444	0.241	0.078	0.443	0.52	0.266	0.256	0.586	0.371
D. ponderosae all lineages	0.947	0.896	0.704	0.684	0.785	0.751	0.938	0.85	0.892	0.887
D. ponderosae lineage moticola	0.776	0.268	0.709	0.691	0.245	0.774	0.905	0.757	0.413	0.708
D. ponderosae lineage ponderosae	0.158	0.675	0.621	0.615	0.425	0.592	0.556	0.882	0.419	0.642
D. valens all lineages	0.872	0.893	0.968	0.877	0.891	0.905	0.918	0.964	0.943	0.936
D. valens eastern lineage	0.815	0.587	0.952	0.962	0.493	0.703	0.955	0.515	0.983	0.53
D. valens western lineage	0.855	0.833	0.684	0.881	0.866	0.711	0.644	0.751	0.675	0.576
D. valens southern lineage	0.864	0.623	0.335	0.649	0.609	0.409	0.331	0.294	0.512	0.492

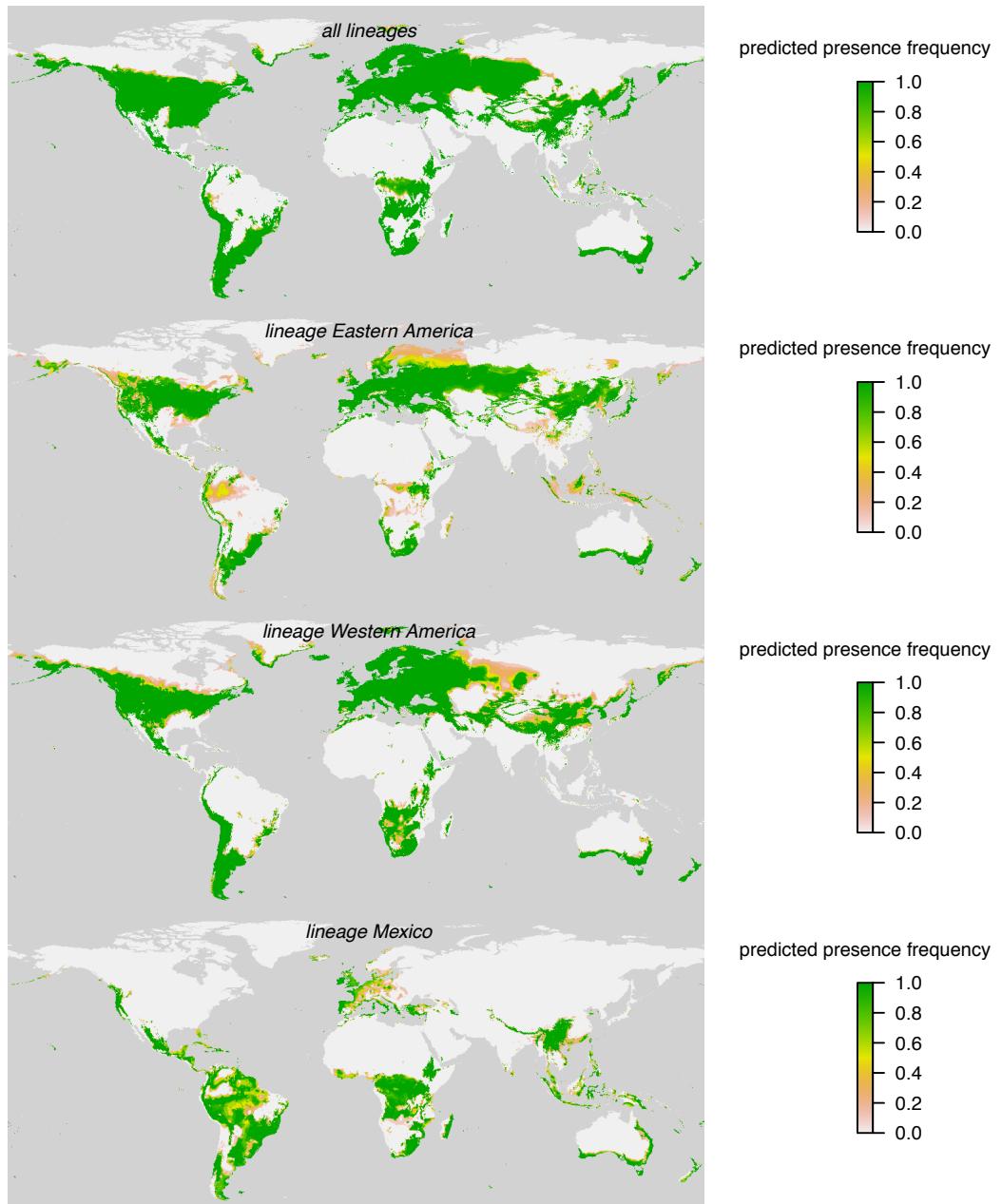
Figure A6: Maps of climatic suitability predicted by MaxEnt lineage-based models for *Dendroctonus* species. Climatic suitability maps display the arithmetic mean of values of 10 replicates. We also represented a map displaying the frequency at which models (out of 10 replicates) predicted a presence when transformed into binary maps with the lowest presence threshold.

(a) *Dendroctonus valens*

Climatic suitability

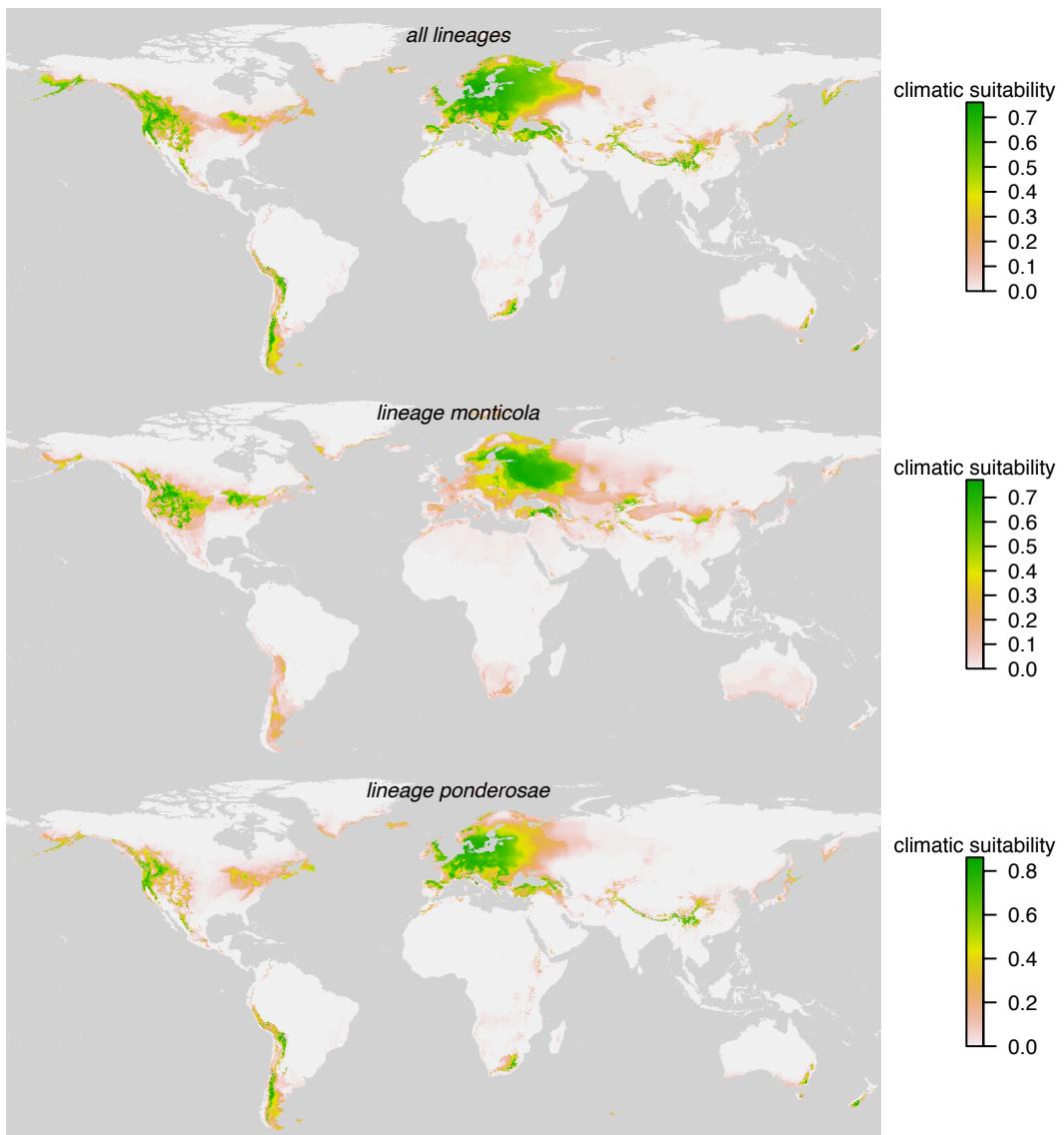


Lowest presence threshold (LPT)

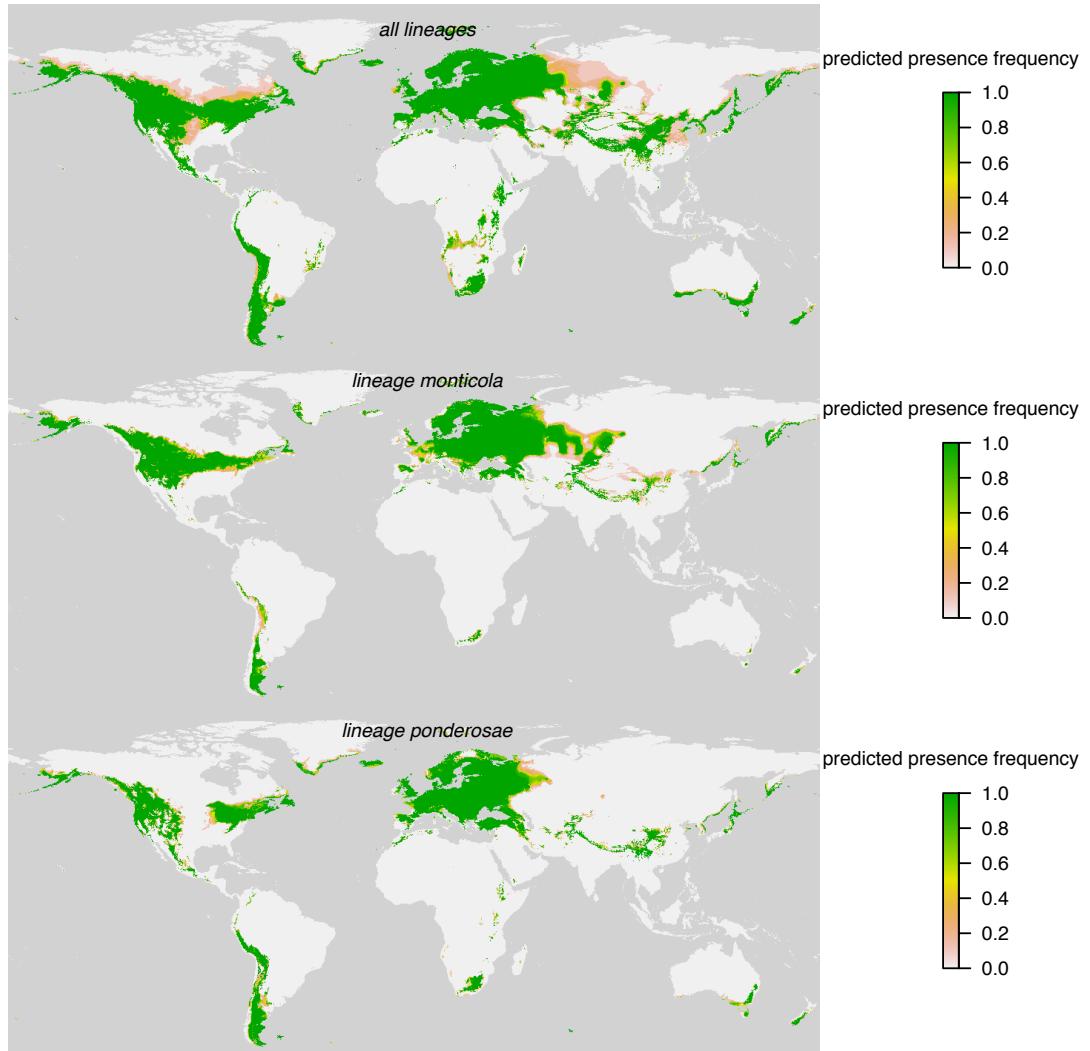


(b) *Dendroctonus ponderosae*

Climatic suitability

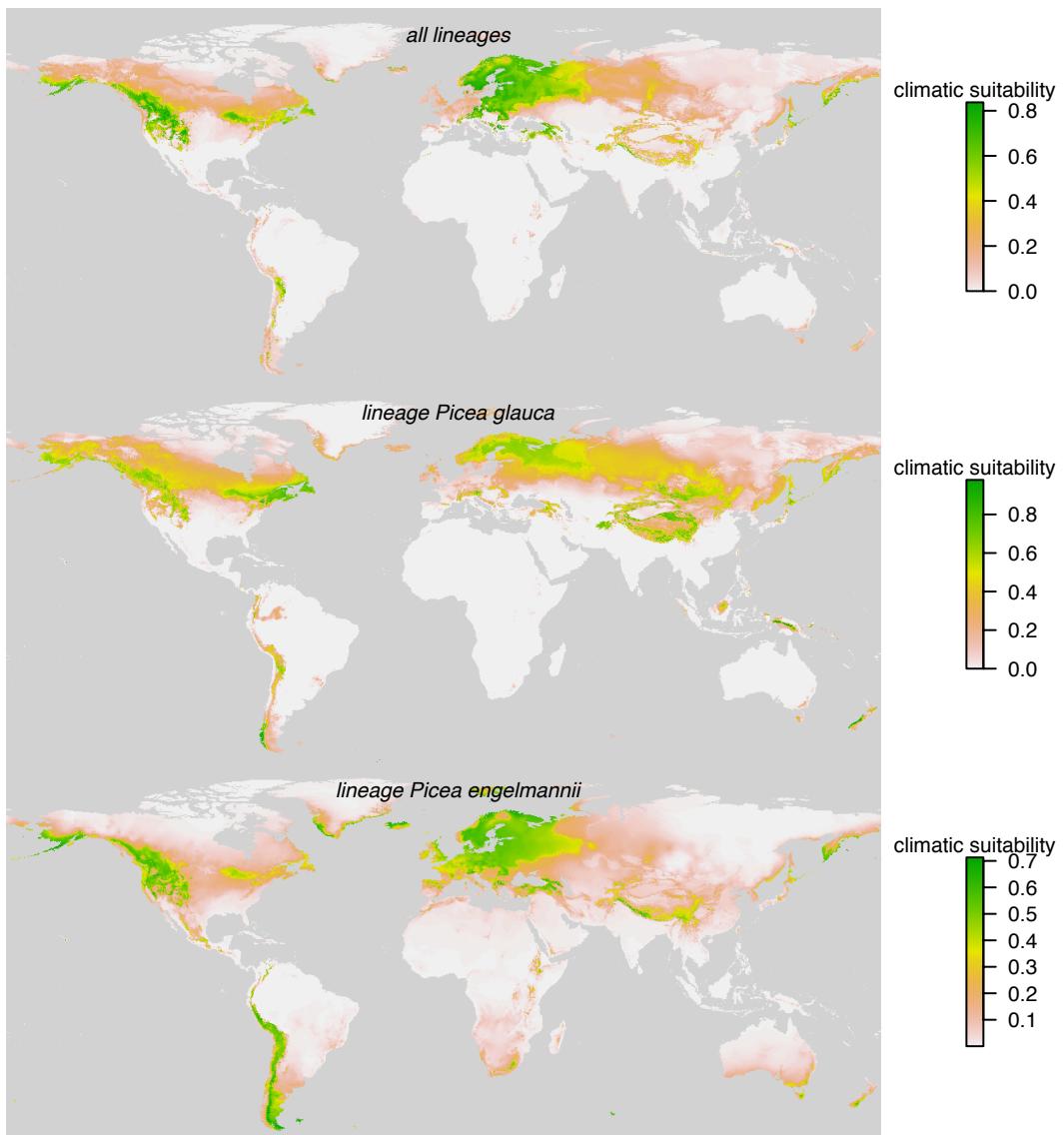


Lowest presence threshold (LPT)

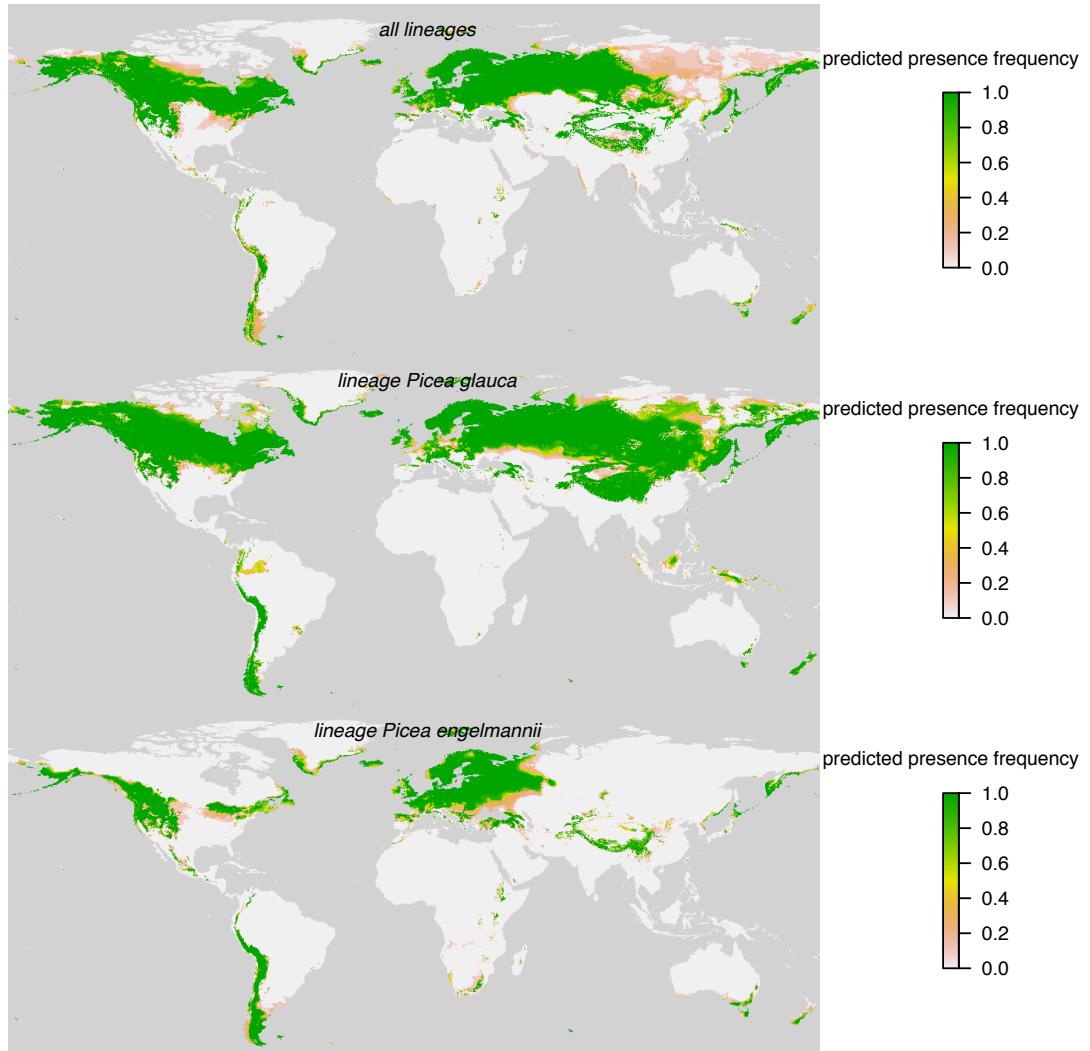


(c) *Dendroctonus rufipennis*

Climatic suitability

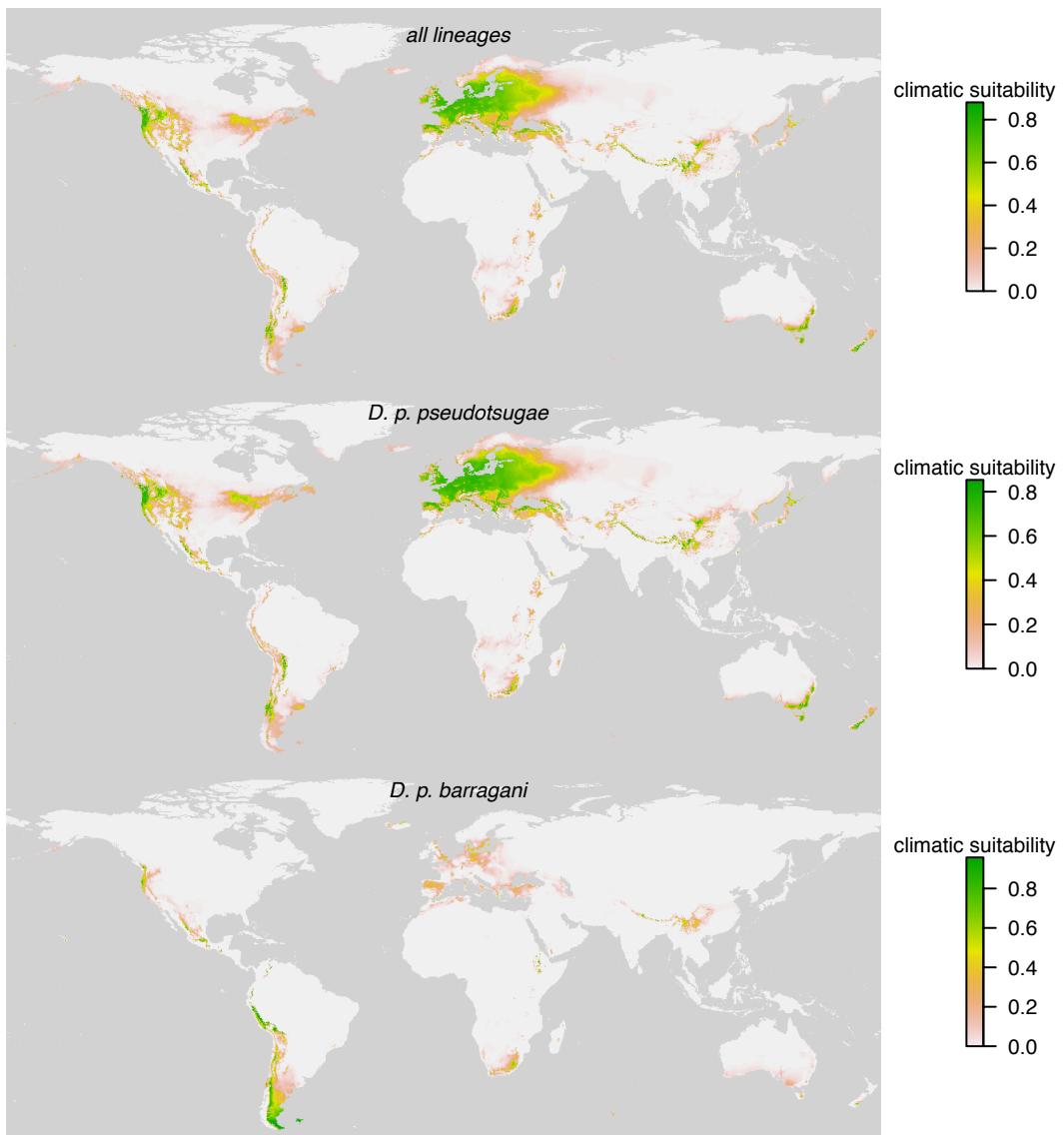


Lowest presence threshold (LPT)

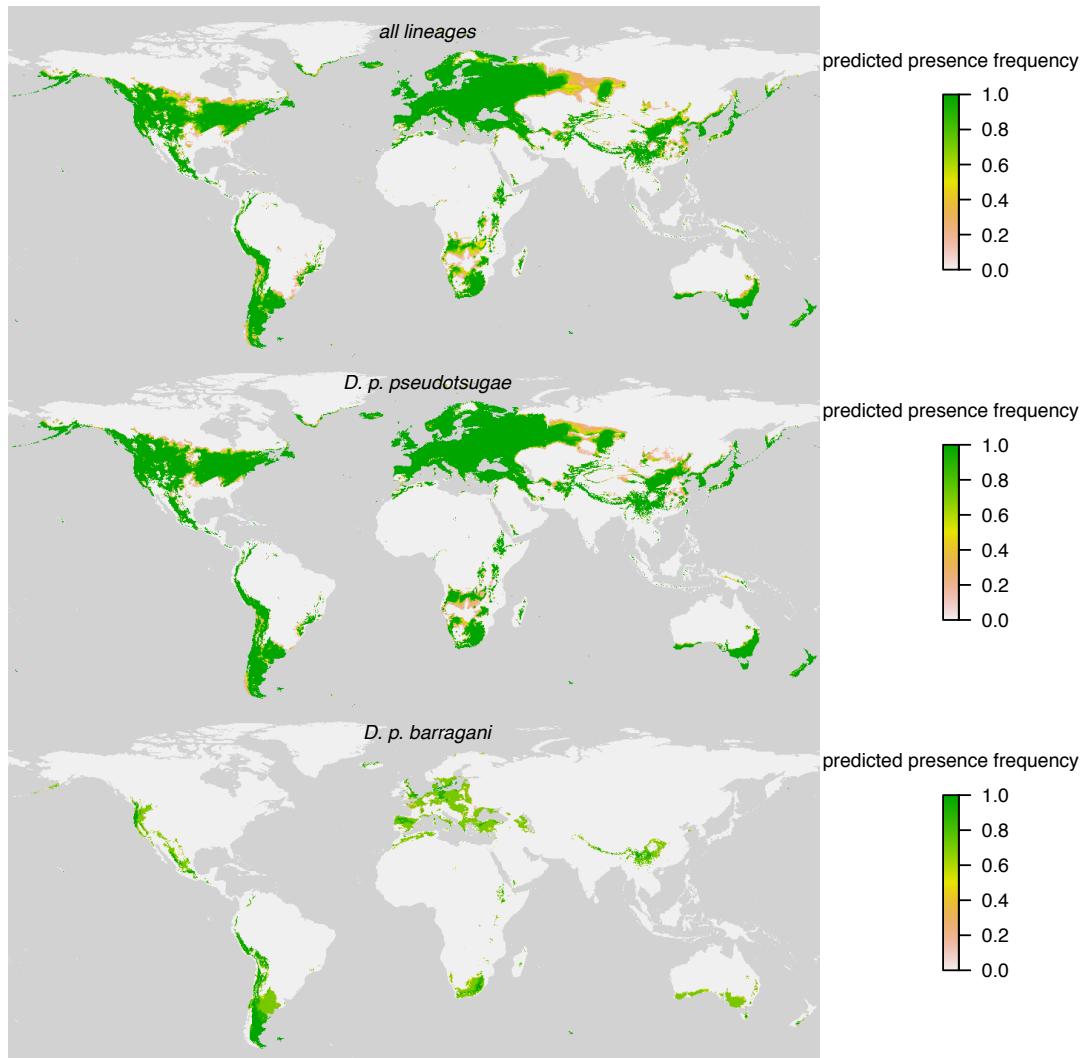


(d) *Dendroctonus pseudotsugae*

Climatic suitability

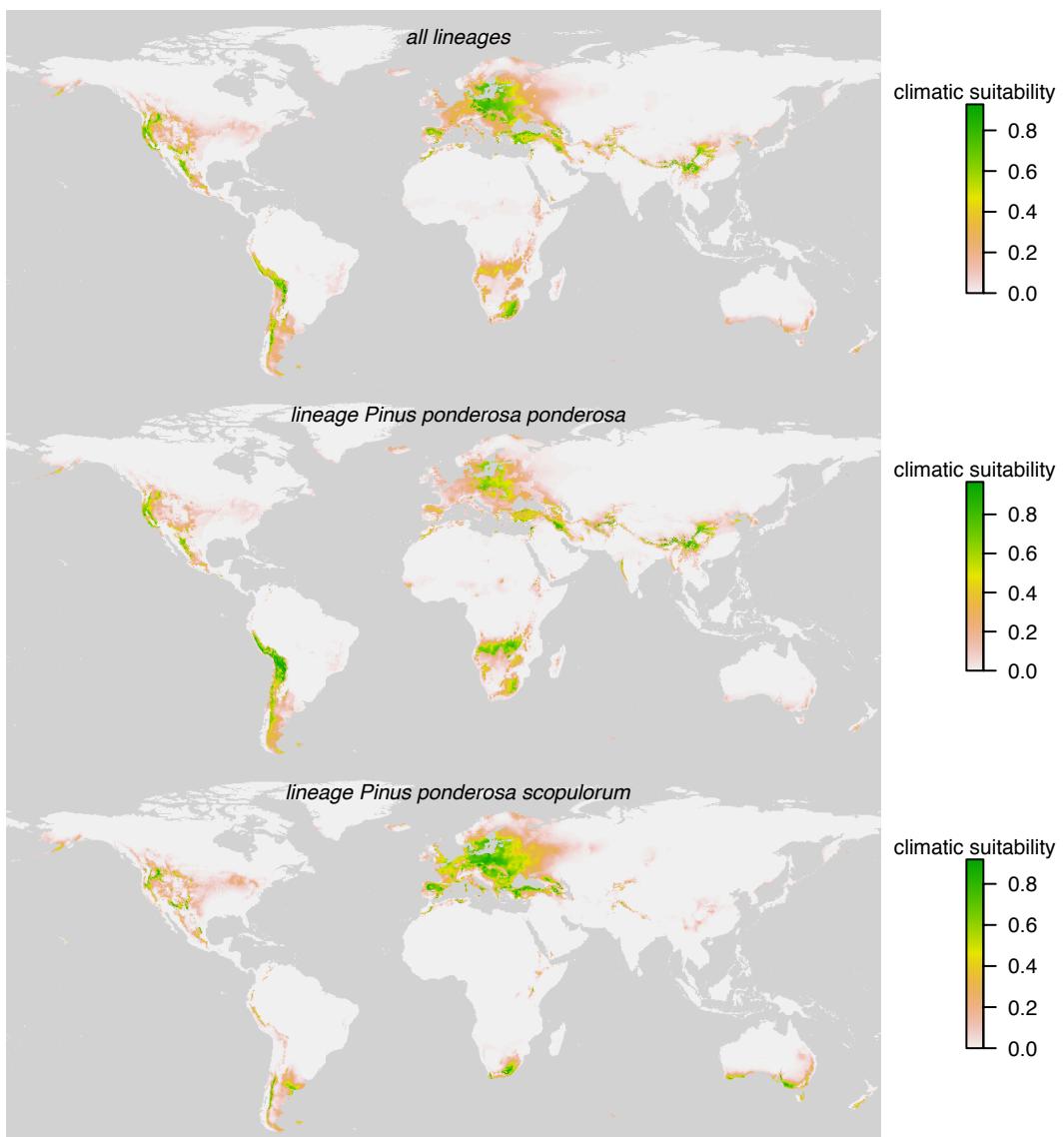


Lowest presence threshold (LPT)



(e) *Dendroctonus brevicomis*

Climatic suitability



Lowest presence threshold (LPT)

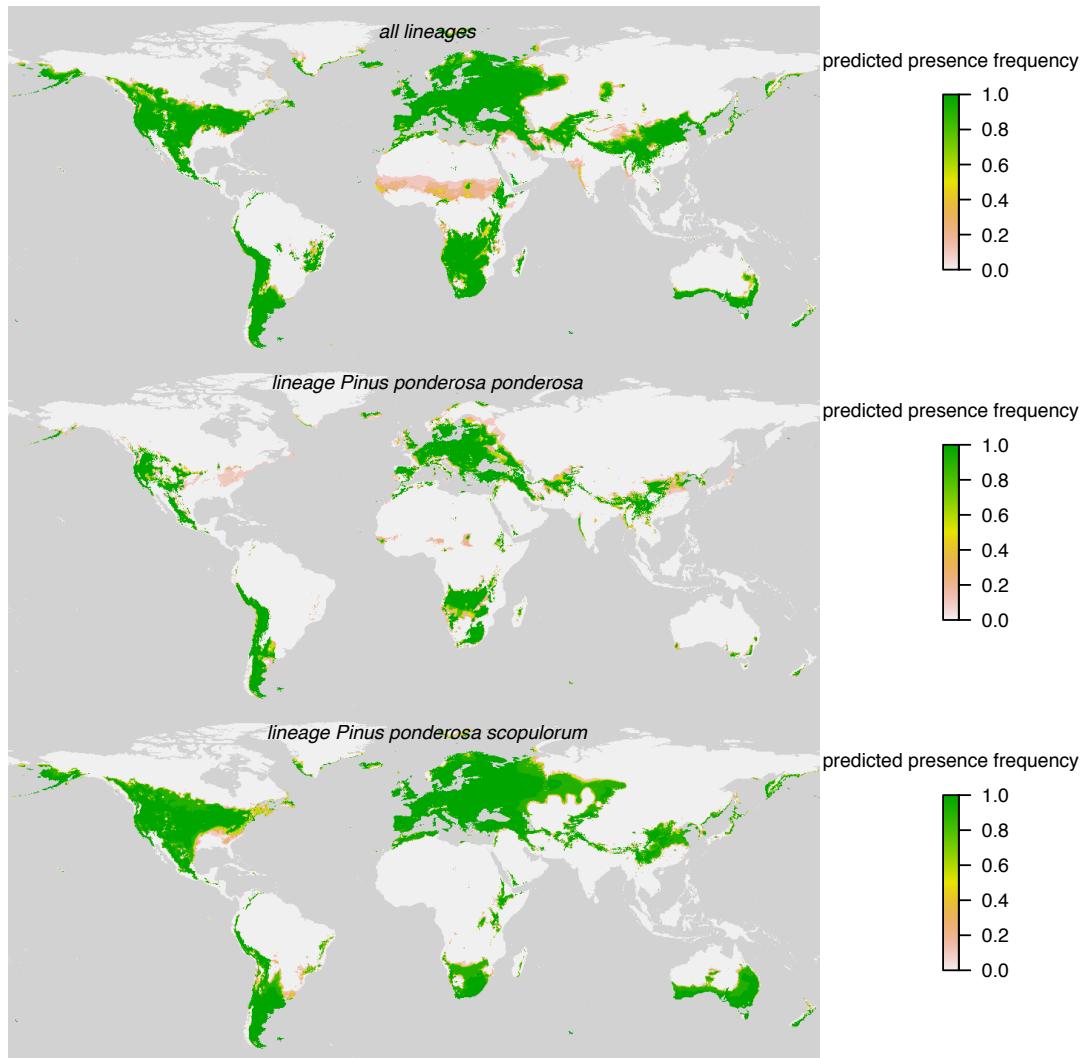
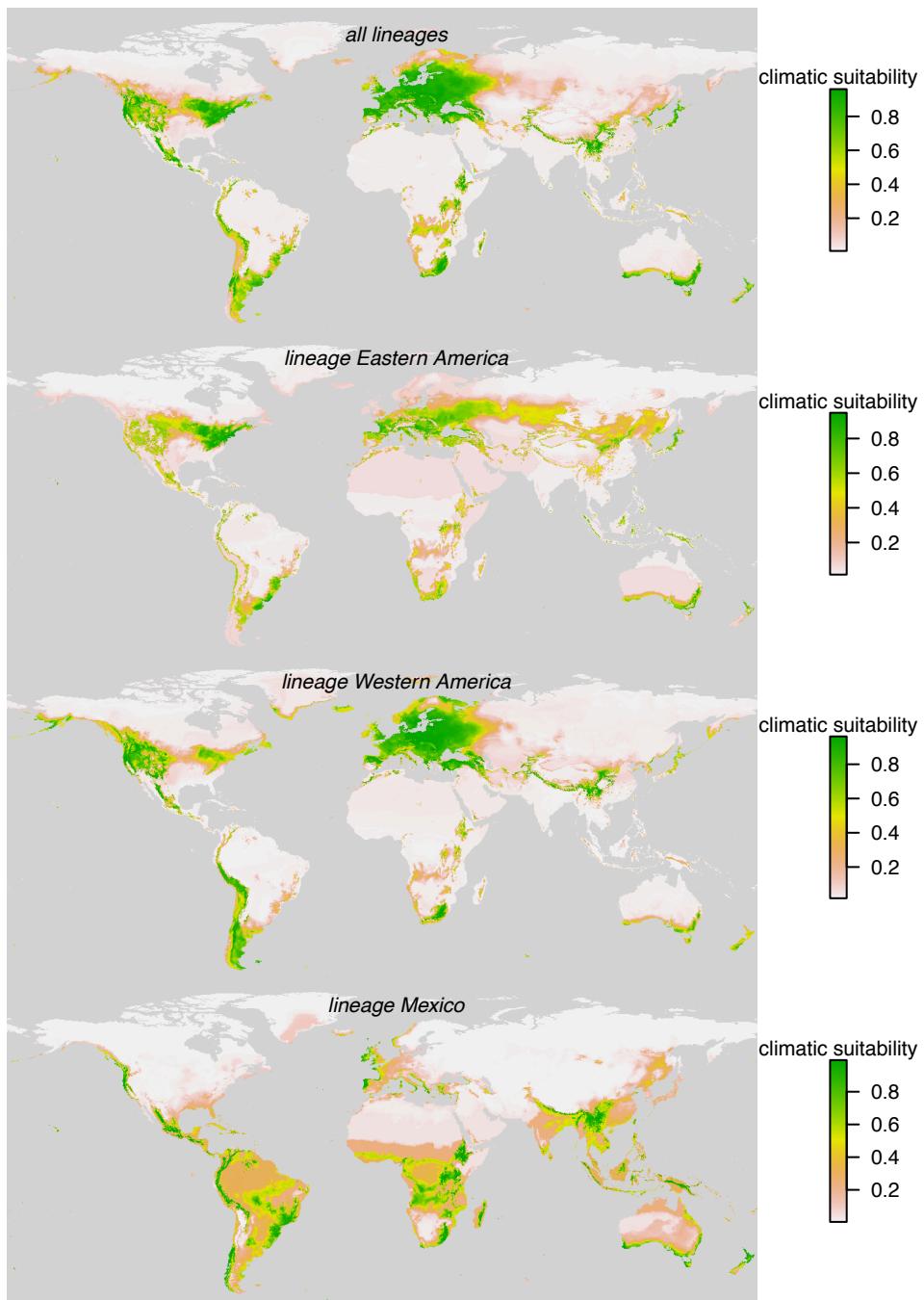


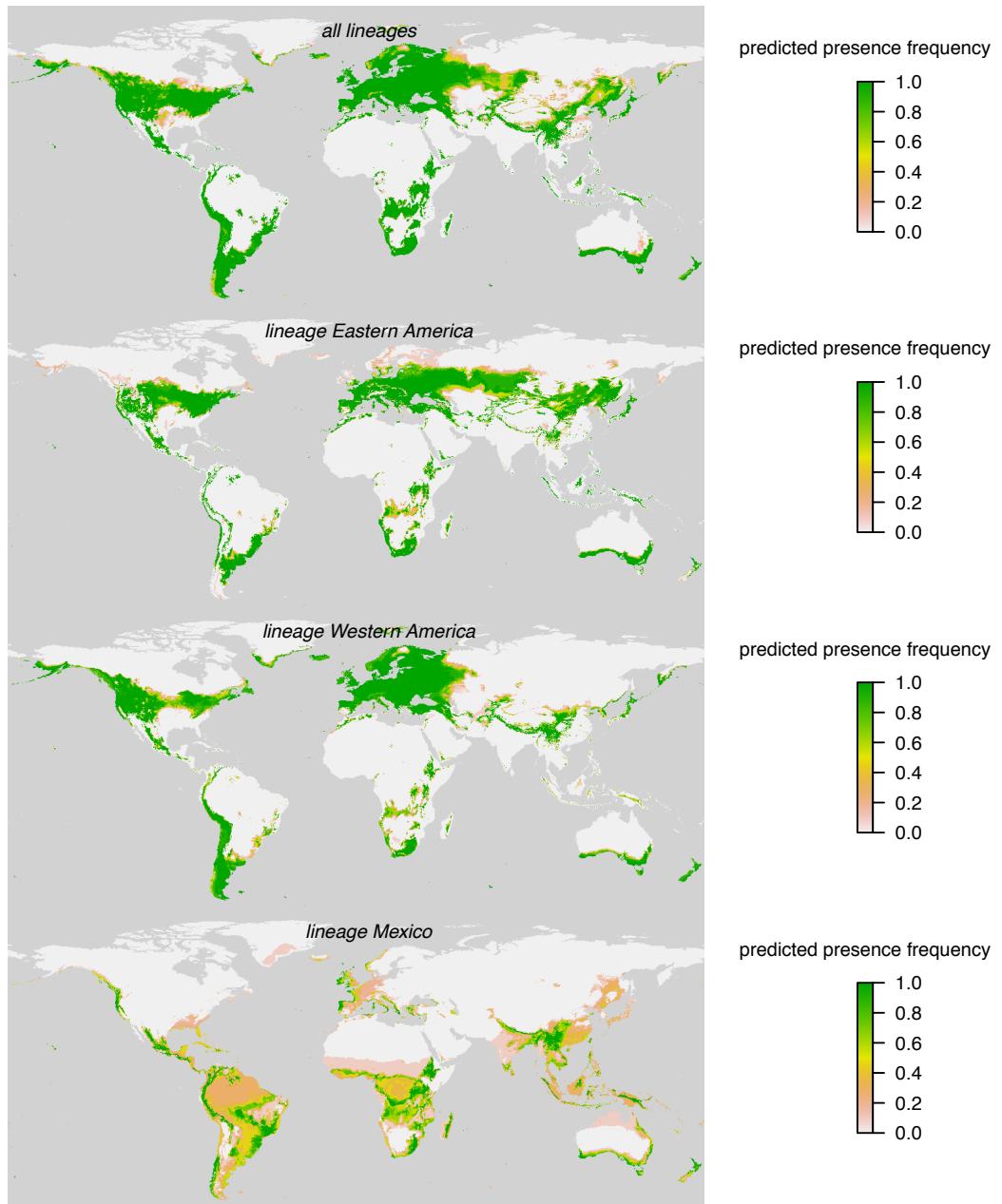
Figure A7: Maps of climatic suitability predicted by Boosted regression trees lineage-based models for *Dendroctonus* species (mean of 10 replicates).

(a) *Dendroctonus valens*

Climatic suitability

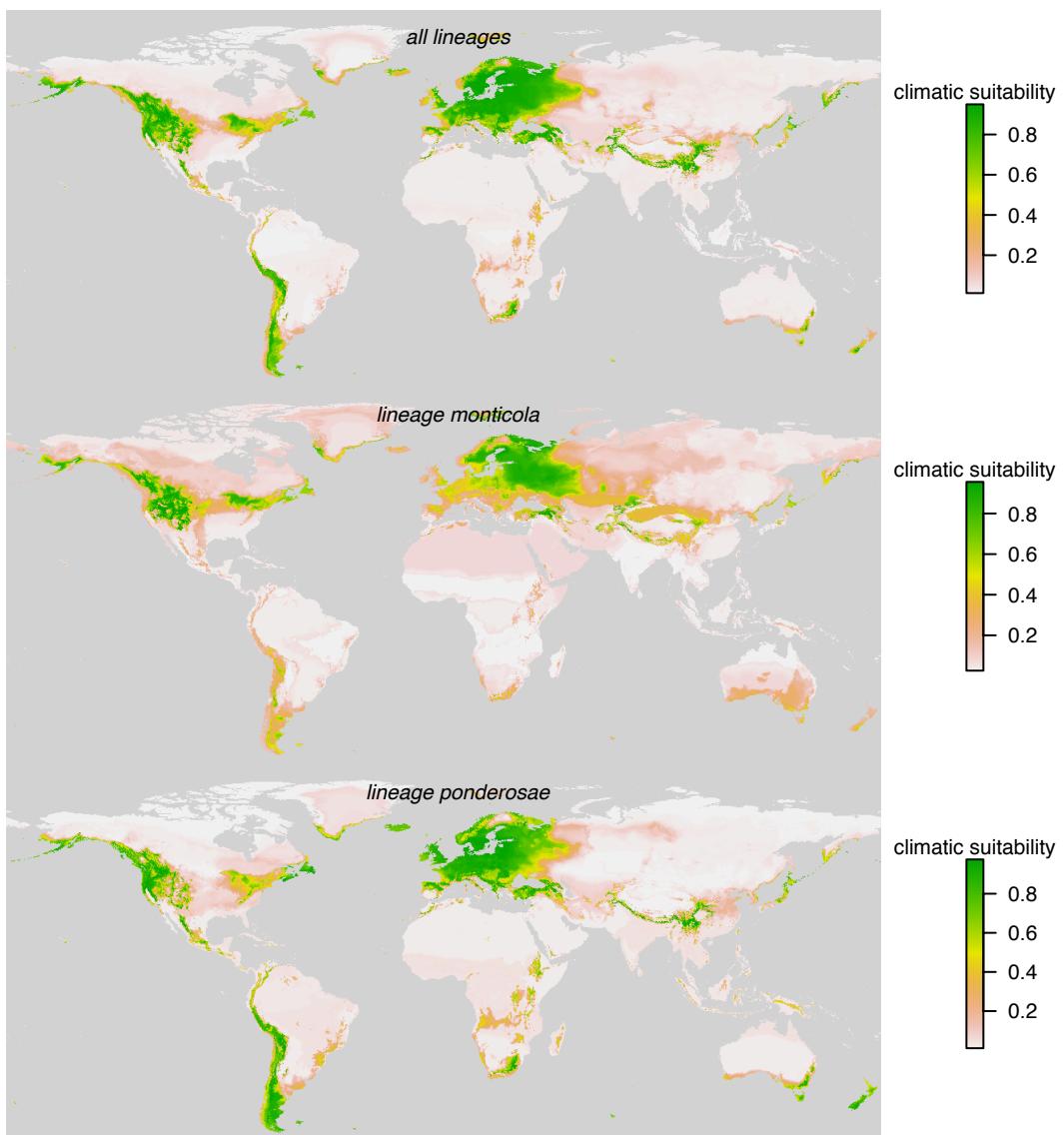


Lowest presence threshold (LPT)

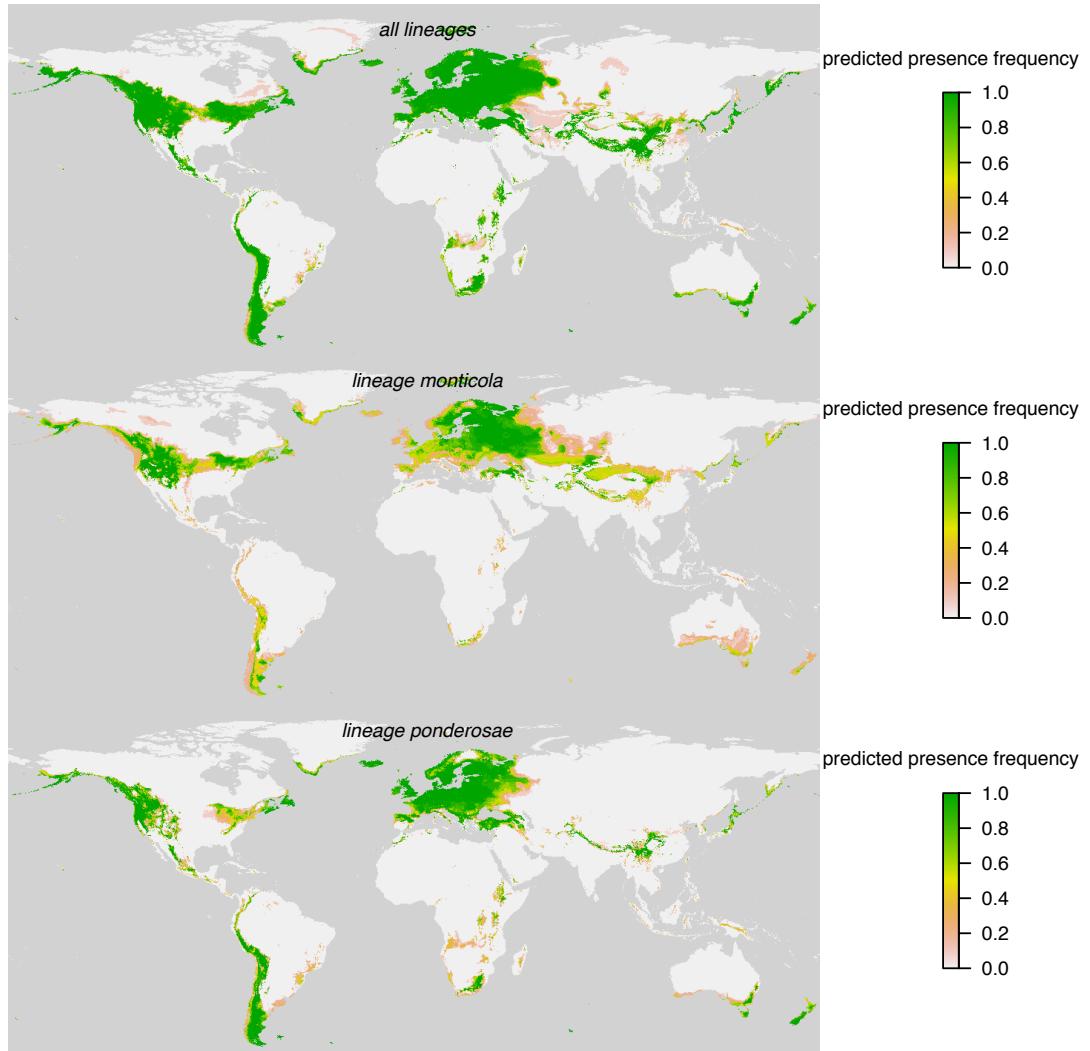


(b) *Dendroctonus ponderosae*

Climatic suitability

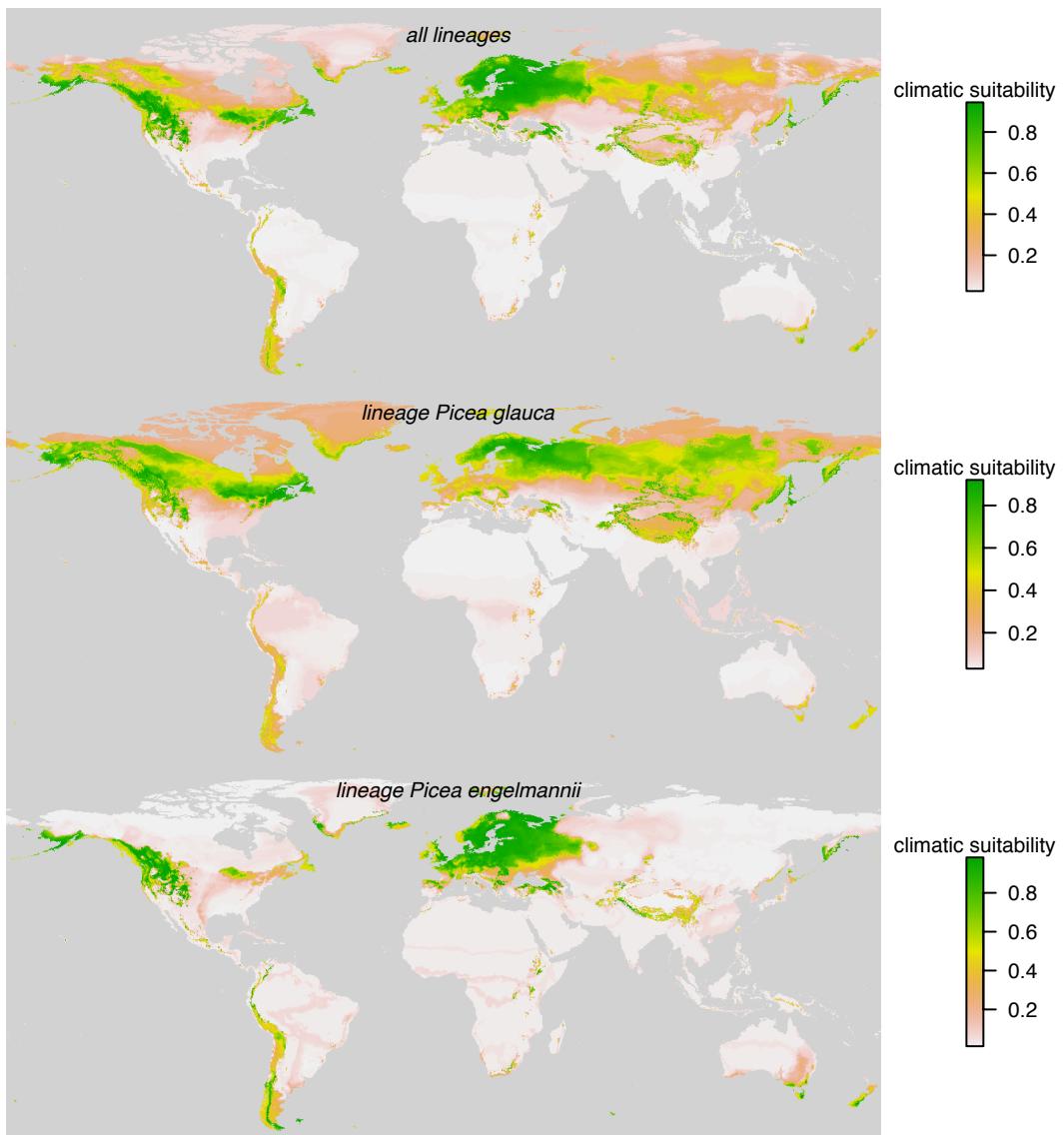


Lowest presence threshold (LPT)

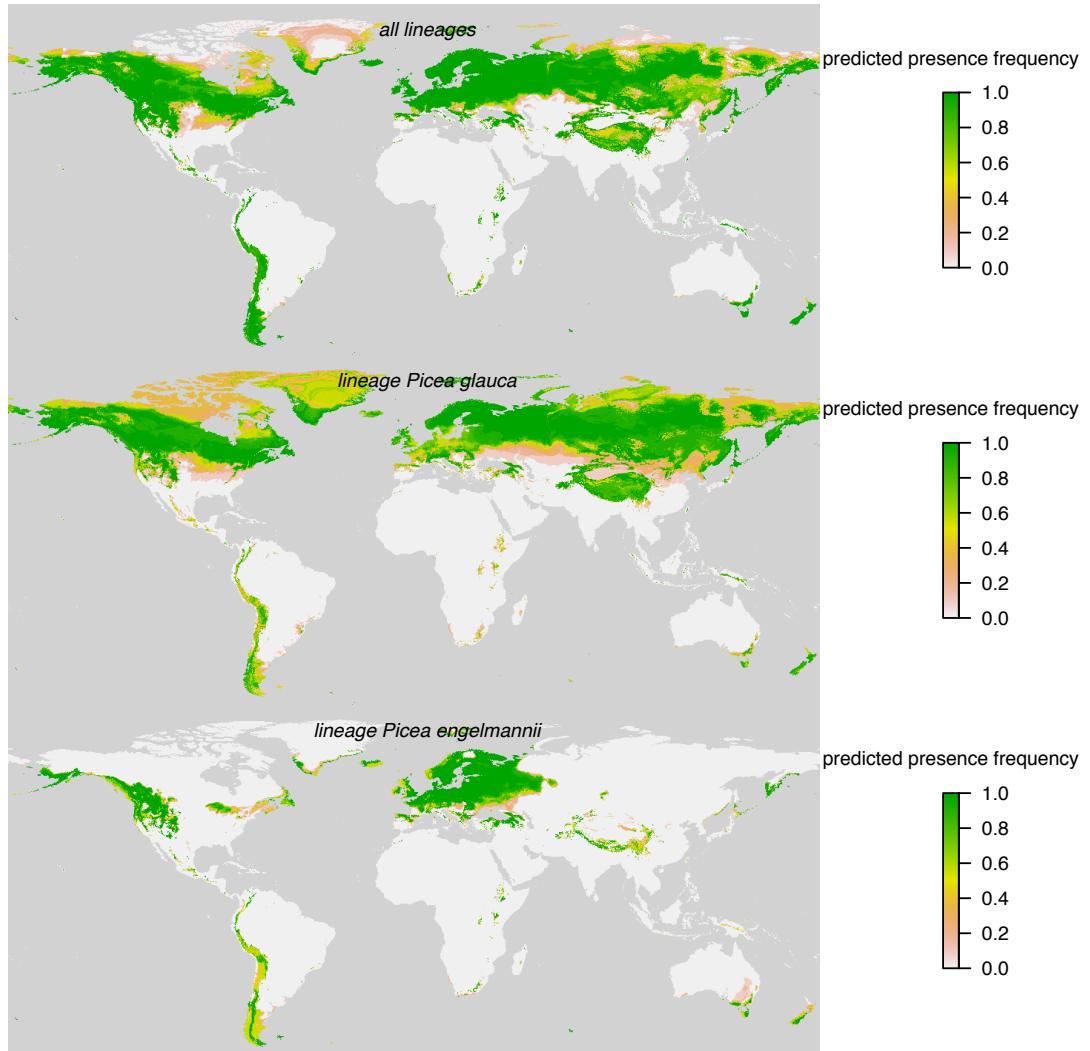


(c) *Dendroctonus rufipennis*

Climatic suitability

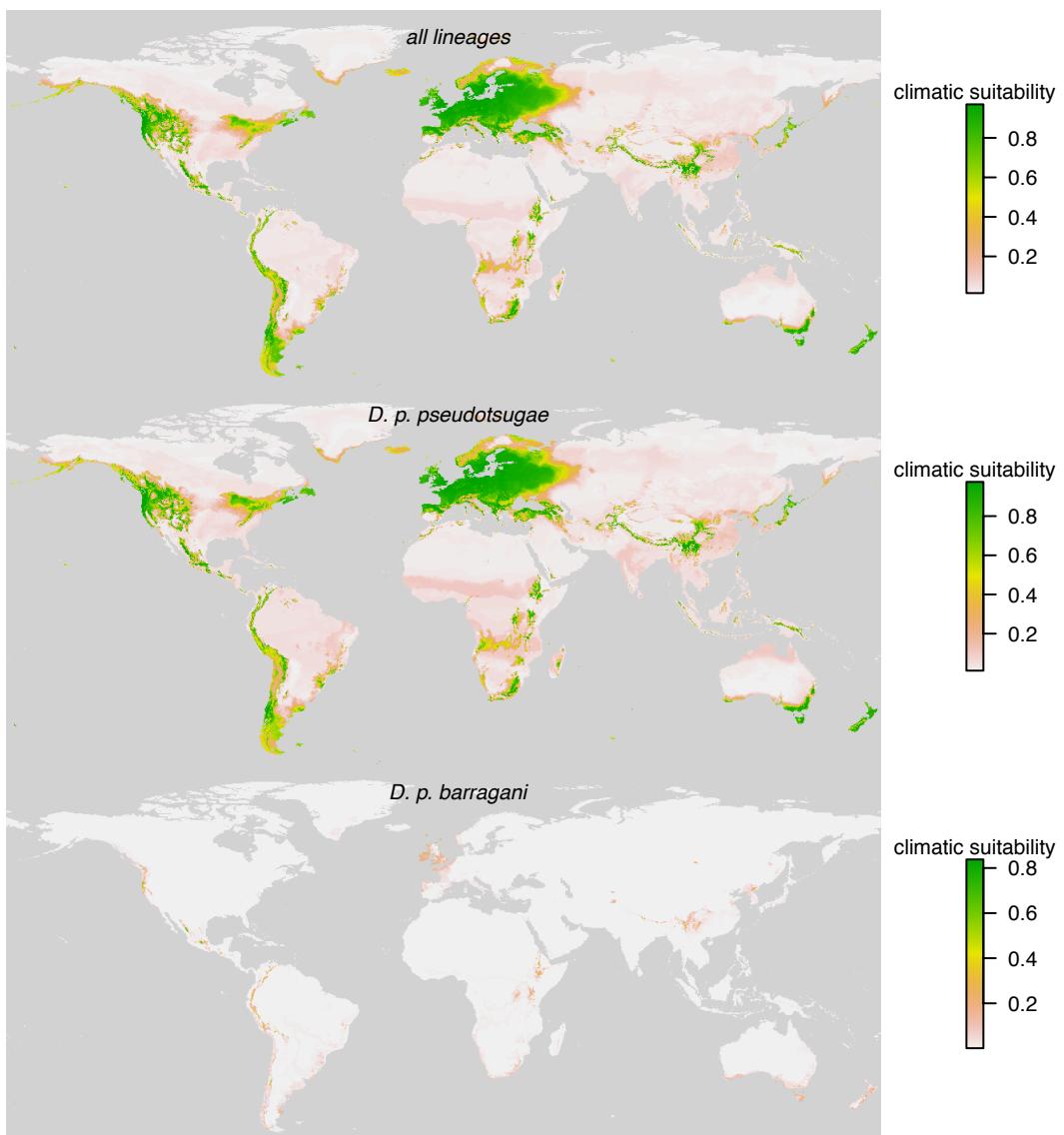


Lowest presence threshold (LPT)

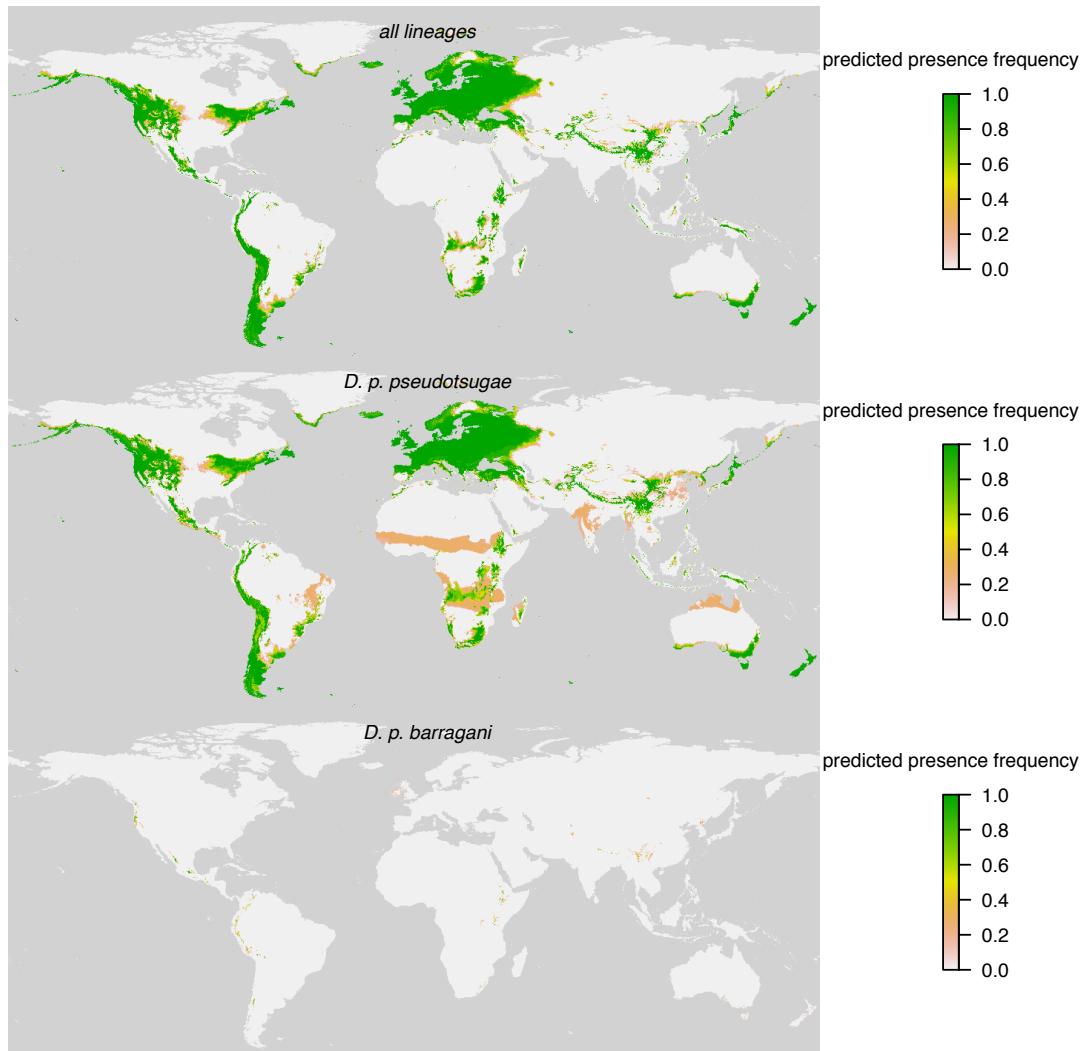


(d) *Dendroctonus pseudotsugae*

Climatic suitability

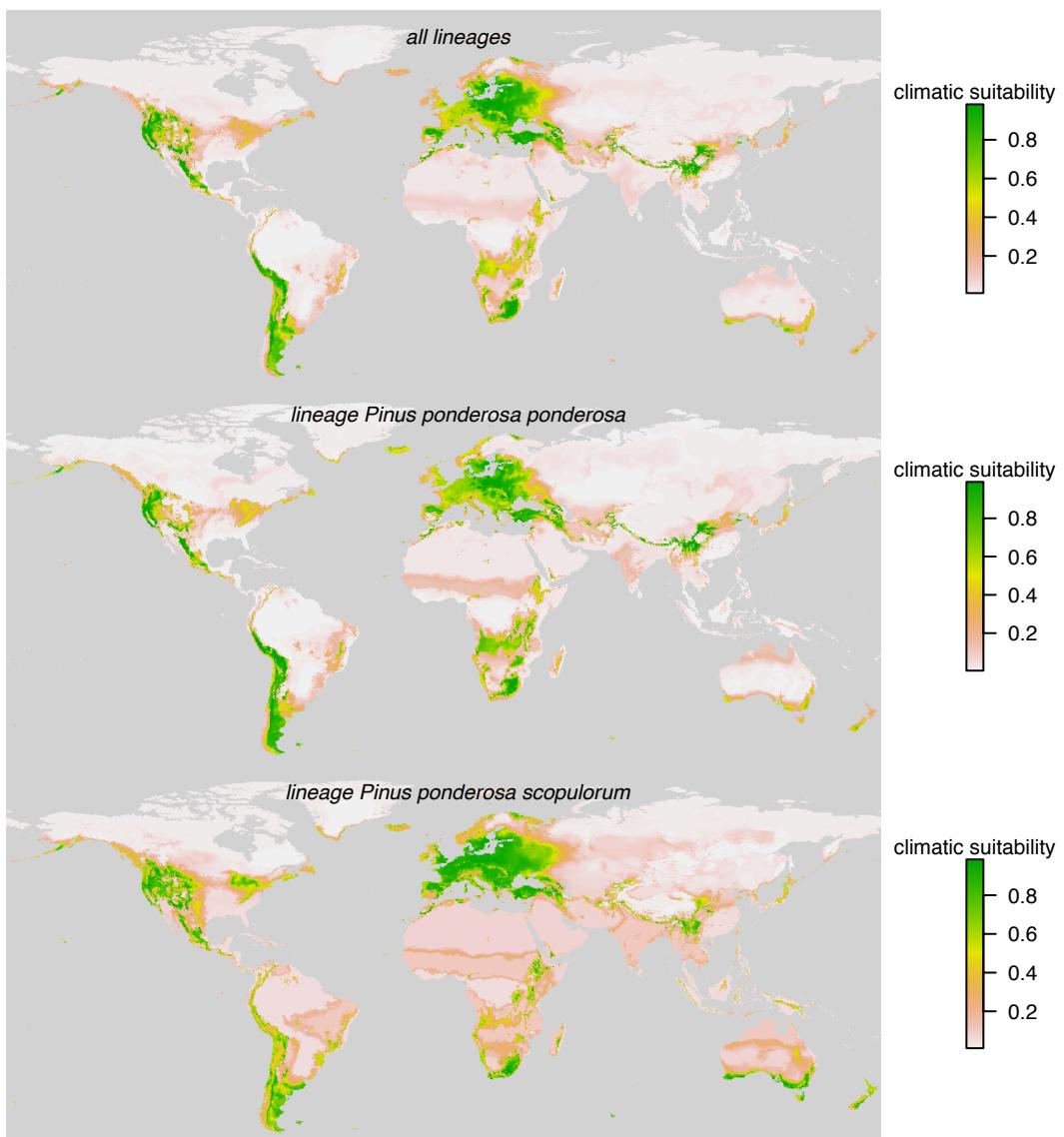


Lowest presence threshold (LPT)



(e) *Dendroctonus brevicomis*

Climatic suitability



Lowest presence threshold (LPT)

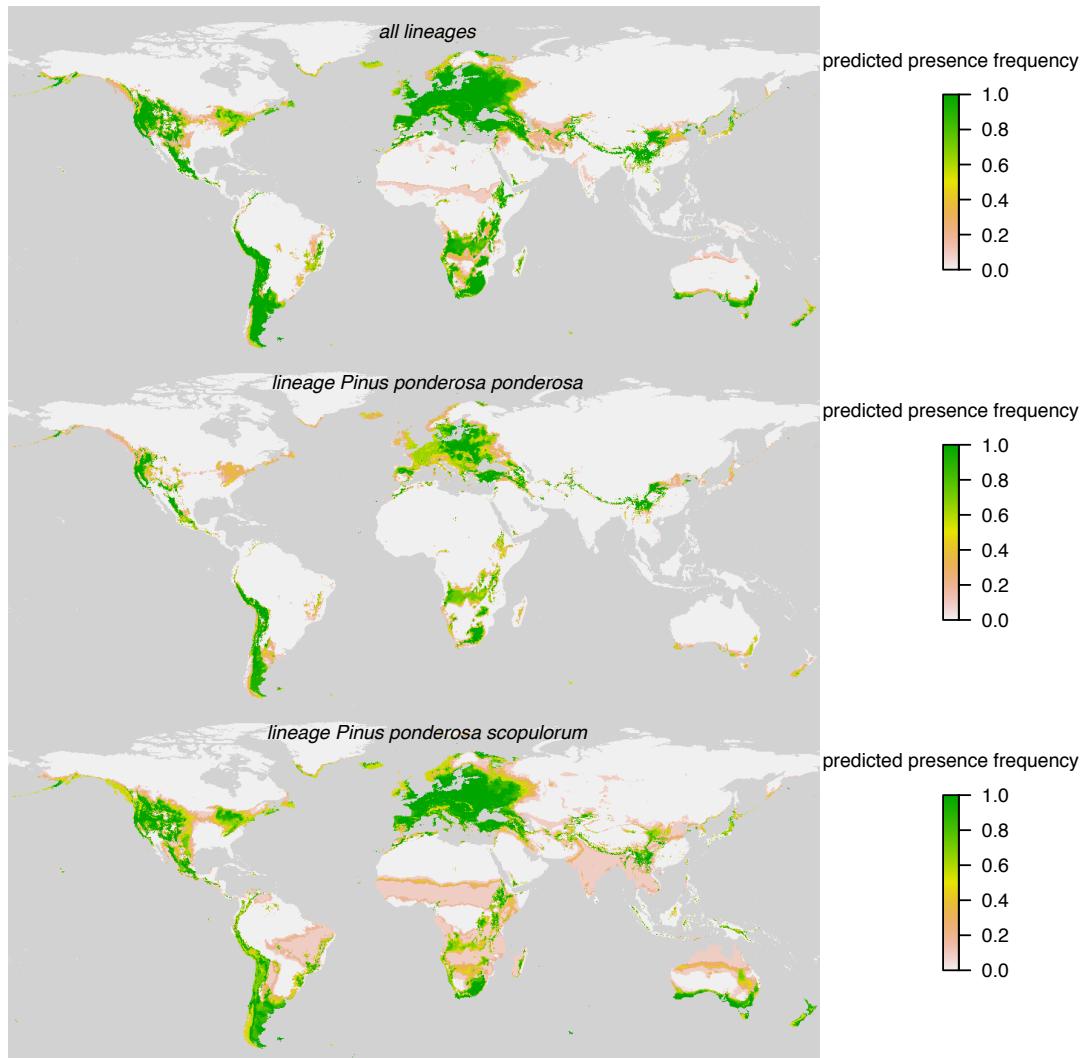
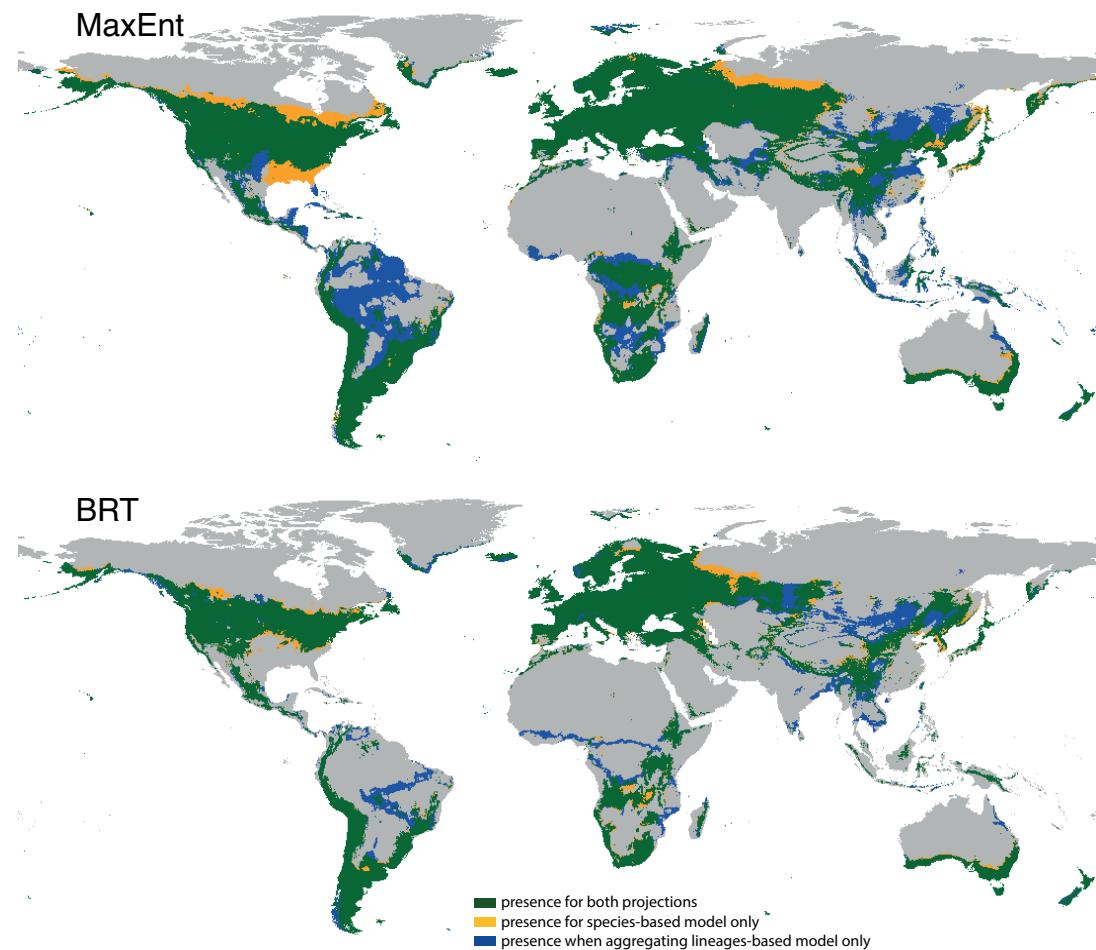
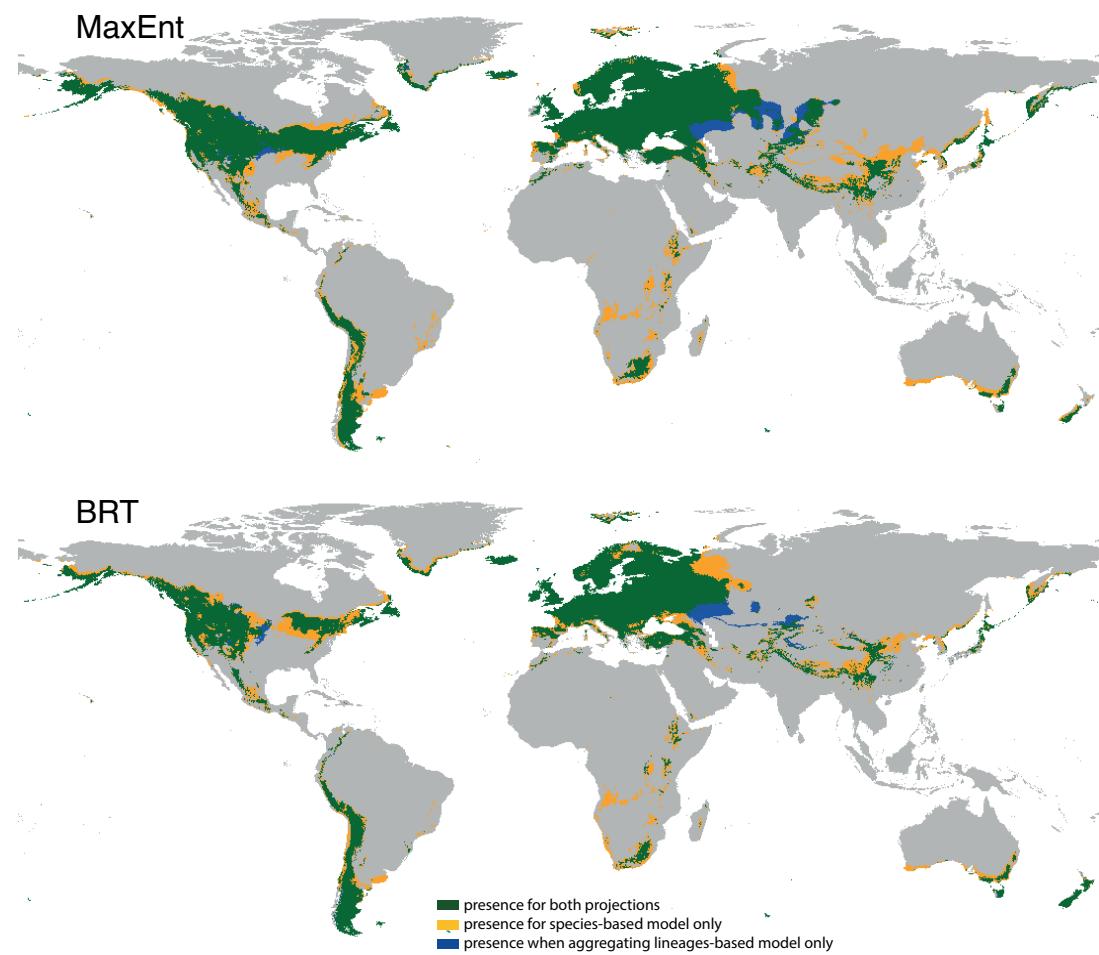


Figure A8: Maps showing the change in worldwide suitable climatic conditions when aggregating binary predictions of lineage-based models. These predictions were compared with the classical species-based models. These projections were obtained by assigning a presence to each pixel that was predicted as climatically suitable for at least one lineage. A pixel was considered as climatically suitable for one lineage if more than 50% of the IS-models (i.e., at least six out 10 models) predicted this pixel as suitable when implementing the lowest presence threshold (Pearson *et al.*, 2007).

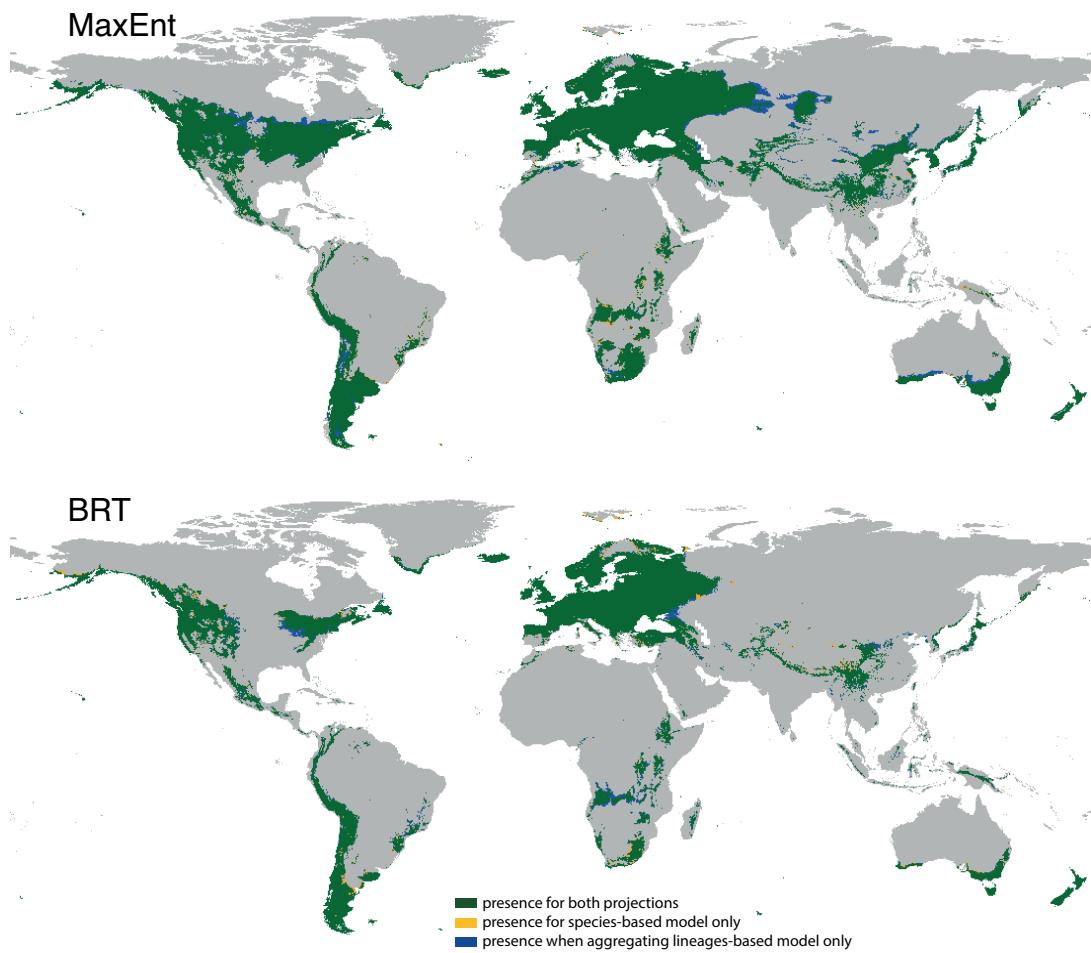
(a) *Dendroctonus valens*



(b) *Dendroctonus ponderosae*



(c) *Dendroctonus pseudotsugae*



(d) *Dendroctonus brevicomis*

