

Appendix S3: Summary and identification of tree species in national forest inventories used for the PorTree project

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Data summary

Species data and selected species

The forest database was compiled from forest inventory plot data of Austria, Bavaria, Baden-Württemberg, Switzerland, France, Slovenia, Italy and Europe (ICP Forest Level 1) (Fig. 1). Across the Alps, 59 species were present in >100 plots, and thus, appropriate for species distribution modelling (Table 1).

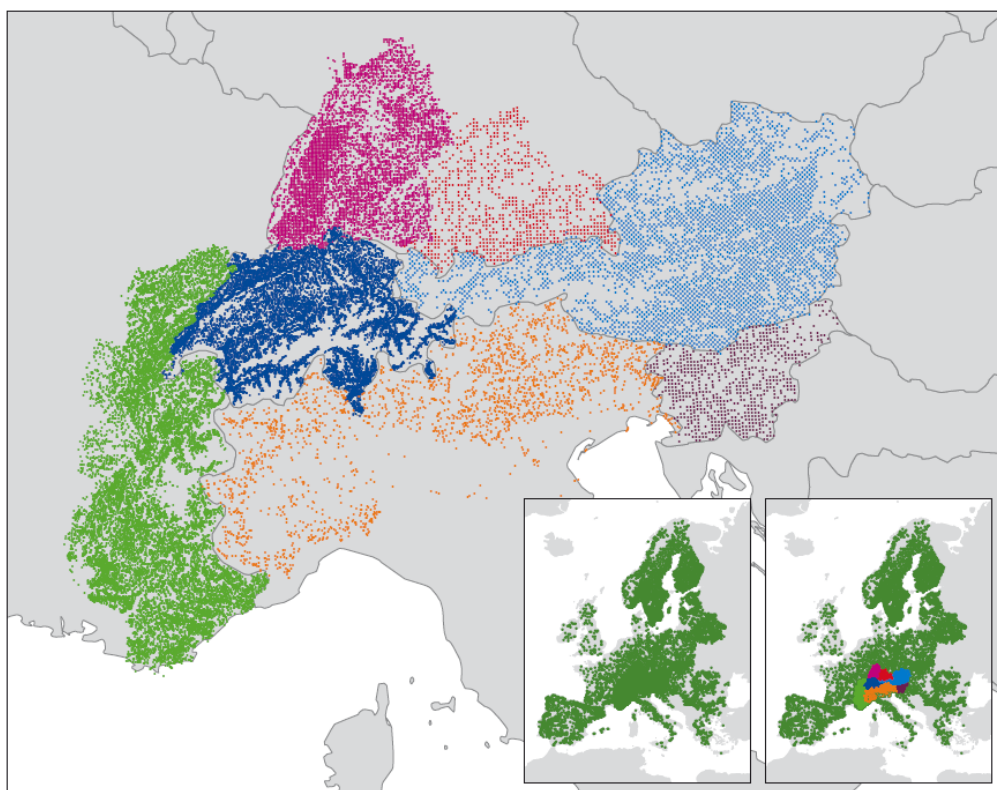


Figure 1: Forest inventory plots within the MANFRED database across the alps compiled from eight regional datasets: France (light green), Switzerland (dark blue), Baden-Württemberg (pink), Bavaria (red), Austria (light blue), Italy (orange), Slovenia (purple) and Europe (Fig. bottom right, green).

Species data preparation

For Austria, Baden-Württemberg and Bavaria, tree species were recorded in 1-4 subplots. We summarized the species information of these subplots and relocated the geographic location of the summary plot by averaging the coordinates of the included subplots. Further, in Bavaria the occurrence of tree species was sampled on a 16x16km raster and on a 8x8km raster. For the modelling, we included only the occurrences on the 16x16km raster.

Due to the lack of forest plots at higher altitudes, species distribution models often fail to accurately predict upper distributional limits. Thus, we included pseudo-absences within the alpine zone (i.e. CORINE level 3 classes 'natural grassland', 'bare rock', 'sparsely vegetated area' and 'glacier'). We randomly generated 20'000 pseudo-absences within this alpine region, and resampled the pseudo-absences in order to proportionally reduce the number of absences with decreasing elevation, resulting in 14'655 pseudo-absences.

An overview of the included forest inventory plots and pseudo-absences is given in Fig. 2.

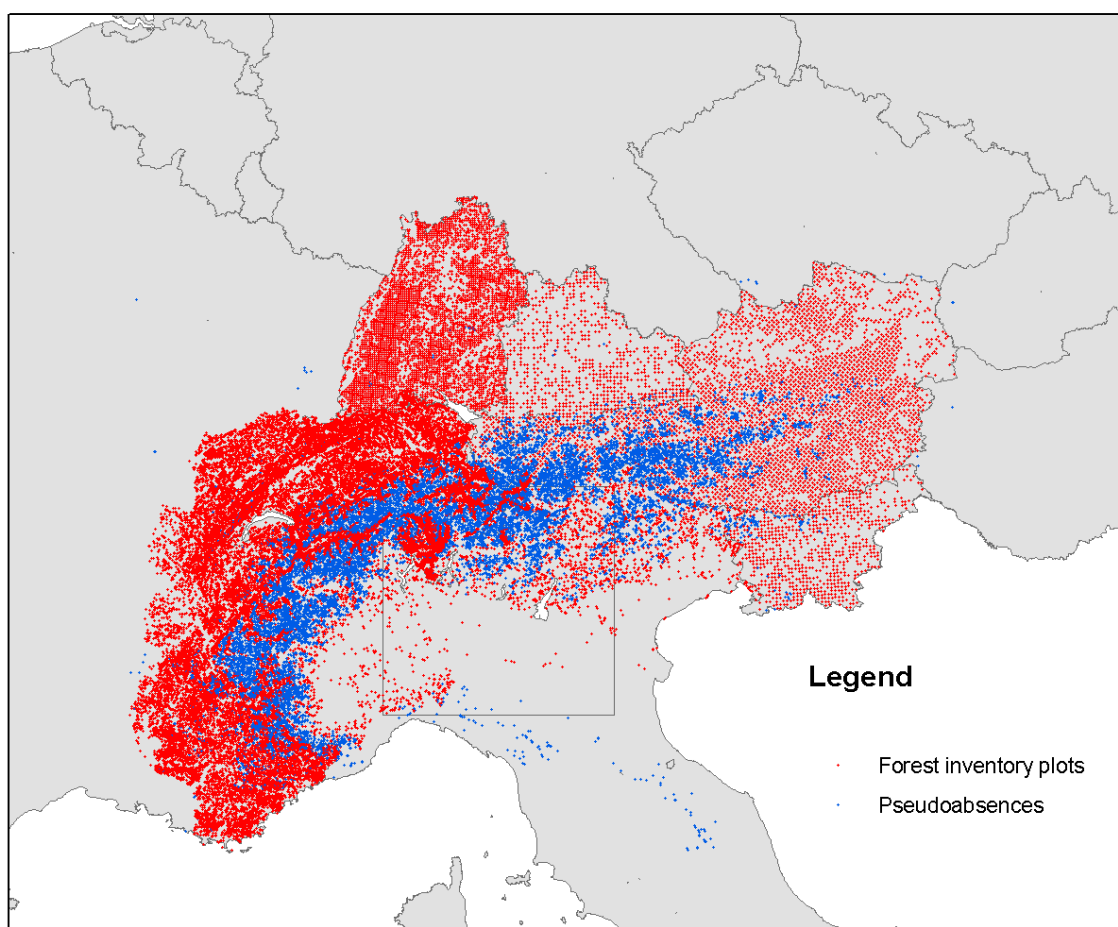


Figure 2: Selected forest inventory plots (red dots) and generate pseudo absences (blue dots) for calibrating species distribution models across the European Alps.

Table 1. Number of occurrences within each region for species which were present over the European Alps in >100 forest plots. Absences, which may be caused by missing sampling of species in a specific region, are indicated with an asterisk (*).

Species	Species abbrev.	ALPS	AU (Austria)	BW (Baden-Württemberg)	BY (Bayern)	CH (Switzerland)	FR (France)	IT (Italy)	SL (Slovenia)
<i>Abies alba</i>	Abiealba	9157	729	1726	232	3304	2812	215	139
<i>Acer campestre</i>	Acercamp	555	0*	326	16	122	0*	91	0*
<i>Acer platanoides</i>	Acerplat	447	0*	299	20	121	0*	7	0*
<i>Acer pseudoplatanus</i>	Acerpseu	3994	0*	1871	345	1554	0*	224	0*
<i>Acer spp.</i>	Acerspp	6236	576	2039	358	1739	1217	307	0*
<i>Alnus glutinosa</i>	Alnuglut	506	164	0*	106	141	0*	95	0*
<i>Alnus incana</i>	Alnuinca	561	139	0*	53	300	0*	69	0*
<i>Alnus spp.</i>	Alnuspp	1745	297	403	147	419	321	158	0*
<i>Arbutus unedo</i>	Arbuuned	104	0	0	0	0	103	1	0
<i>Betula pendula</i>	Betupend	1496	0*	730	163	426	0*	177	0*
<i>Betula pubescens</i>	Betupube	661	0*	0*	0*	63	557	41	0*
<i>Betula spp.</i>	Betuspp	2533	358	730	163	467	557	258	0*
<i>Carpinus betulus</i>	Carpbetu	3421	274	1089	68	238	1653	99	0*
<i>Castanea sativa</i>	Castsati	1457	44	127	0	328	555	403	0*
<i>Corylus avellana</i>	Coryavel	380	0*	0*	0*	7	373	0*	0*
<i>Fagus sylvatica</i>	Fagusylv	14652	1209	3598	488	4364	3968	542	483
<i>Frangula alnus</i>	Franalnu	359	0*	359	0*	0*	0*	0*	0*
<i>Fraxinus excelsior</i>	Fraxexce	3827	0*	1890	248	1389	0*	300	0*
<i>Fraxinus ornus</i>	Fraxornu	371	0	0	0	15	0*	356	0*
<i>Fraxinus spp.</i>	Fraxspp	6543	565	1890	248	1399	1811	630	0*
<i>Ilex aquifolium</i>	Ilexaqui	142	0*	125	0*	7	0*	10	0*
<i>Juglans regia</i>	Juglregi	129	0*	0*	0*	22	50	57	0*
<i>Laburnum spp.</i>	Labusp	178	0*	0	0*	0	178	0*	0*
<i>Larix decidua</i>	Larideci	5348	1199	921	111	1452	1070	595	0*
<i>Larix kaempferi</i>	Larikaem	139	0*	136	0*	0*	3	0*	0*
<i>Ostrya carpinifolia</i>	Ostrcarp	533	0*	0	0	41	109	383	0*
<i>Picea abies</i>	Piceabie	18922	2849	3694	723	6978	3474	835	369
<i>Pinus cembra</i>	Pinucemb	493	74	0	0	250	94	75	0*
<i>Pinus halepensis</i>	Pinuhale	1111	0	0	0	0	1111	0	0*
<i>Pinus nigra</i>	Pinunigr	296	61	48	0	25	34	100	28
<i>Pinus pinaster</i>	Pinupina	412	0	0	0	0	403	9	0*
<i>Pinus sylvestris</i>	Pinusylv	7708	805	1833	239	965	3434	318	114
<i>Pinus uncinata</i>	Pinuunci	534	0*	0*	0	150	377	7	0
<i>Populus nigra</i>	Popunigr	208	0*	137	0*	19	0*	52	0*
<i>Populus tremula</i>	Poputrem	1176	116	127	58	102	654	119	0
<i>Prunus avium</i>	Prunaviu	1219	79	562	42	277	0*	259	0*
<i>Prunus padus</i>	Prunpadu	104	0*	89	0*	11	0*	4	0*
<i>Prunus spp.</i>	Prunspp	1995	79	641	42	287	671	275	0*
<i>Pseudotsuga menziesii</i>	Pseumenz	1039	0*	896	29	43	67	4	0*

<i>Quercus ilex</i>	Querilex	1378	0	0	0	0	1367	11	0
<i>Quercus petraea</i>	Querpetr	3690	0*	1290	9	507	1667	217	0*
<i>Quercus pubescens</i>	Querpube	3738	0*	0	0	48	3424	266	0*
<i>Quercus robur</i>	Querrobu	2712	0*	1240	220	375	807	70	0*
<i>Quercus rubra</i>	Querrubr	264	0*	206	13	15	20	10	0*
<i>Quercus suber</i>	Quersube	428	0	0	0	0	428	0	0
<i>Quercus spp.</i>	Querspp	11424	510	2200	230	899	6839	544	202
<i>Robinia pseudoacacia</i>	Robipseu	746	52	113	0*	55	300	226	0*
<i>Salix caprea</i>	Salicapr	155	0*	0*	0*	0*	0*	155	0*
<i>Salix spp.</i>	Salispp	1588	148	453	0*	190	596	201	0*
<i>Sorbus aria</i>	Sorbaria	698	0*	129	49	324	0*	196	0*
<i>Sorbus aucuparia</i>	Sorbaucu	569	0*	0*	210	236	0*	123	0*
<i>Sorbus torminalis</i>	Sorbtorm	198	0*	121	3	12	62	0*	0*
<i>Sorbus spp.</i>	Sorbspp	2122	0*	963	239	552	62	306	0*
<i>Taxus baccata</i>	Taxubacc	135	0*	0*	8	80	47	0*	0*
<i>Tilia cordata</i>	Tilicord	195	0*	0*	0*	195	0*	0*	0*
<i>Tilia platyphyllos</i>	Tiliplat	116	0*	0*	0*	116	0*	0*	0*
<i>Tilia spp.</i>	Tilispp	1585	119	506	60	295	605	0*	0*
<i>Ulmus glabra</i>	Ulmuglab	531	0*	220	0*	311	0*	0*	0*
<i>Ulmus spp.</i>	Ulmuspp	922	94	220	66	322	220	0*	0*