Forest Condition in Europe

The 2023 Assessment

Online Supplementary Material

ICP Forests Technical Report under the UNECE Convention on Long-range Transboundary Air Pollution (Air Convention)

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Working Group on Effects of the Convention on Long-range Transboundary Air Pollution

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S1 TREE CROWN CONDITION AND DAMAGE CAUSES – ADDITIONAL TABLES AND MAPS

S1-1 Mean plot defoliation of main tree species in 2022

Table S1-1: Percentage of plots with mean plot defoliation in defoliation classes 0-3 (class 2 subdivided) for the main species or species groups (n trees pr. plot ≥ 3) and the number of plots in each group in 2022. Dead trees are not included.

Main species or species groups	Class 0 0-10%	Class 1 >10-25%	Class 2-1 >25-40%	Class 2-2 >40-60%	Class 3 >60%	No. of plots
Scots pine (*Pinus sylvestris*)	15.4	61.6	16.9	5.3	0.8	1 163
Norway spruce (*Picea abies*)	21.5	40.3	28.6	8.9	0.6	873
Austrian pine (*Pinus nigra*)	12.1	58.2	18.3	9.3	2.1	289
Mediterranean lowland pines	3.5	65.1	25.2	5.2	1.0	401
Common beech (*Fagus sylvatica*)	20.6	41.3	27.6	7.8	2.8	715
Deciduous temperate oaks	8.3	42.1	33.3	13.3	3.1	649
Dec. (sub-) Mediterranean oaks	12.6	49.5	24.1	11.4	2.4	493
Evergreen oaks	2.0	42.5	42.1	12.1	1.2	247

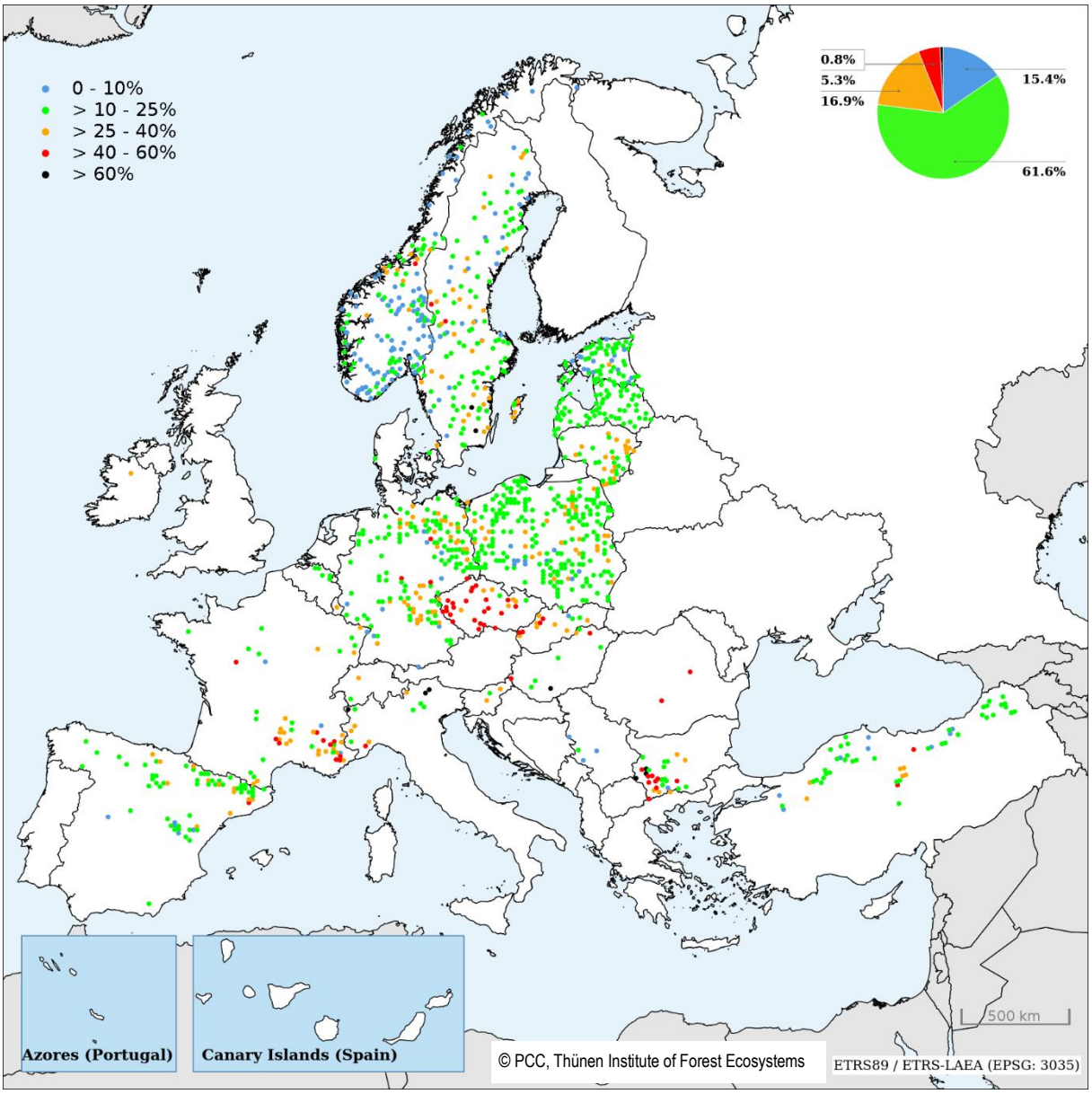


Figure S1-1: Mean plot defoliation of Scots pine (*Pinus sylvestris*) in 2022. Dead trees are not included. The legend (top left) indicates the degree of defoliation (defoliation class) ranging from none (blue), slight (green), moderate (orange and red), to severe (black). The percentages refer to the needle/leaf loss in the crown compared to a reference tree. The pie chart (top right) indicates the percentage of plots per defoliation class.

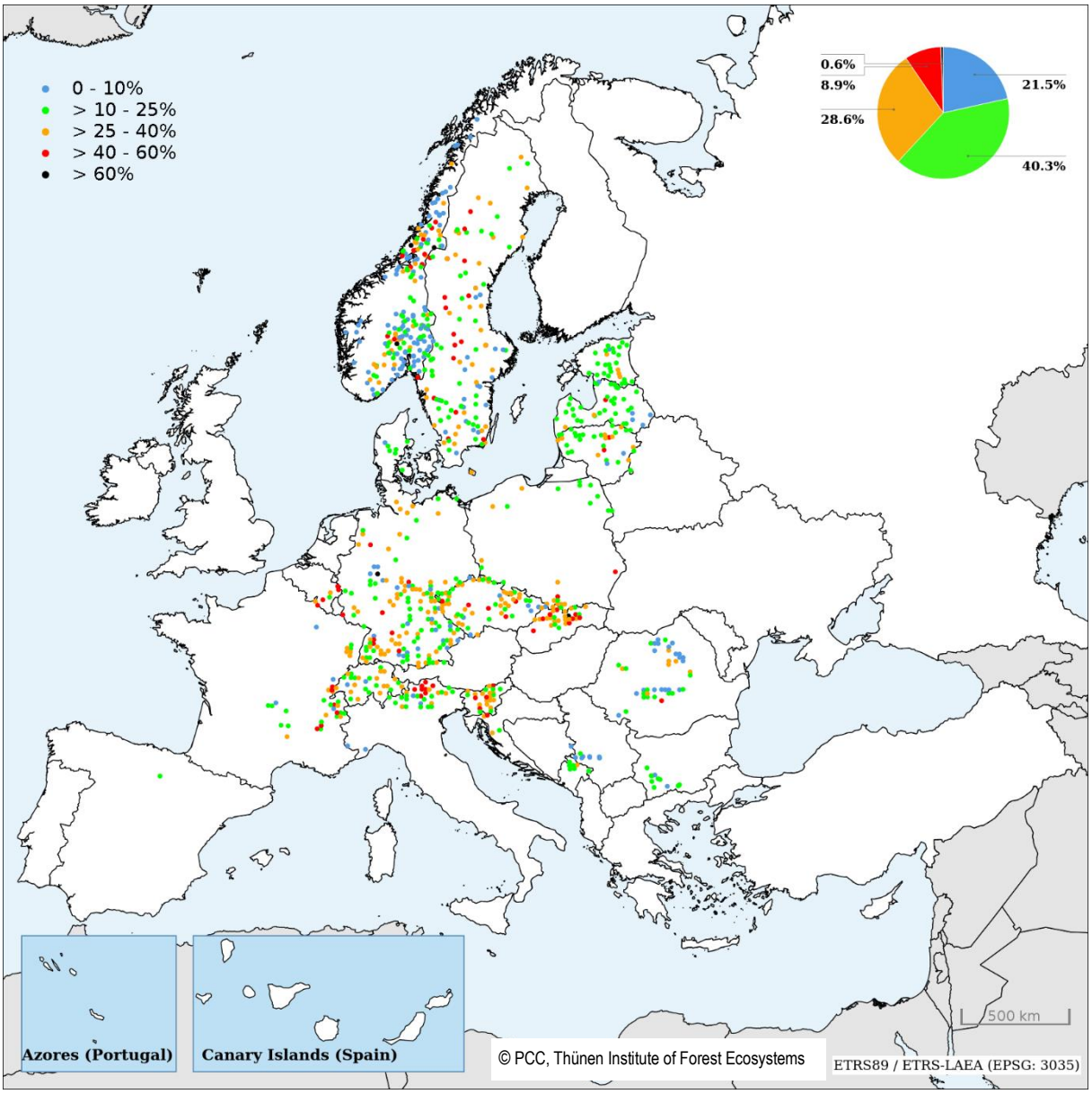


Figure S1-2: Mean plot defoliation of Norway spruce (*Picea abies*) in 2022. Dead trees are not included. The legend (top left) indicates the degree of defoliation (defoliation class) ranging from none (blue), slight (green), moderate (orange and red), to severe (black). The percentages refer to the needle/leaf loss in the crown compared to a reference tree. The pie chart (top right) indicates the percentage of plots per defoliation class.

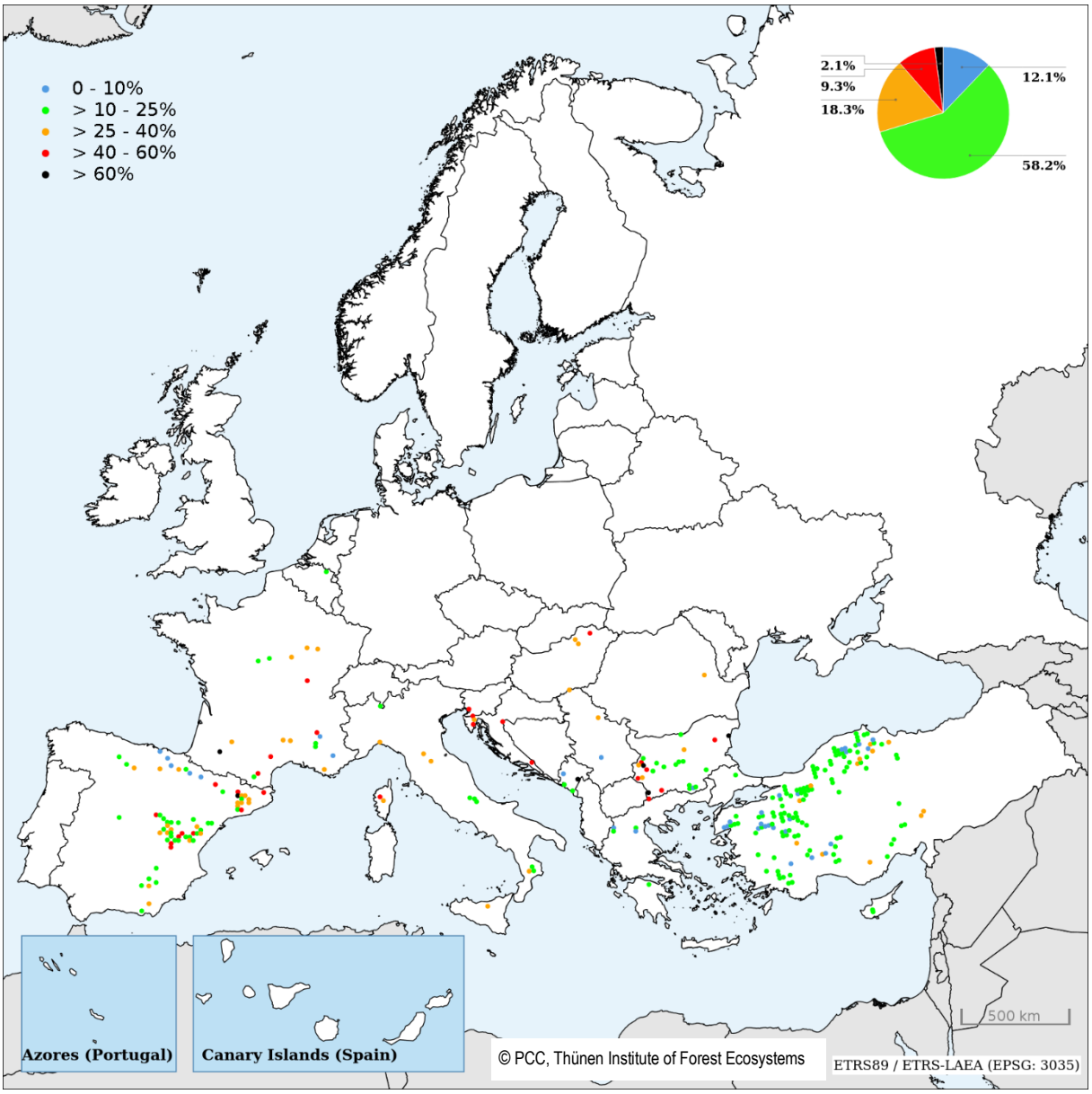


Figure S1-3: Mean plot defoliation of Austrian pine (*Pinus nigra*) in 2022. Dead trees are not included. The legend (top left) indicates the degree of defoliation (defoliation class) ranging from none (blue), slight (green), moderate (orange and red), to severe (black). The percentages refer to the needle/leaf loss in the crown compared to a reference tree. The pie chart (top right) indicates the percentage of plots per defoliation class.

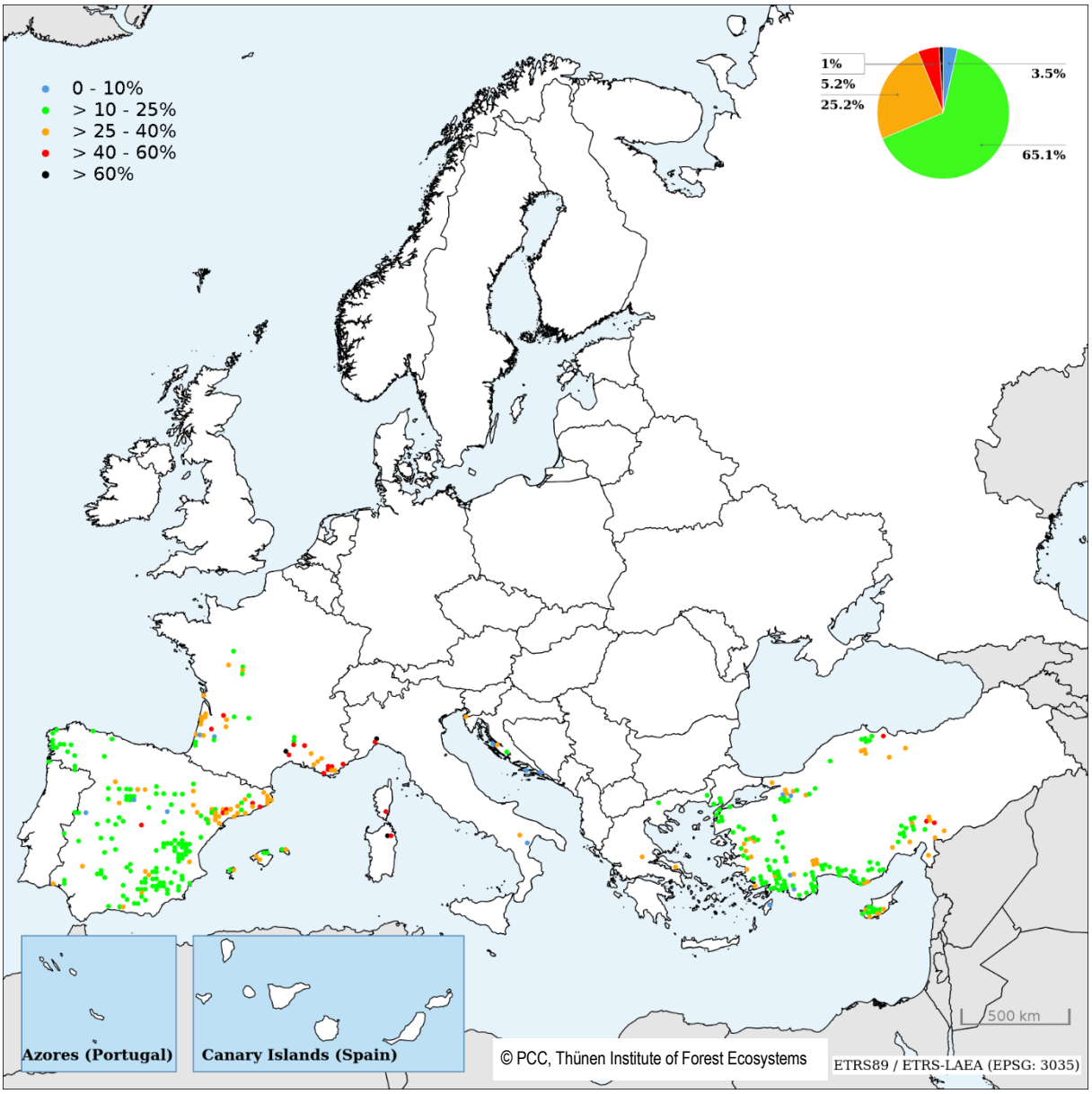


Figure S1-4: Mean plot defoliation of Mediterranean lowland pines (*Pinus halepensis, P. pinaster, P. pinea, P. brutia*) in 2022. Dead trees are not included. The legend (top left) indicates the degree of defoliation (defoliation class) ranging from none (blue), slight (green), moderate (orange and red), to severe (black). The percentages refer to the needle/leaf loss in the crown compared to a reference tree. The pie chart (top right) indicates the percentage of plots per defoliation class.

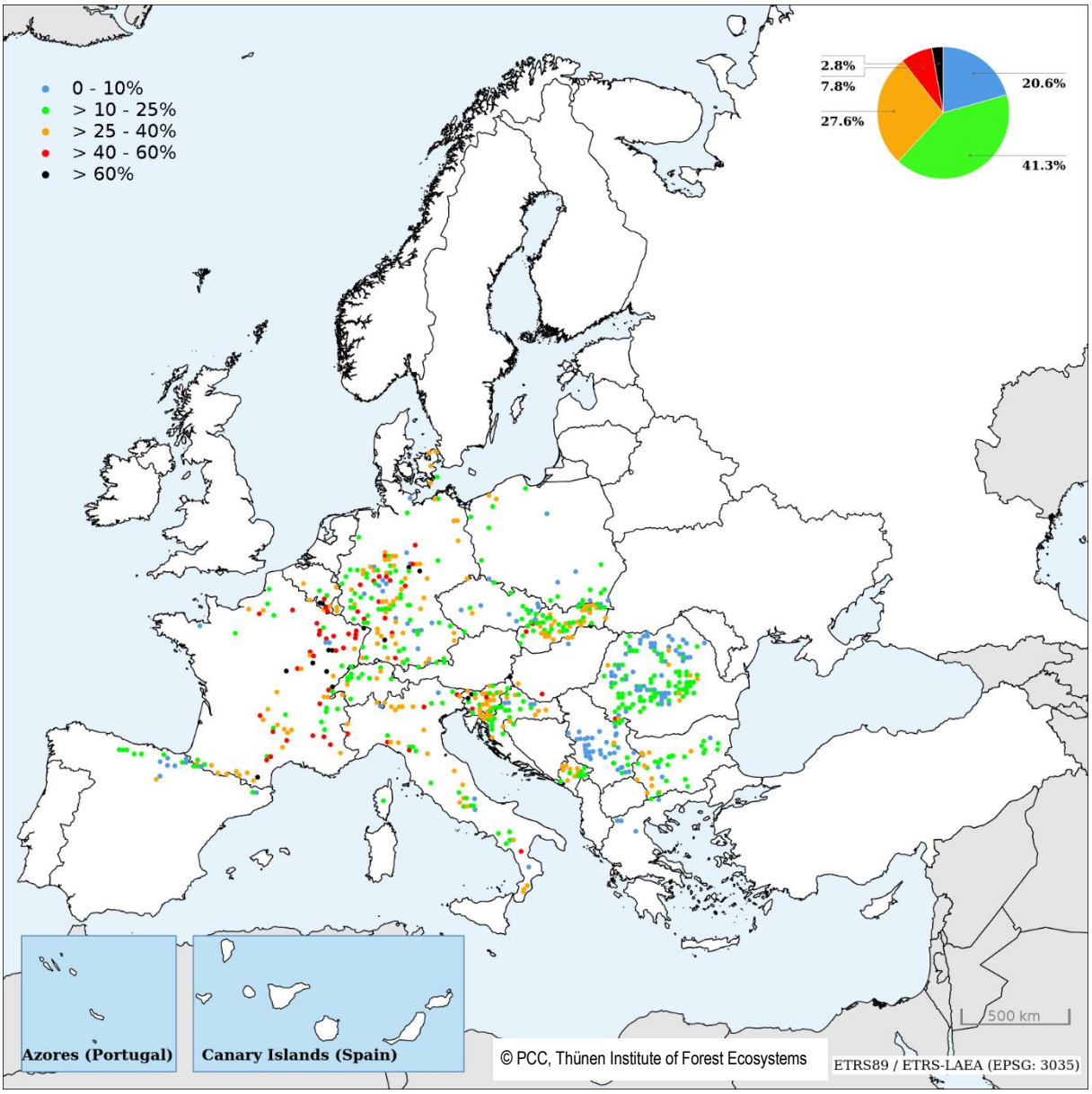


Figure S1-5: Mean plot defoliation of common beech (*Fagus sylvatica*) in 2022. Dead trees are not included. The legend (top left) indicates the degree of defoliation (defoliation class) ranging from none (blue), slight (green), moderate (orange and red), to severe (black). The percentages refer to the needle/leaf loss in the crown compared to a reference tree. The pie chart (top right) indicates the percentage of plots per defoliation class.

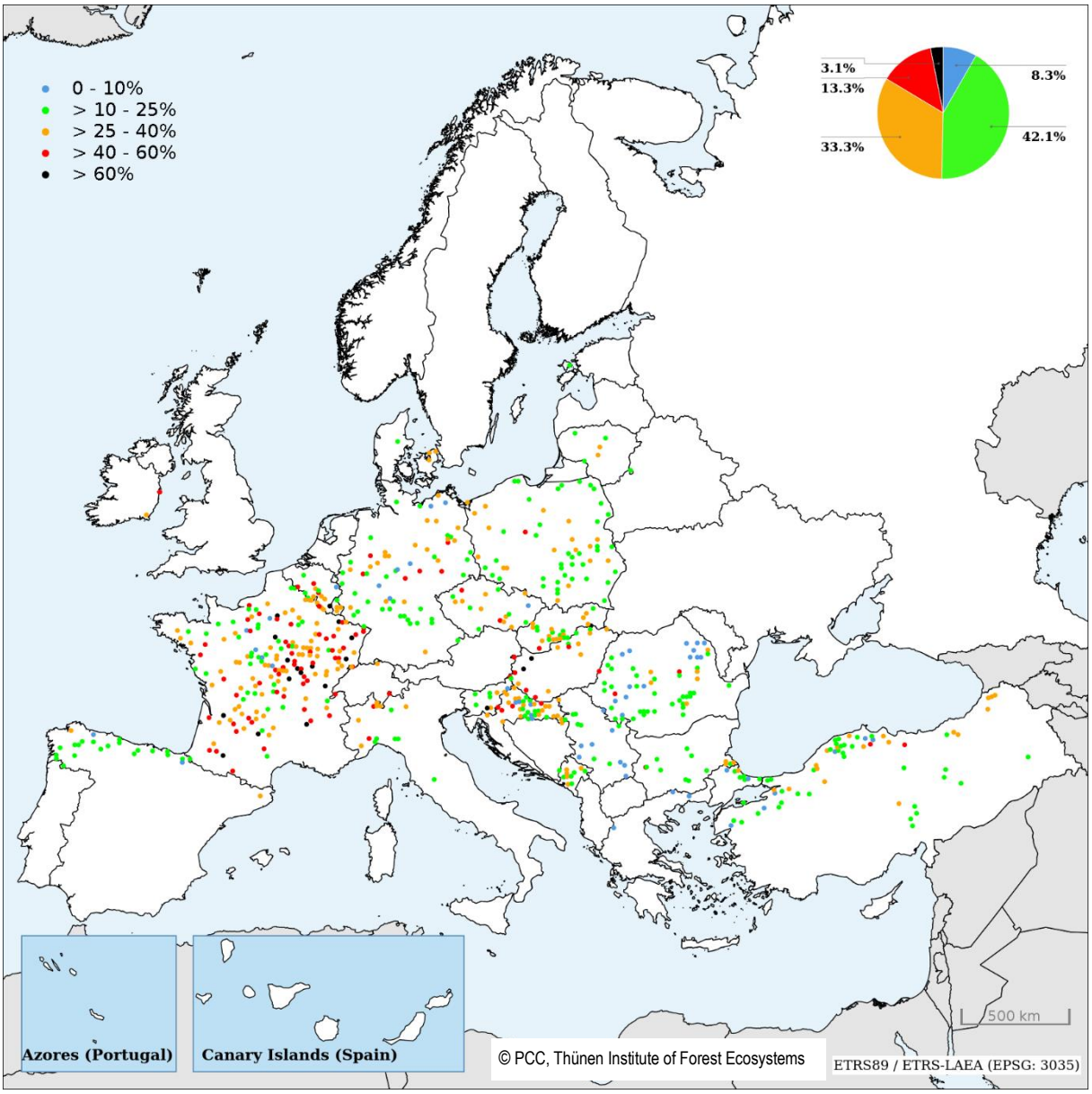


Figure S1-6: Mean plot defoliation of deciduous temperate oaks (*Quercus robur and Q. petraea*) in 2022. Dead trees are not included. The legend (top left) indicates the degree of defoliation (defoliation class) ranging from none (blue), slight (green), moderate (orange and red), to severe (black). The percentages refer to the needle/leaf loss in the crown compared to a reference tree. The pie chart (top right) indicates the percentage of plots per defoliation class.

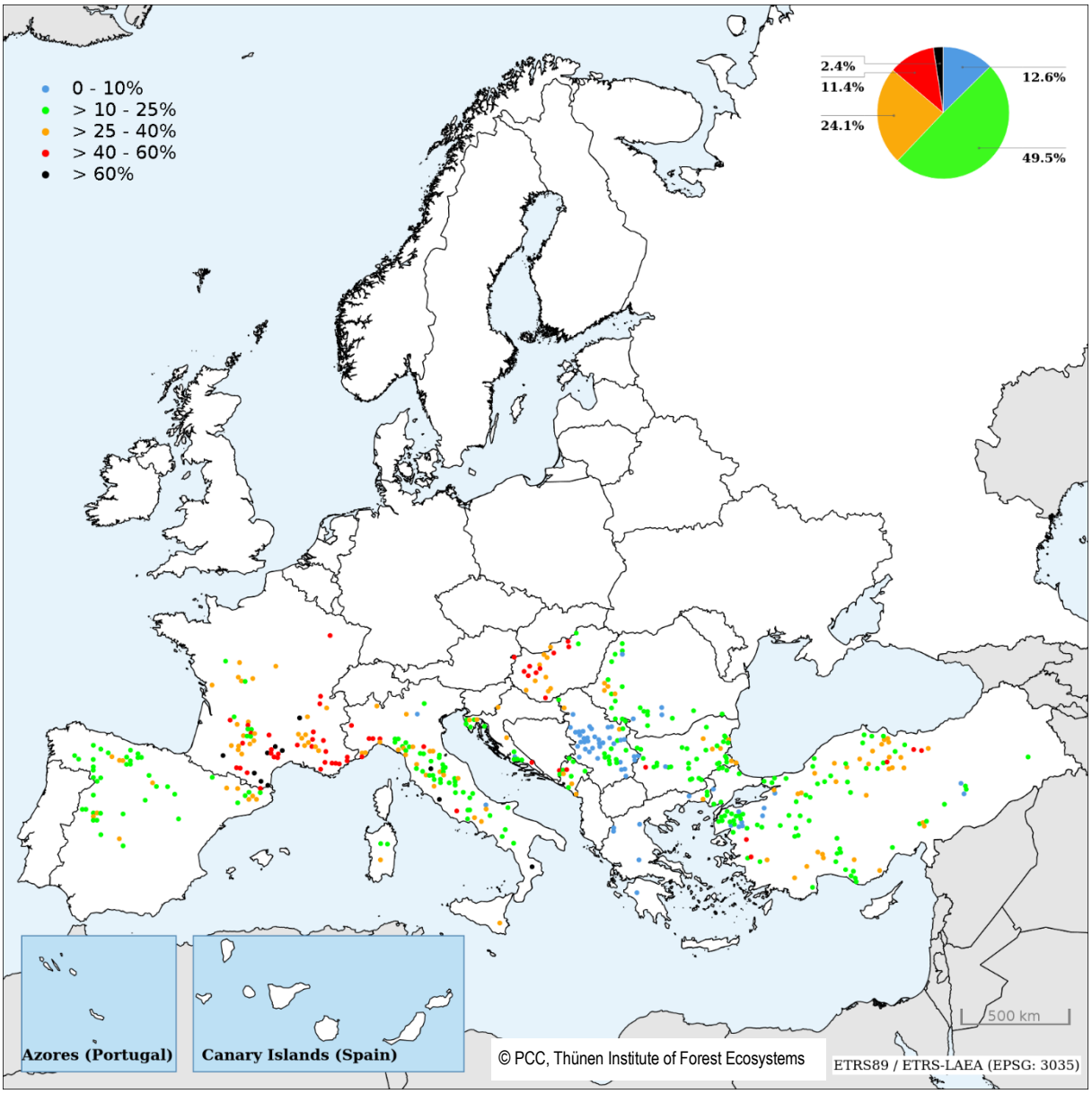


Figure S1-7: Mean plot defoliation of deciduous (sub-) Mediterranean oaks (*Quercus cerris, Q. frainetto, Q. pubescens, Q. pyrenaica*) in 2022. Dead trees are not included. The legend (top left) indicates the degree of defoliation (defoliation class) ranging from none (blue), slight (green), moderate (orange and red), to severe (black). The percentages refer to the needle/leaf loss in the crown compared to a reference tree. The pie chart (top right) indicates the percentage of plots per defoliation class.

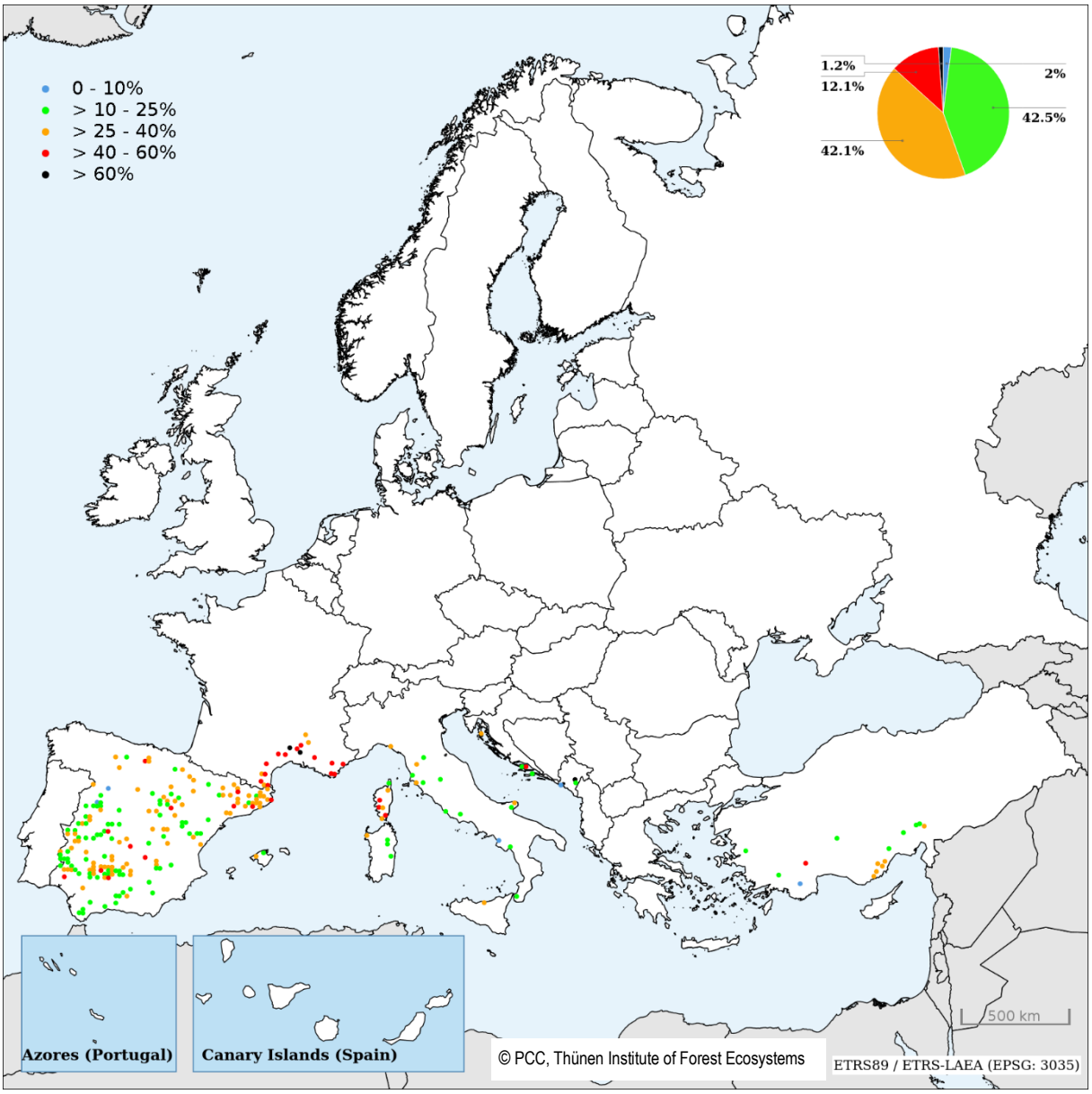


Figure S1-8: Mean plot defoliation of evergreen oaks (*Quercus coccifera, Q. ilex, Q. rotundifolia, Q. suber*) in 2022. Dead trees are not included. The legend (top left) indicates the degree of defoliation (defoliation class) ranging from none (blue), slight (green), moderate (orange and red), to severe (black). The percentages refer to the needle/leaf loss in the crown compared to a reference tree. The pie chart (top right) indicates the percentage of plots per defoliation class.

S1-2 Trends in mean plot defoliation of the main tree species 2013–2022

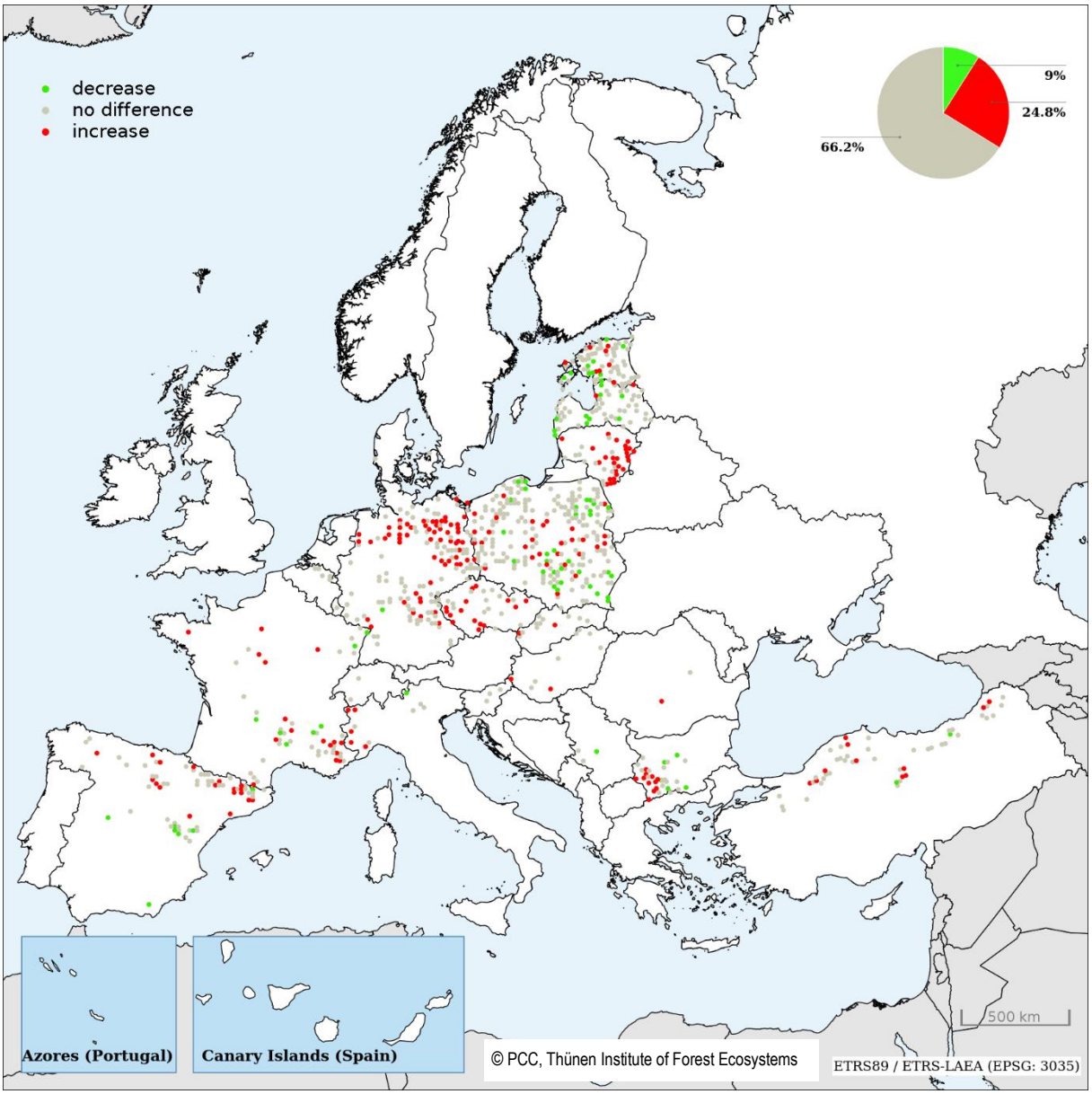


Figure S1-9: Trends in mean plot defoliation of Scots pine (*Pinus sylvestris*) between 2013 and 2022. Plots were included if assessments were available for at least 80% of the period. The legend (top left) indicates whether mean plot defoliation overall decreased, stayed the same or increased within the given period. The pie chart (top right) indicates the respective percentage of plots per trend direction.

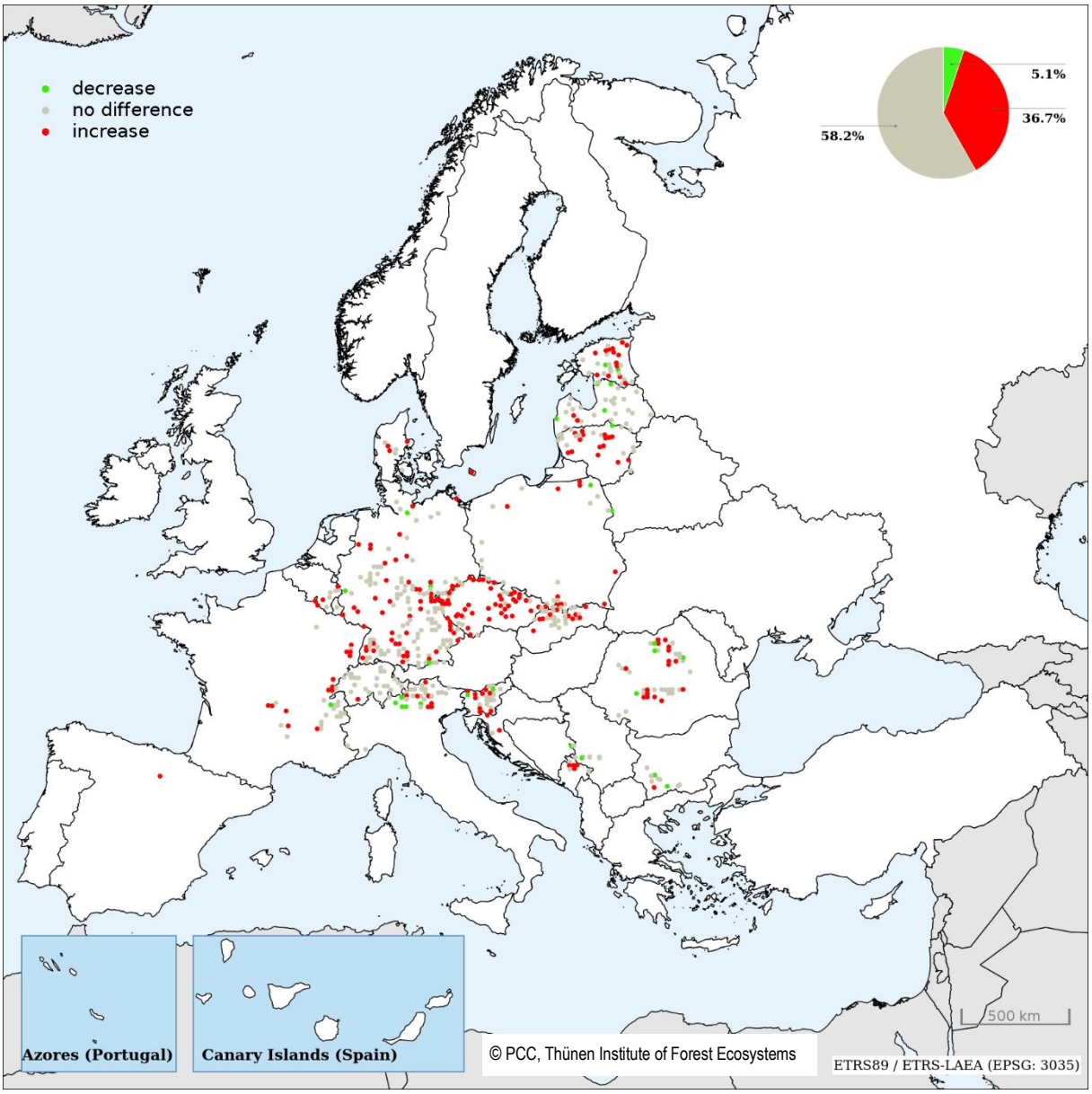


Figure S1-10: Trends in mean plot defoliation of Norway spruce (*Picea abies*) between 2013 and 2022. Plots were included if assessments were available for at least 80% of the period. The legend (top left) indicates whether mean plot defoliation overall decreased, stayed the same or increased within the given period. The pie chart (top right) indicates the respective percentage of plots per trend direction.

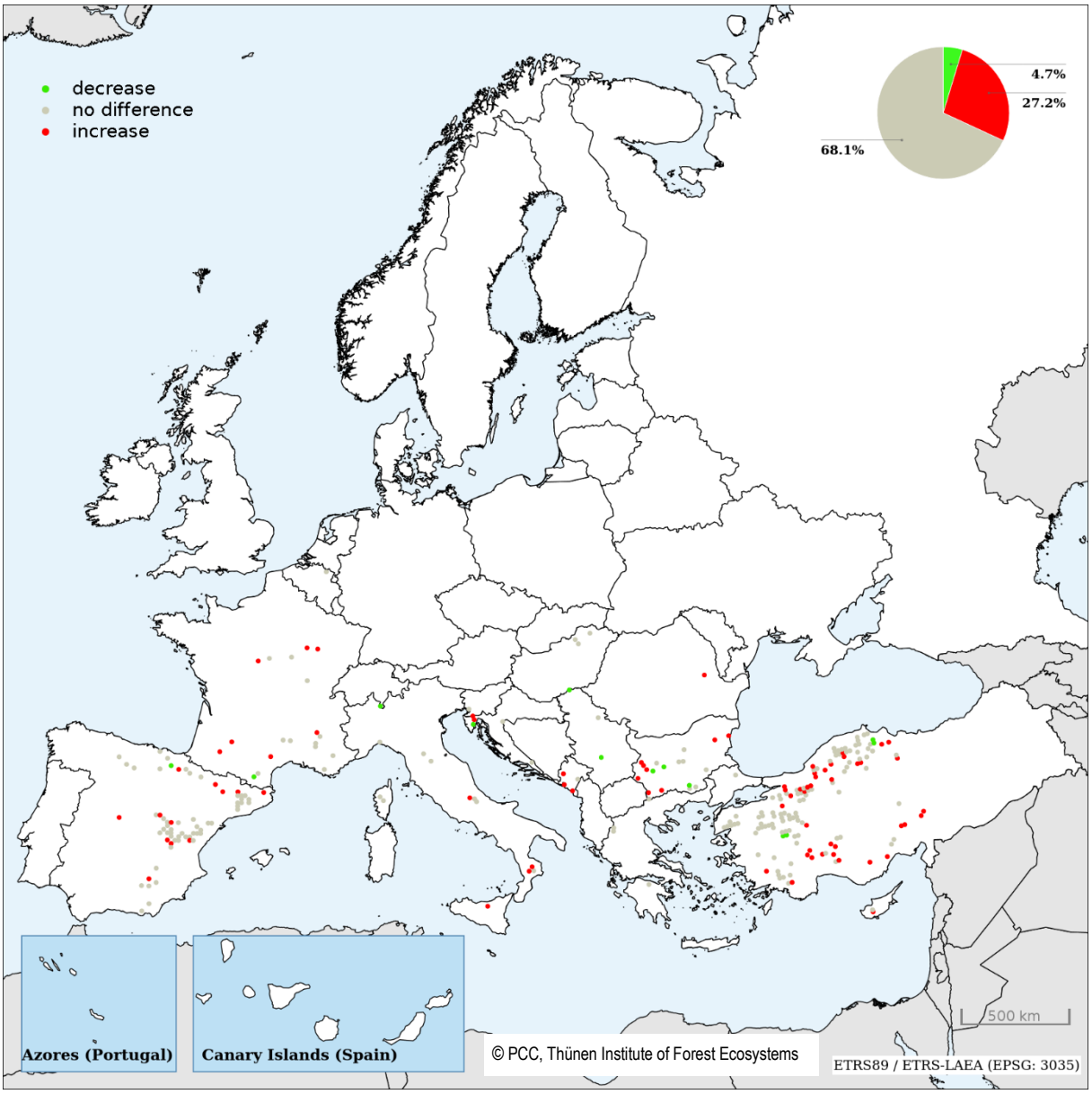


Figure S1-11: Trends in mean plot defoliation of Austrian pine (*Pinus nigra*) between 2013 and 2022. Plots were included if assessments were available for at least 80% of the period. The legend (top left) indicates whether mean plot defoliation overall decreased, stayed the same or increased within the given period. The pie chart (top right) indicates the respective percentage of plots per trend direction.

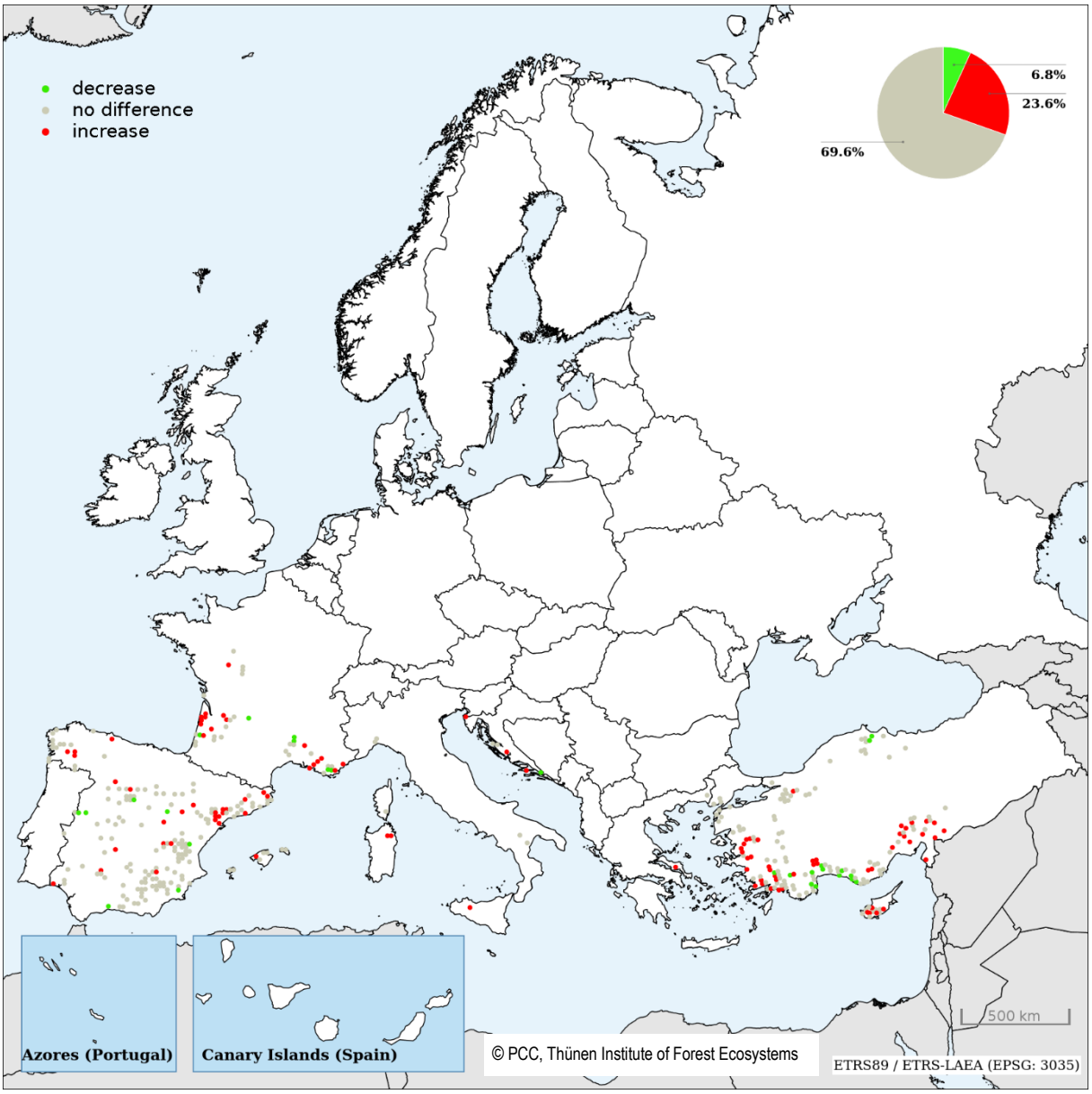


Figure S1-12: Trends in mean plot defoliation of Mediterranean lowland pines (*Pinus brutia*, *P. halepensis*, *P. pinaster*, *P. pinea*) between 2013 and 2022. Plots were included if assessments were available for at least 80% of the period. The legend (top left) indicates whether mean plot defoliation overall decreased, stayed the same or increased within the given period. The pie chart (top right) indicates the respective percentage of plots per trend direction.

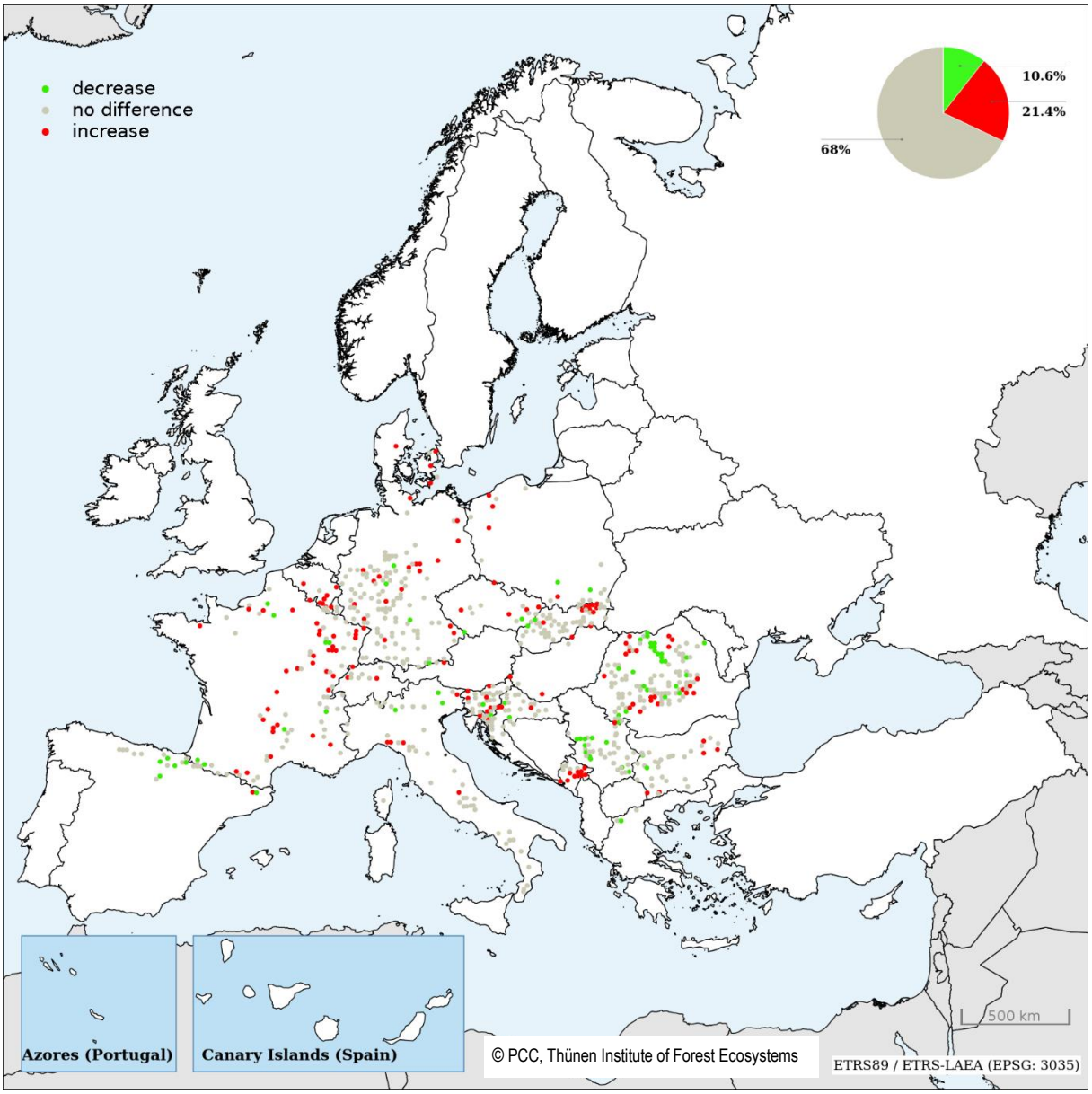


Figure S1-13: Trends in mean plot defoliation of common beech (*Fagus sylvatica*) between 2013 and 2022. Plots were included if assessments were available for at least 80% of the period. The legend (top left) indicates whether mean plot defoliation overall decreased, stayed the same or increased within the given period. The pie chart (top right) indicates the respective percentage of plots per trend direction.

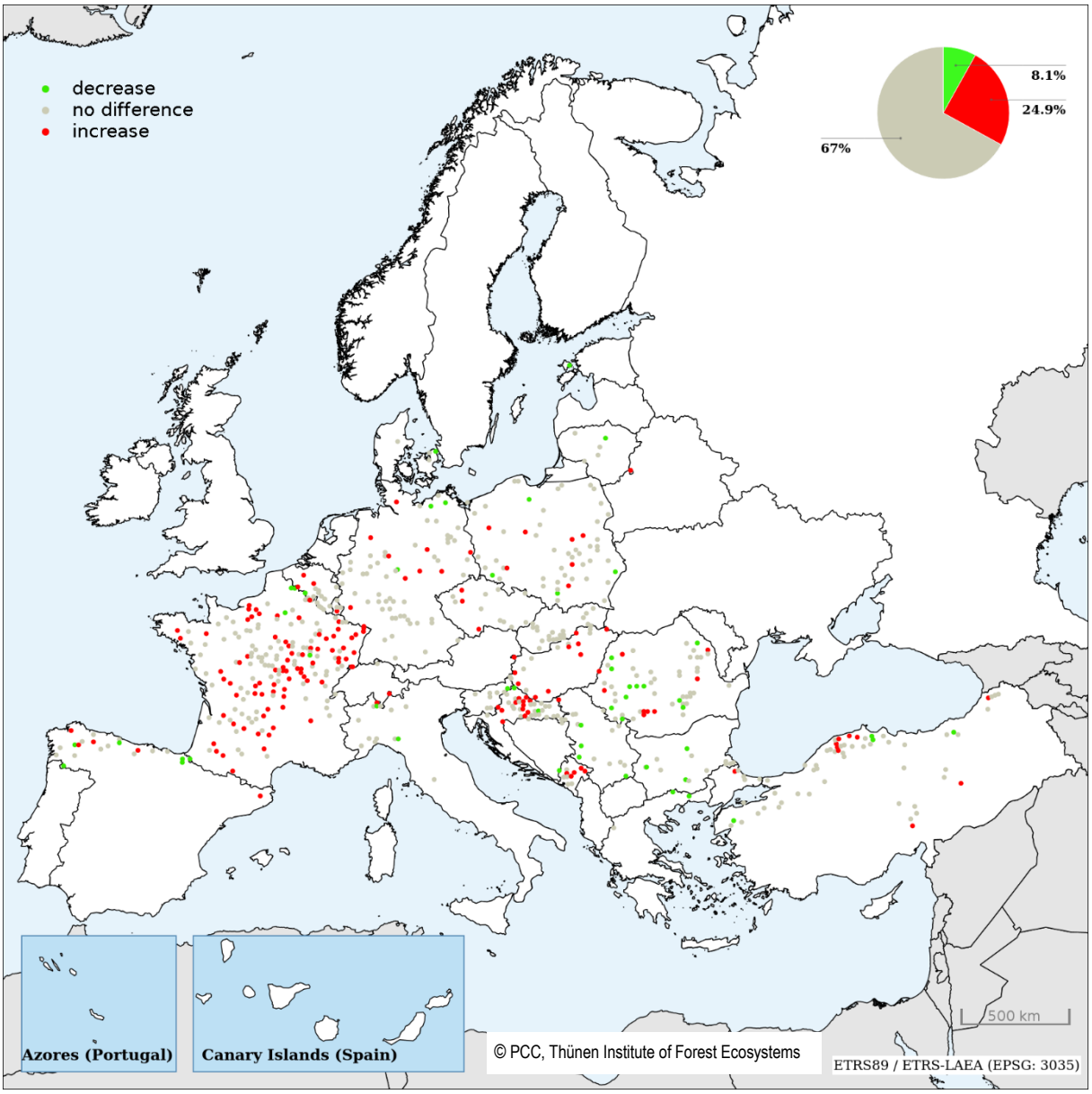


Figure S1-14: Trends in mean plot defoliation of deciduous temperate oaks (*Quercus robur* and *Q. petraea*) between 2013 and 2022. Plots were included if assessments were available for at least 80% of the period. The legend (top left) indicates whether mean plot defoliation overall decreased, stayed the same or increased within the given period. The pie chart (top right) indicates the respective percentage of plots per trend direction.

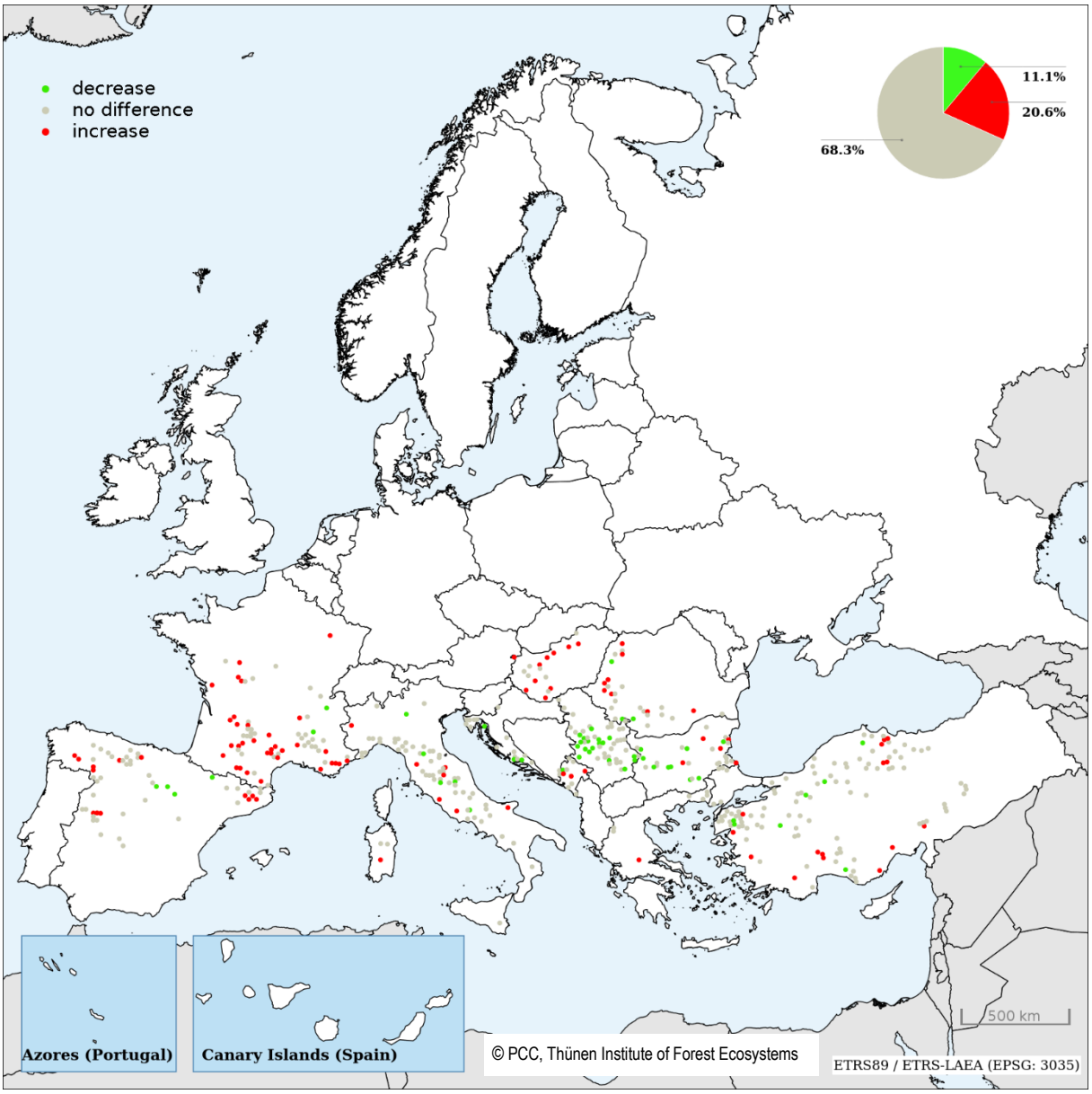


Figure S1-15: Trends in mean plot defoliation of deciduous (sub-) Mediterranean oaks (*Quercus cerris, Q. frainetto, Q. pubescens, Q. pyrenaica*) between 2013 and 2022. Plots were included if assessments were available for at least 80% of the period. The legend (top left) indicates whether mean plot defoliation overall decreased, stayed the same or increased within the given period. The pie chart (top right) indicates the respective percentage of plots per trend direction.

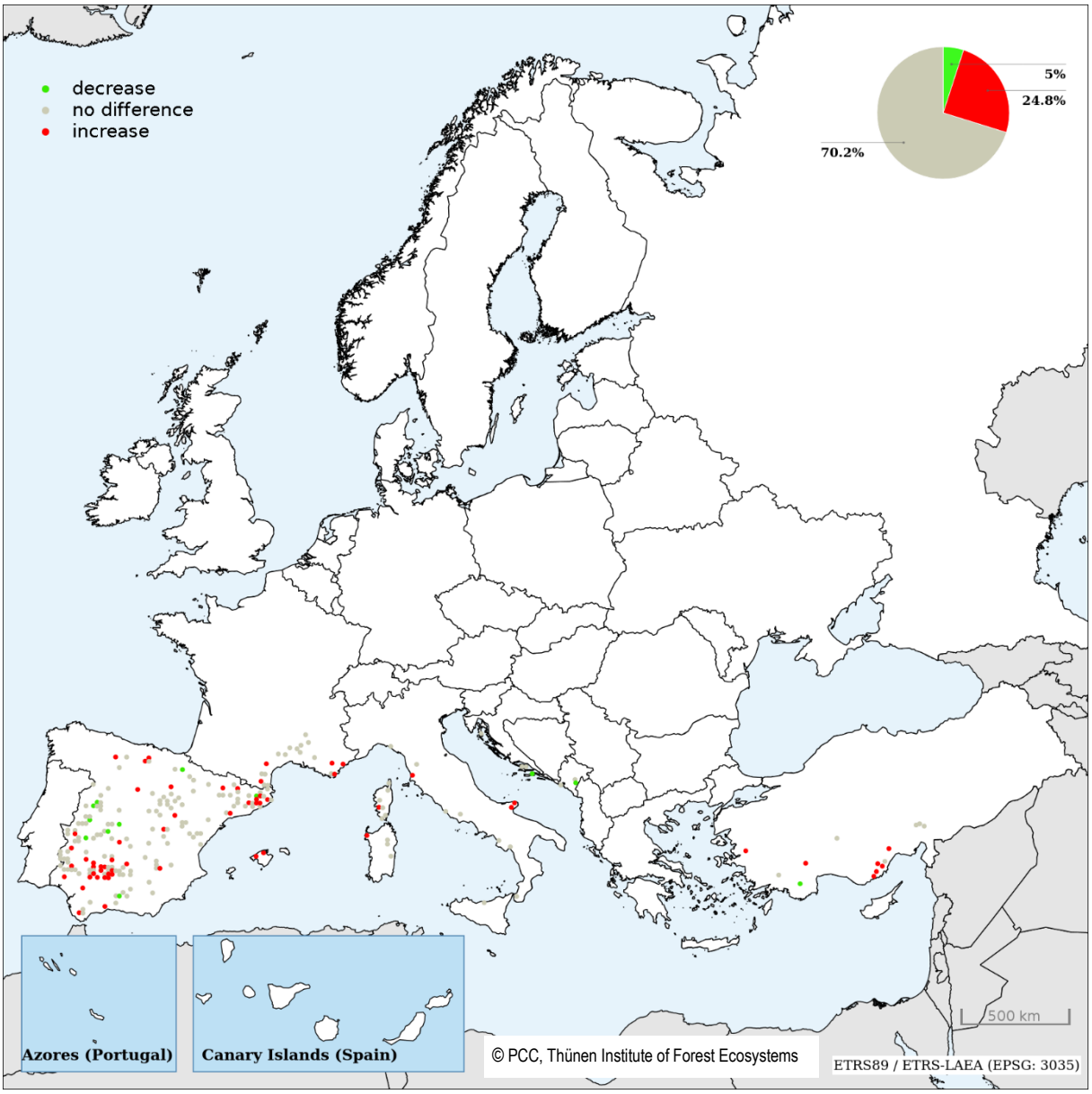


Figure S1-16: Trends in mean plot defoliation of evergreen oaks (*Quercus coccifera, Q ilex, Q. rotundifolia, Q. suber*) between 2013 and 2022. Plots were included if assessments were available for at least 80% of the period. The legend (top left) indicates whether mean plot defoliation overall decreased, stayed the same or increased within the given period. The pie chart (top right) indicates the respective percentage of plots per trend direction.

S1-3 Damage from various damaging agent groups reported in 2022

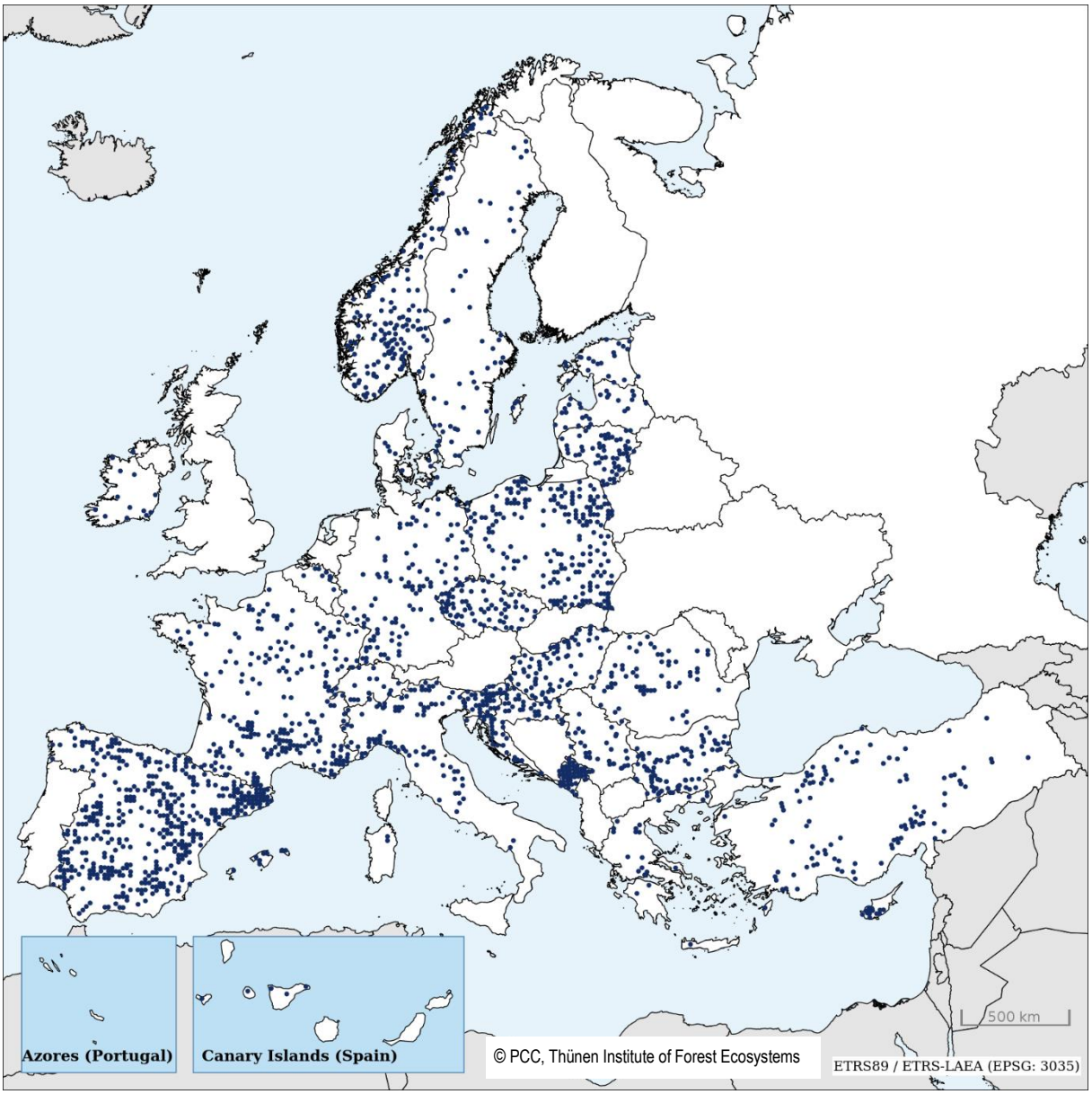


Figure S1-17: Damage from agent group Abiotic factors reported in 2022. Both fresh and old damage is shown.

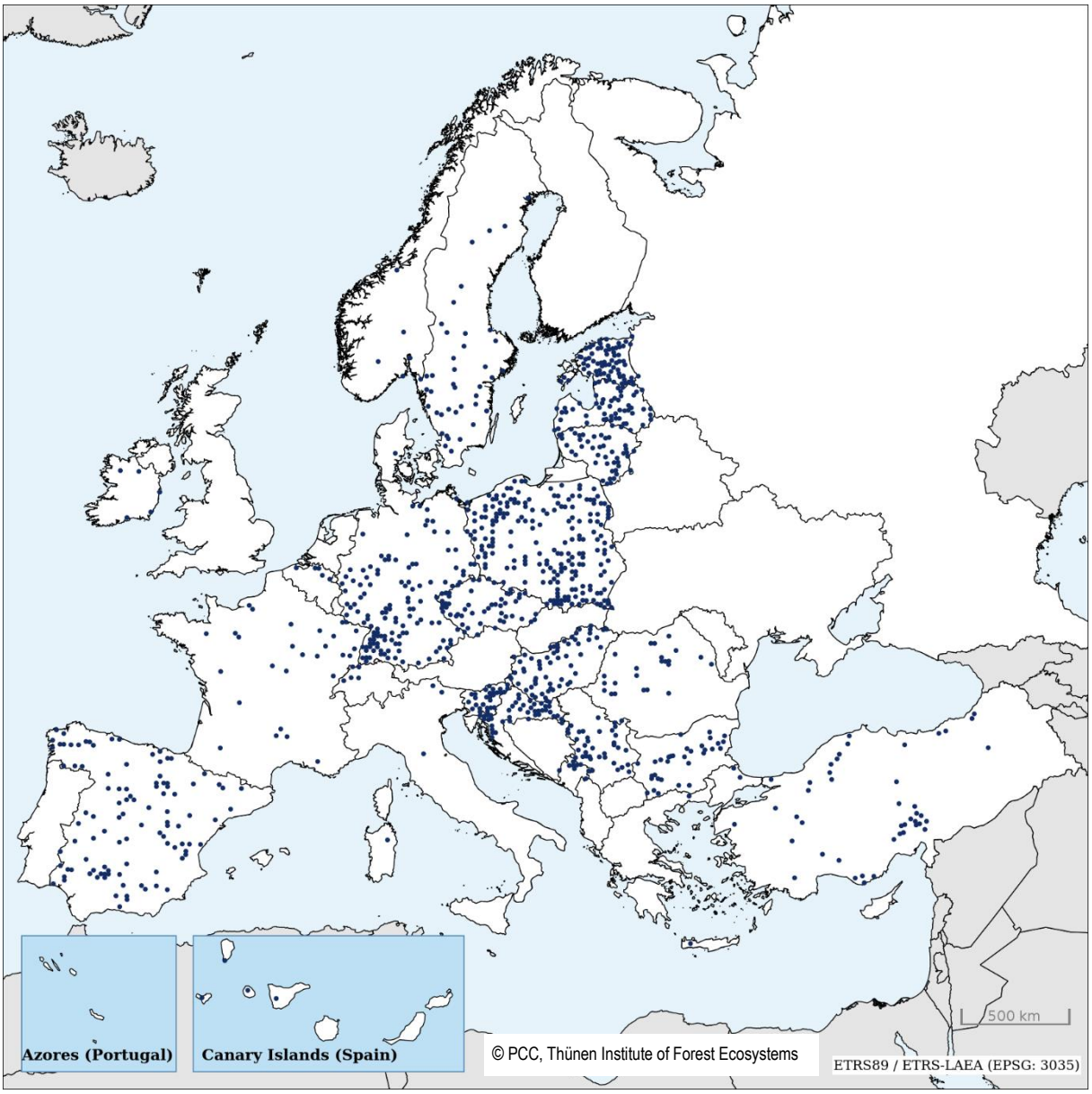


Figure S1-18: Damage from agent group Direct action of man reported in 2022. Both fresh and old damage is shown.

Figure S1-19: Damage from agent group Fire reported in 2022. Both fresh and old damage is shown.

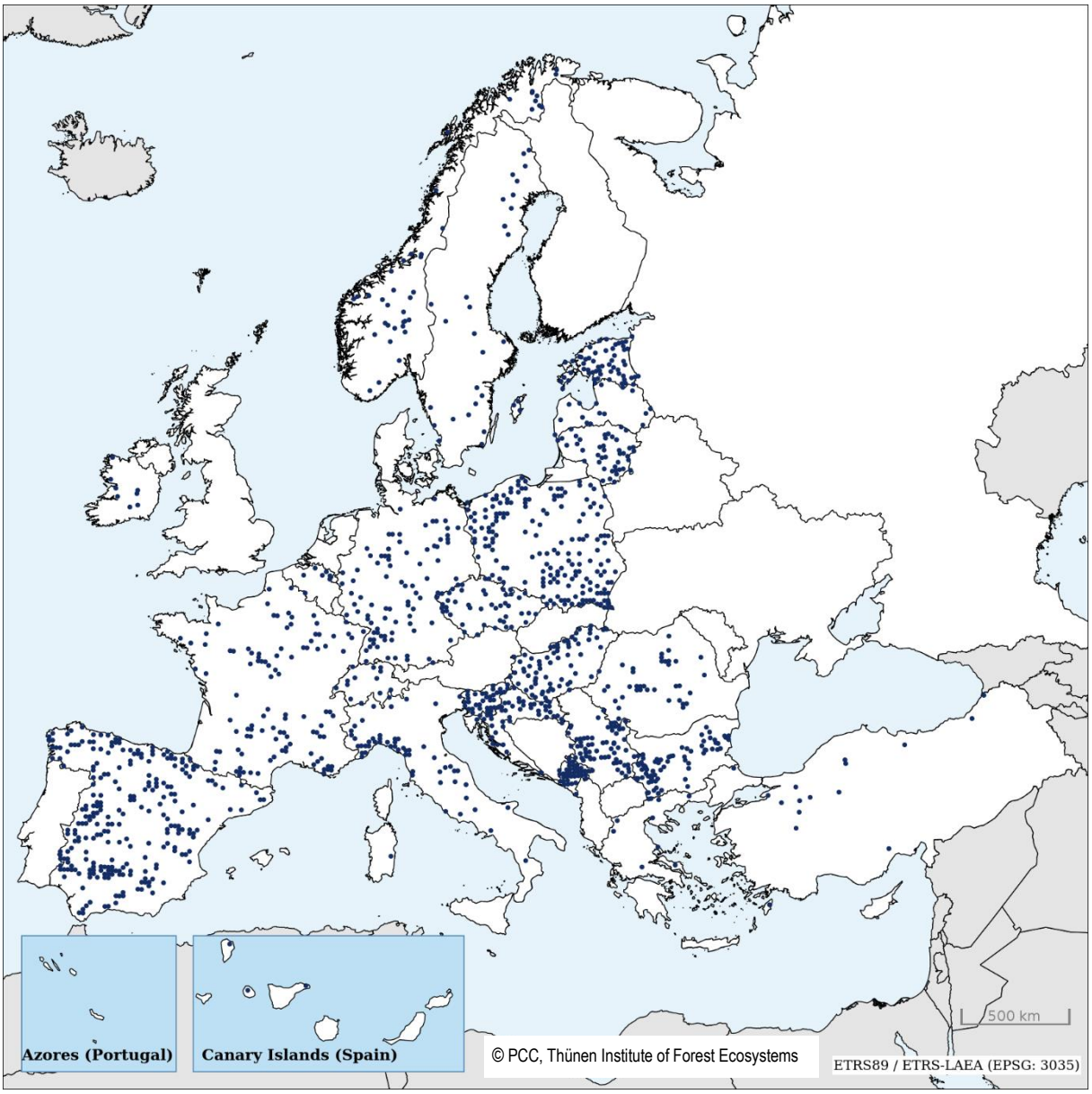


Figure S1-20: Damage from agent group Fungi reported in 2022. Both fresh and old damage is shown.

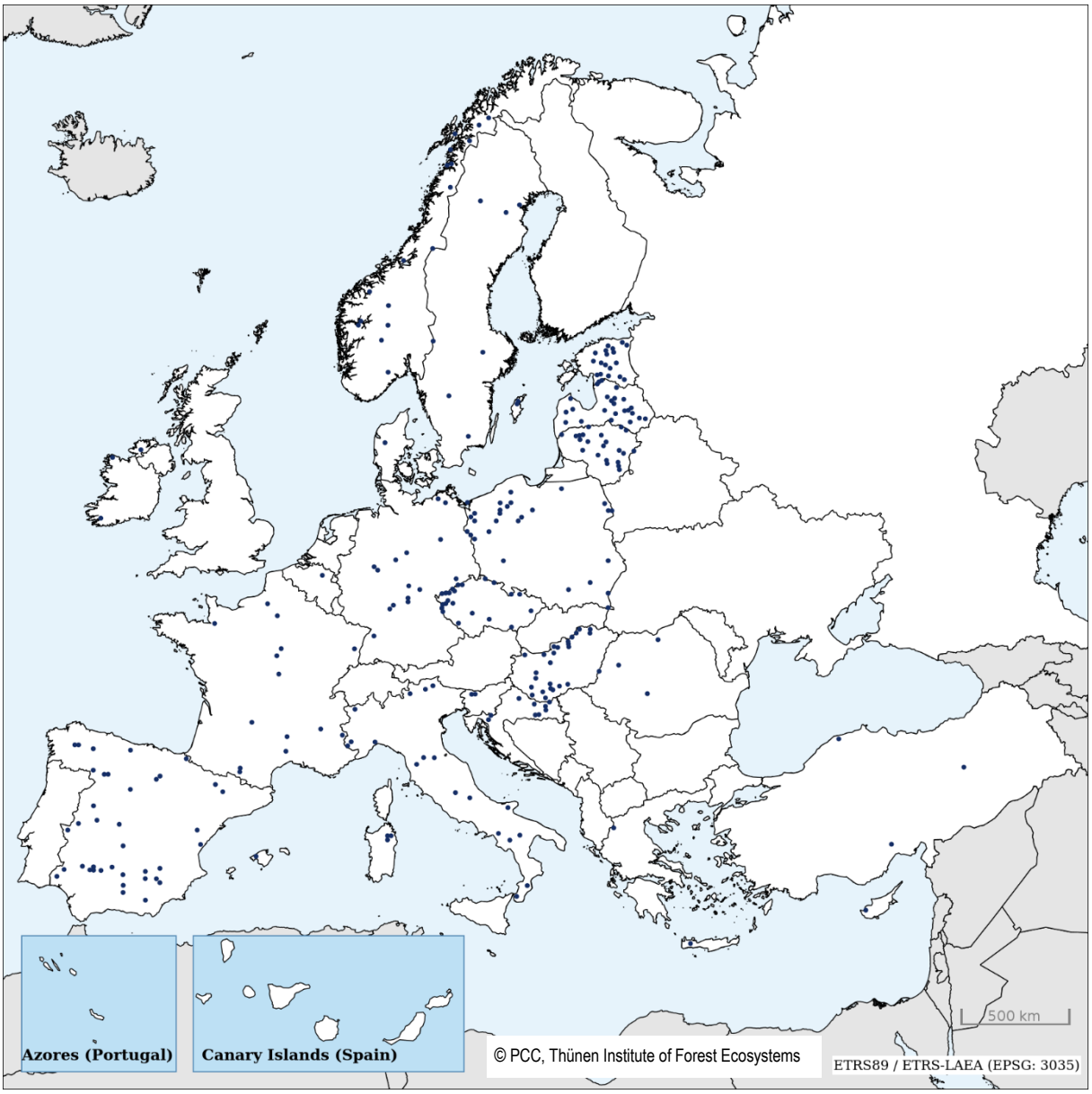


Figure S1-21: Damage from agent group Game and grazing reported in 2022. Both fresh and old damage is shown.

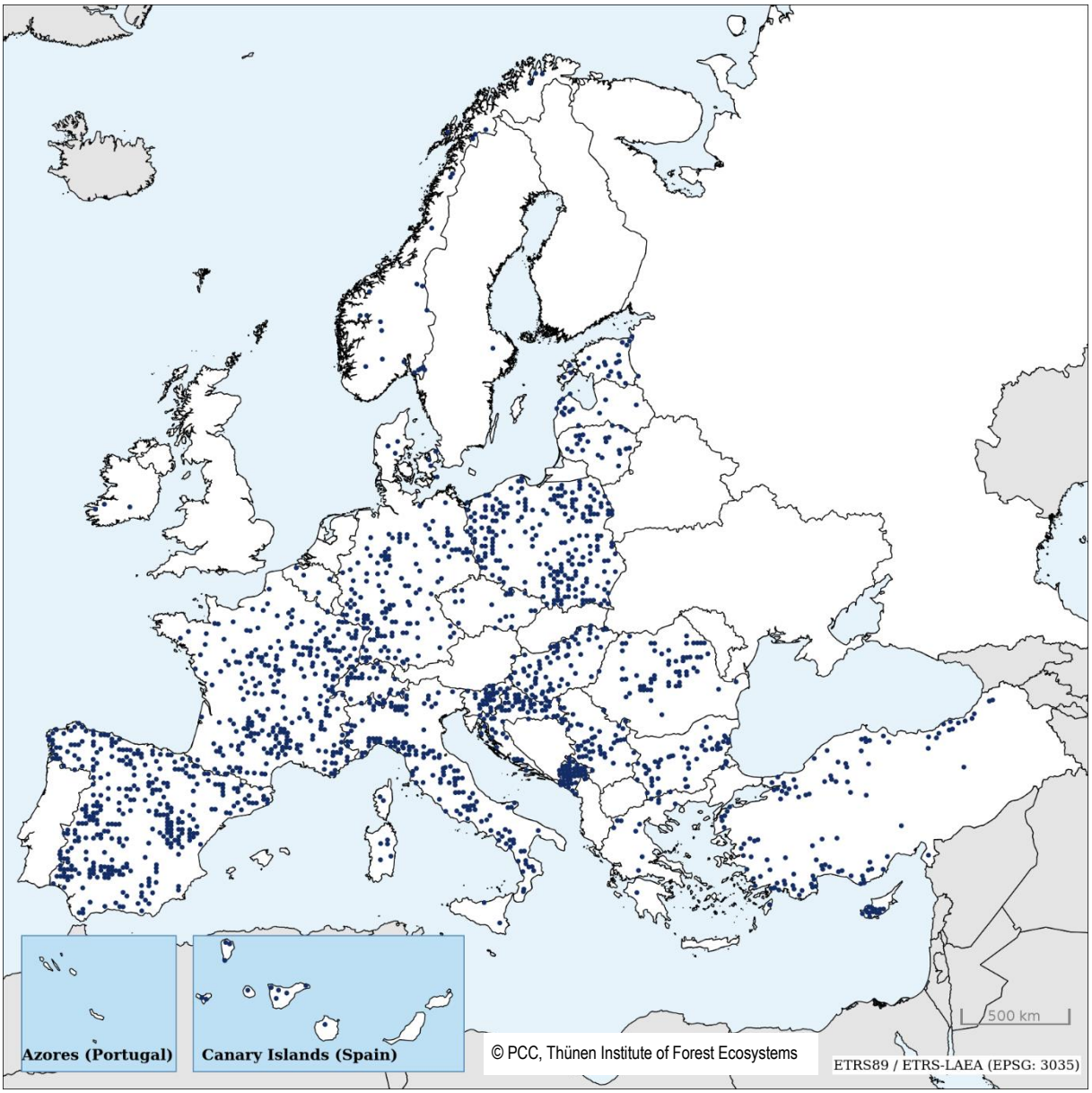


Figure S1-22: Damage from agent group Insects reported in 2022. Both fresh and old damage is shown.

S2 RESULTS OF THE NATIONAL CROWN CONDITION SURVEYS

S2-1 Information on the monitoring design for the national crown condition surveys in the participating countries in 2022

Country	Total area (1000 ha)	Forest area (1000 ha)	Grid size (km x km)	No. of sample plots	No. of sample trees
Albania	No information available for 2022				
Andorra	47	18	4x4	12	290
Belarus	No information available for 2022				
Belgium-Flanders	1351	146	4x4	78	1486
Belgium-Wallonia	1685	555	varying	46	358
Bulgaria	11100	3921	4x4/16x16	160	5599
Croatia	5659	2795	16x16	97	2328
Cyprus	925	298	16x16	15	360
Czechia	7887	2679	8x8	251	8606
Denmark	4300	640	varying	394	2703
Estonia	4534	2326	16x16	93	2113
Finland	No information available for 2022				
France	54883	17100	16x16	557	10698
Germany	35721	11419	16x16	406	9727
Greece	13205	6513	16x16	36	819
Hungary	9300	1948	16x16	78	1872
Ireland	6976	808	16x16	35	593
Italy	30128	10967	16x16	256	4371
Latvia	6459	3223	16x16	115	1730
Lithuania	6529	2205	4x4/16x16	1013	5905
Luxembourg	259	91	4x4	51	1199
Moldova, Rep. of	3384	374	3x3	566	13308
Montenegro	1381	827	16x16	49	1176
North Macedonia	No information available for 2022				
Norway	32381	12210	3x3	1845	10506
Poland	31268	9265	8x8	2071	41420
Portugal	No information available for 2022				
Romania	23840	7046	16x16	238	5712
Russian Fed.	No information available for 2022				
Serbia	8836	2252	4x4/16x16	130	2886
Slovakia	4904	2014	16x16	99	3704
Slovenia	2027	1197	16x16	44	1056
Spain	50599	28082	16x16	620	14880
Sweden	40655	27915	varying	3787	7663
Switzerland	4129	1279	16x16	49	993
Türkiye	78005	23000	16x16	579	13134
Ukraine	No information available for 2022				
Total				**13 770**	**177 195**

S2-2 Tree defoliation (%) in different defoliation classes from national crown condition surveys in 2022

Participating country	No. of sample trees	Defoliation classes 0 none (%)	1 slight (%)	2 moderate (%)	3 severe (%)	4 dead (%)	2-4 mod.-dead (%)
Andorra							
Broadleaves	5	0.0	60.0	40.0	0.0	0.0	40.0
Conifers	285	11.5	46.0	39.3	2.5	0.7	42.5
All trees	290	11.3	46.24	39.31	2.46	0.69	42.5
Belgium-Flanders							
Broadleaves	865	11.2	60.6	26.6	1.3	0.3	28.2
Conifers	621	4.0	71.7	23.0	0.0	1.3	24.3
All trees	1486	8.2	65.2	25.1	0.8	0.7	26.6
Belgium-Wallonia							
Broadleaves	201	8.5	25.4	53.2	12.4	0.5	66.2
Conifers	157	3.8	24.8	56.1	15.3	0.0	71.3
All trees	358	6.4	25.1	54.5	13.7	0.3	68.4
Bulgaria							
Broadleaves	3170	24.1	50.5	21.6	2.0	1.8	25.5
Conifers	2429	27.2	25.2	34.1	10.8	2.7	47.6
All trees	5599	25.4	39.5	27.0	5.8	2.2	35.1
Croatia							
Broadleaves	1966	25.6	42.5	27.8	3.3	0.9	31.9
Conifers	362	25.1	29.6	38.1	7.2	0.0	45.3
All trees	2328	25.6	40.5	29.4	3.9	0.7	34.0
Cyprus							
Broadleaves	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conifers	360	3.6	64.4	30.0	1.9	0.0	31.9
All trees	360	3.6	64.4	30.0	1.9	0.0	31.9
Czechia							
Broadleaves	2592	21.1	44.1	32.2	2.0	0.6	34.8
Conifers	6014	12.2	19.8	61.5	6.1	0.4	68.0
All trees	8606	14.9	27.2	52.7	4.8	0.4	58.0
Denmark							
Broadleaves	1292	39.5	37.5	22.4	0.6	0.0	23.0
Conifers	1411	53.5	35.6	10.1	0.8	0.0	10.9
All trees	2703	46.8	36.5	16.0	0.7	0.0	16.7
Estonia							
Broadleaves	267	59.0	38.0	2.0	1.0	0.0	3.0
Conifers	1846	46.0	44.0	8.0	1.0	1.0	10.0
All trees	2113	47.6	43.2	7.2	1.0	0.9	9.1

Participating country	No. of sample trees	Defoliation classes 0 none (%)	1 slight (%)	2 moderate (%)	3 severe (%)	4 dead (%)	2-4 mod.-dead (%)
France							
Broadleaves	6971	8.4	24.0	52.2	14.8	0.6	67.6
Conifers	3727	20.8	31.5	42.4	4.8	0.5	47.7
All trees	10698	12.7	26.6	48.8	11.3	0.6	60.7
Germany							
Broadleaves	4168	23.5	38.5	32.7	4.1	1.2	38.0
Conifers	5559	18.8	48.7	27.4	1.2	3.9	32.5
All trees	9727	20.8	44.3	29.7	2.4	2.7	34.9
Greece							
Broadleaves	239	64.0	21.8	12.1	2.1	0.0	14.2
Conifers	580	50.7	27.6	19.0	2.6	0.2	21.7
All trees	819	54.6	25.9	17.0	2.4	0.1	19.5
Hungary							
Broadleaves	1704	9.9	21.8	46.7	19.5	2.1	68.3
Conifers	168	21.3	31.6	32.2	13.7	1.2	47.1
All trees	1872	10.9	22.7	45.4	19.0	2.0	66.4
Ireland							
Broadleaves	157	16.6	33.1	24.8	15.9	9.6	50.3
Conifers	436	65.1	20.2	10.3	3.0	1.4	14.7
All trees	593	52.3	23.6	14.2	6.4	3.5	24.1
Italy							
Broadleaves	3267	13.5	41.9	37.5	5.7	1.4	44.6
Conifers	1104	22.8	32.8	35.6	7.2	1.6	44.4
All trees	4371	15.9	39.6	37.0	6.1	1.5	44.6
Latvia							
Broadleaves	464	9.7	87.9	1.7	0.0	0.7	2.4
Conifers	1266	12.6	81.8	4.7	0.6	0.3	5.6
All trees	1730	11.9	83.4	3.9	0.5	0.4	4.7
Lithuania							
Broadleaves	2322	21.0	59.8	16.4	1.2	1.6	19.2
Conifers	3583	12.9	61.2	24.6	0.6	0.7	25.9
All trees	5905	16.1	60.7	21.4	0.8	1.1	23.3
Luxembourg							
Broadleaves	834	9.7	19.5	61.4	7.4	1.9	70.7
Conifers	365	28.5	30.4	29.3	2.2	9.6	41.1
All trees	1199	15.4	22.9	51.6	5.8	4.3	61.7
Moldova, Rep. of							
Broadleaves	13266	37.0	33.0	25.0	1.0	4.0	30.0
Conifers	42	29.0	50.0	10.0		11.0	21.0
All trees	13308	37.0	33.1	25.0	1.0	4.0	30.0

Participating country	No. of sample trees	Defoliation classes 0 none (%)	1 slight (%)	2 moderate (%)	3 severe (%)	4 dead (%)	2-4 mod.-dead (%)
Montenegro							
Broadleaves	888	17.0	49.9	30.5	2.6	0.0	33.1
Conifers	288	22.6	45.8	20.8	10.8	0.0	31.6
All trees	1176	18.4	48.9	28.2	4.6	0.0	32.7
Norway							
Broadleaves	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conifers	10506	48.5	34.8	13.7	2.7	0.3	16.7
All trees	10506	48.5	34.8	13.7	2.7	0.3	16.7
Poland							
Broadleaves	15807	18.4	64.0	15.8	1.2	0.7	17.6
Conifers	25613	12.0	73.8	12.8	0.9	0.5	14.2
All trees	41420	14.5	70.1	14.0	1.0	0.6	15.5
Romania							
Broadleaves	4758	46.7	40.9	10.6	1.4	0.4	12.4
Conifers	954	54.7	28.6	15.4	1.2	0.1	16.7
All trees	5712	48.0	38.9	11.4	1.4	0.4	13.1
Serbia							
Broadleaves	2550	83.4	10.6	4.3	1.7	0.0	6.0
Conifers	336	92.2	3.0	2.1	2.7	0.0	4.8
All trees	2886	84.4	9.7	4.0	1.8	0.0	5.9
Slovakia							
Broadleaves	2339	7.6	52.2	36.9	3.1	0.2	40.2
Conifers	1365	3.8	38.2	53.5	4.3	0.2	58.0
All trees	3704	6.2	47.0	43.0	3.5	0.2	46.8
Slovenia							
Broadleaves	712	9.0	47.1	32.9	10.0	1.1	44.0
Conifers	344	19.5	32.0	40.4	8.1	0.0	48.6
All trees	1056	12.4	42.1	35.3	9.4	0.8	45.5
Spain							
Broadleaves	7556	19.2	57.9	18.5	2.9	1.5	23.0
Conifers	7324	17.7	61.6	16.4	2.1	2.3	20.8
All trees	14880	18.4	59.7	17.5	2.5	1.9	21.9
Sweden							
Broadleaves	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conifers	7663	48.5	32.8	15.6	2.8	0.3	18.7
All trees	7663	48.5	32.8	15.6	2.8	0.3	18.7
Switzerland							
Broadleaves	273	18.2	50.5	8.8	8.0	14.5	31.3
Conifers	720	22.3	52.3	16.3	0.2	8.9	25.4
All trees	993	21.2	51.8	14.2	2.3	10.4	27.0

Participating country	No. of sample trees	Defoliation classes 0 none (%)	1 slight (%)	2 moderate (%)	3 severe (%)	4 dead (%)	2-4 mod.-dead (%)
Türkiye							
Broadleaves	5117	33.0	46.4	18.1	1.7	0.8	20.6
Conifers	8017	29.3	52.0	17.3	0.9	0.6	18.8
All trees	13134	30.7	49.8	17.6	1.2	0.7	19.5

S2-3 Percentage of moderately to severely defoliated trees (defoliation classes 2–4) between 2013 and 2022 – All species

Participating countries	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Change % points 2021/22
Albania	21.0										**N/A**
Andorra	3.4	5.3	4.5	3.4	7.0	5.6		21.6	20.8	42.5	**+21.7**
Belgium	27.6	27.5	26.4	26.1	26.6	27.7	31.7	33.9	30.7	34.8	**+4.1**
Bulgaria	33.5	26.0	26.2	29.9	27.7	31.9	31.2	34.3	33.5	35.1	**+1.6**
Croatia	29.1	31.5	29.7	28.5	25.6	30.8	30.3	29.4	32.7	34.0	**+1.3**
Cyprus	8.9	13.3	12.5	35.0	23.6	33.5	29.6	26.0	29.9	31.9	**+2.0**
Czechia	51.7		52.0	54.3	53.6	56.4	57.4	56.7	57.2	58.0	**+0.8**
Denmark	4.9	7.0	8.7	14.8	12.9	21.4	32.3	24.0	13.9	16.7	**+2.8**
Estonia	8.0	6.7	6.7	6.4	5.2	8.5	5.7	6.0	8.1	9.1	**+1.0**
France	40.1	42.8	43.4	48.6	48.8	52.2	55.1	57.4	59.5	60.7	**+1.2**
Germany	22.7	26.2	23.8	28.0	22.7	28.7	36.4	37.5	34.8	34.9	**+0.1**
Greece		24.8	20.2		20.2	18.4	20.7	20.0	16.7	19.5	**+2.8**
Hungary	22.4	24.2	24.0	34.6	41.0	47.3	35.1	36.7	47.5	66.4	**+18.9**
Ireland								20.8	23.2	24.1	**+0.9**
Italy	33.7	30.8	29.8	34.7	39.0	39.0	36.0	36.2	42.0	44.6	**+2.6**
Latvia	6.4	5.1	4.4	5.7	5.3	5.1	5.5	3.5	4.0	4.7	**+0.7**
Lithuania	19.7	21.7	23.8	21.0	21.1	18.5	19.2	18.9	19.9	23.3	**+3.4**
Luxembourg	33.2		32.6	38.2	30.3	31.3	50.1	54.0	54.6	61.7	**+7.1**
Moldova, Rep. of		19.9	26.1	26.5	28.7		28.0	38.9	29.1	30.0	**+0.9**
Montenegro	22.7		25.4	27.3	26.6	33.6		37.6	32.4	32.7	**+0.3**
Norway	17.7	15.9	16.5	15.5	19.0	15.5	16.5	17.2	14.9	16.7	**+1.8**
Poland	18.8	18.9	16.7	19.5	20.2	18.6	21.2	19.4	17.1	15.5	**-1.6**
Romania	13.6	13.5	13.1	13.4	14.5	14.8	11.6	12.9	12.1	13.1	**+1.0**
Serbia	14.7	12.4	10.7	11.3	11.8	11.9	8.9	7.1	6.1	5.9	**-0.2**
Slovakia	43.4		34.5	40.3	32.6	42.7	38.8	40.4	37.7	46.8	**+9.1**
Slovenia	30.9	38.3	37.8	33.9	37.0	36.0	37.7	38.1	42.2	45.5	**+3.3**
Spain	16.6	14.9		21.9	27.8	22.7	26.9	21.9	21.2	21.9	**+0.7**
Sweden	19.9		19.8	16.4	18.2	17.6	17.1	17.8	21.1	18.7	**-2.4**
Switzerland	26.0	30.6	24.8	25.2	33.7	23.5	33.5	26.4	26.9	27.0	**+0.1**
Türkiye	10.2	11.0	9.5	9.8	8.8	10.5	12.1	11.9	13.9	19.5	**+5.6**
Ukraine	7.1	6.0	7.1								**N/A**

Please note that some differences in the level of defoliation between participating countries may be at least partly due to differences in standards used. This restriction, however, does not affect the reliability of the trends over time. In some countries there has been a change in the monitoring design at different points in time.

S2-4 Percentage of moderately to severely defoliated trees (defoliation classes 2–4) between 2013 and 2022 – Conifers

Participating countries	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Change % points 2021/22
Albania	21.0										**N/A**
Andorra	3.1	5.4	4.3	3.5	7.1	5.6		21.6	20.8	42.5	**+21.7**
Belgium	19.7	22.8	27.9	24.6	26.8	27.7	33.5	33.9	28.9	33.9	**+5.0**
Bulgaria	40.8	34.1	40.1	39.9	37.0	45.0	45.4	48.1	46.8	47.6	**+0.8**
Croatia	48.3	49.7	56.0	51.0	35.0	47.0	53.6	48.7	46.0	45.3	**-0.7**
Cyprus	8.9	13.3	12.5	35.0	23.6	33.5	29.6	26.0	29.9	31.9	**+2.0**
Czechia	59.2		57.8	60.3	60.3	63.0	64.3	64.2	65.4	68.0	**+2.6**
Denmark	2.8	5.3	7.4	11.3	11.8	15.2	22.0	21.9	13.0	10.9	**-2.1**
Estonia	8.5	6.9	6.5	6.7	5.5	9.3	5.8	6.0	8.0	10.0	**+2.0**
France	33.7	36.6	38.0	39.3	38.8	40.0	42.0	42.4	43.4	47.7	**+4.3**
Germany	18.1	19.7	20.3	22.3	19.5	22.8	31.2	33.5	33.1	32.5	**-0.6**
Greece		26.7	27.2		32.1	26.2	28.7	29.1	22.0	21.7	**-0.3**
Hungary	23.5	30.7	46.5	52.8	44.9	52.3	43.2	48.0	47.4	47.1	**-0.3**
Ireland								9.8	13.0	14.7	**+1.7**
Italy	24.2	24.0	22.6	19.6	21.8	28.1	28.8	26.9	43.2	44.4	**+1.2**
Latvia	6.9	4.8	4.4	4.9	5.3	3.9	4.6	3.3	5.0	5.6	**+0.6**
Lithuania	23.1	21.1	25.0	21.7	23.5	21.1	21.7	21.0	22.3	25.9	**+3.6**
Luxembourg	17.5	93.3	18.7	17.4	17.7	16.2	35.5	36.2	36.2	41.1	**+4.9**
Moldova, Rep. of		29.4		21.6	19.6		19.2	17.0	14.3	21.0	**+6.7**
Montenegro	22.6		26.1	28.1	23.6	30.9		38.2	33.3	31.6	**-1.7**
Norway	17.7	15.9	16.5	15.5	19.0	15.5	16.5	17.2	14.9	16.7	**+1.8**
Poland	17.8	17.2	15.7	17.1	18.4	17.2	19.6	17.5	16.6	14.2	**-2.4**
Romania	13.9	13.7	8.0	10.4	10.7	10.3	13.7	17.4	16.4	16.7	**+0.3**
Serbia	13.0	14.6	14.5	13.5	12.0	10.2	9.8	8.7	8.6	4.8	**-3.8**
Slovakia	43.3		49.4	45.6	41.6	49.7	45.3	51.3	54.0	58.0	**+4.0**
Slovenia	31.3	38.1	41.0	38.6	40.6	40.3	42.7	41.1	44.1	48.6	**+4.5**
Spain	12.6	11.4		20.9	26.2	23.1	26.7	20.8	18.3	20.8	**+2.5**
Sweden	19.9	18.8	19.8	16.4	18.2	17.6	17.1	17.8	17.5	18.7	**+1.2**
Switzerland	23.3	31.7	24.0	24.9	33.4	22.1	33.6	23.3	27.7	25.4	**-2.3**
Türkiye	6.9	7.2	8.6	9.1	8.2	10.2	11.4	11.7	14.1	18.8	**+4.7**
Ukraine	7.5	6.8	7.9								**N/A**

Please note that some differences in the level of defoliation between participating countries may be at least partly due to differences in standards used. This restriction, however, does not affect the reliability of the trends over time. In some countries there has been a change in the monitoring design at different points in time.

S2-5 Percentage of moderately to severely defoliated trees (defoliation classes 2–4) between 2013 and 2022 – Broadleaves

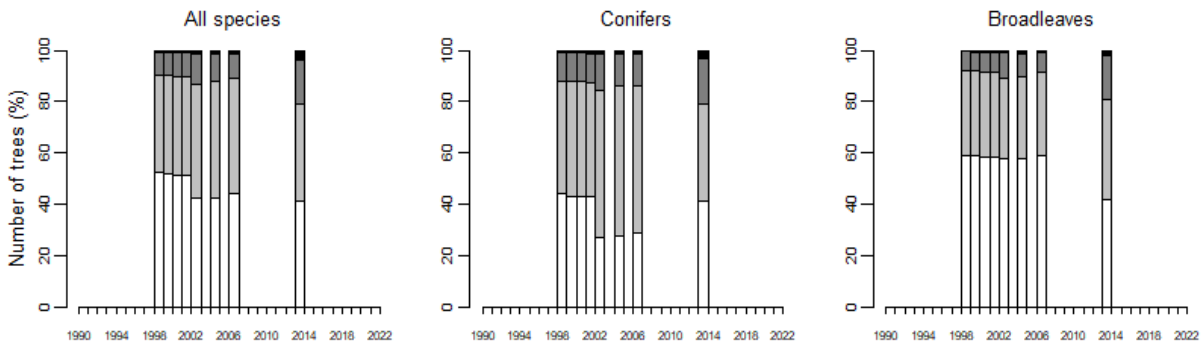
Participating country	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Change % points 2021/22
Albania	19.0										**N/A**
Andorra	20.0	20.0	16.7	0.0	0.0	0.0		16.7	20.0	40.0	**+20.0**
Belgium	29.4	31.4	25.1	27.4	26.2	27.7	30.2	33.7	32.0	35.4	**+3.4**
Bulgaria	28.0	20.0	15.6	22.3	20.5	21.8	20.3	23.7	23.2	25.5	**+2.3**
Croatia	25.7	28.1	25.3	24.7	24.0	27.8	26.4	26.0	30.4	31.9	**+1.5**
Cyprus				N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
Czechia	25.7		32.7	34.7	31.6	35.6	37.5	36.3	35.6	34.8	**-0.8**
Denmark	7.9	9.0	10.8	19.7	14.4	30.0	46.0	26.1	15.2	23.0	**+7.8**
Estonia	5.3	5.7	8.0	5.2	3.3	4.1	5.1	6.0	9.0	3.0	**-6.0**
France	43.6	46.1	47.0	53.5	54.2	58.8	62.2	65.4	68.2	67.6	**-0.6**
Germany	29.8	36.1	29.0	35.7	27.5	37.1	43.6	43.2	37.0	38.0	**+1.0**
Greece		16.7	11.3		14.6	14.4	15.5	12.9	13.0	14.2	**+1.2**
Hungary	22.3	23.3	21.4	32.5	40.6	46.8	34.3	35.5	47.5	68.3	**+20.8**
Ireland								53.4	52.0	50.3	**-1.7**
Italy	37.1	33.4	32.1	39.5	45.0	43.4	38.1	39.6	41.6	44.6	**+3.0**
Latvia	4.4	6.1	4.2	8.3	5.2	8.8	8.1	3.8	1.1	2.4	**+1.3**
Lithuania	14.7	22.5	21.9	20.0	17.8	14.2	15.2	15.4	15.9	19.2	**+3.3**
Luxembourg	42.4	34.6	40.3	49.0	37.2	39.7	57.4	62.8	62.6	70.7	**+8.1**
Moldova, Rep. of		19.9	26.1	26.5	28.7	N/A	28.0	39.0	29.1	30.0	**+0.9**
Montenegro	22.8		25.2	27.1	27.6	34.8		37.4	32.1	33.1	**+1.0**
Norway	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
Poland	20.7	21.9	18.4	24.0	23.3	21.1	23.9	22.6	17.9	17.6	**-0.3**
Romania	13.6	13.0	13.9	14.2	15.3	15.8	11.2	12.1	11.2	12.4	**+1.2**
Serbia	14.9	12.1	10.1	11.0	11.8	12.1	8.7	6.9	5.8	6.0	**+0.2**
Slovakia	43.5	43.5	24.3	36.5	26.7	38.4	34.8	33.8	28.1	40.2	**+12.1**
Slovenia	30.6	38.4	35.9	31.1	35.1	33.7	35.1	36.6	41.3	44.0	**+2.7**
Spain	20.7	18.4		22.7	29.3	22.4	27.0	23.0	24.0	23.0	**-1.0**
Sweden					N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
Switzerland	31.5	28.0	26.4	25.9	34.7	26.6	33.2	34.5	24.7	31.3	**+6.6**
Türkiye	15.7	17.2	10.8	11.0	9.8	11.0	13.1	12.2	13.5	20.6	**+7.1**
Ukraine	7.0	5.5	6.3								**N/A**

Please note that some differences in the level of defoliation between participating countries may be at least partly due to differences in standards used. This restriction, however, does not affect the reliability of the trends over time. In some countries there has been a change in the monitoring design at different points in time.

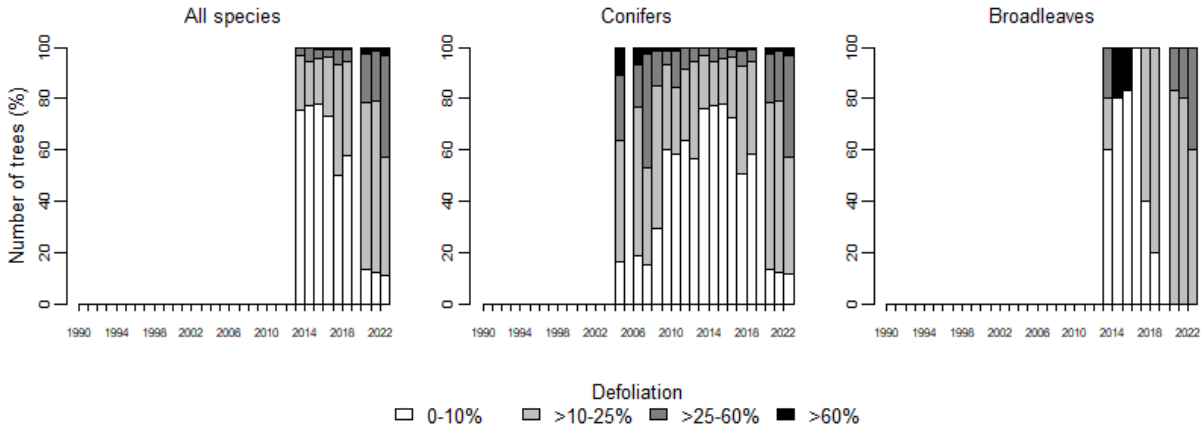
S2-6 Change of tree defoliation over time (1990–2022) per country

Please note that some countries have changed their monitoring design at different points in time which may explain sudden strong increases or decreases in the number of trees per defoliation category in the figures below. For detailed information, please contact the respective NFCs. Their contact information is given in the Annex of the ICP Forests 2023 Technical Report[1].

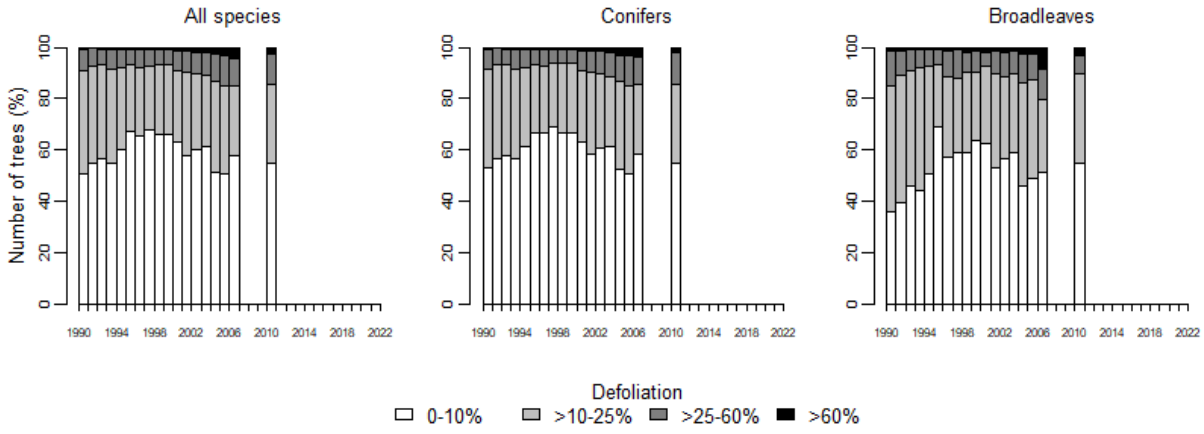
ALBANIA



ANDORRA

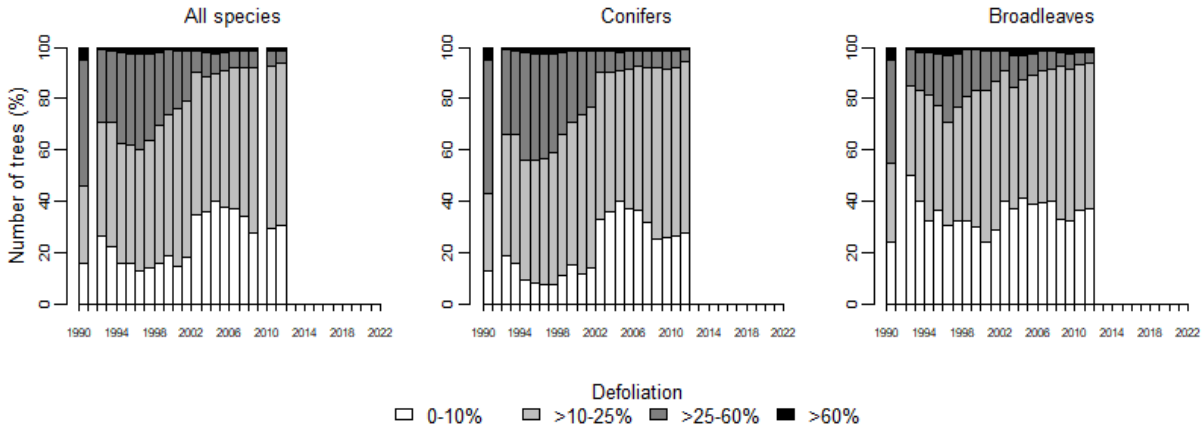


AUSTRIA

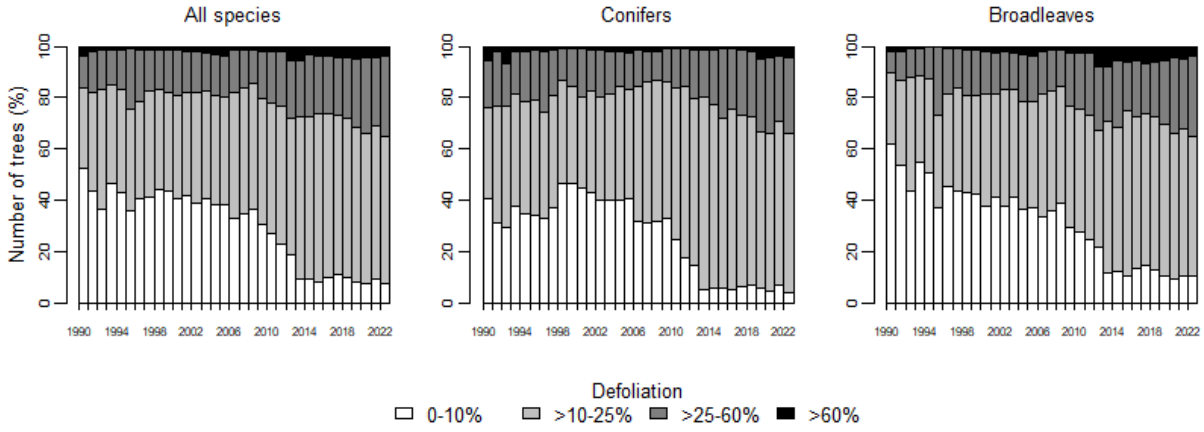


[1] http://icp-forests.net/page/icp-forests-technical-report

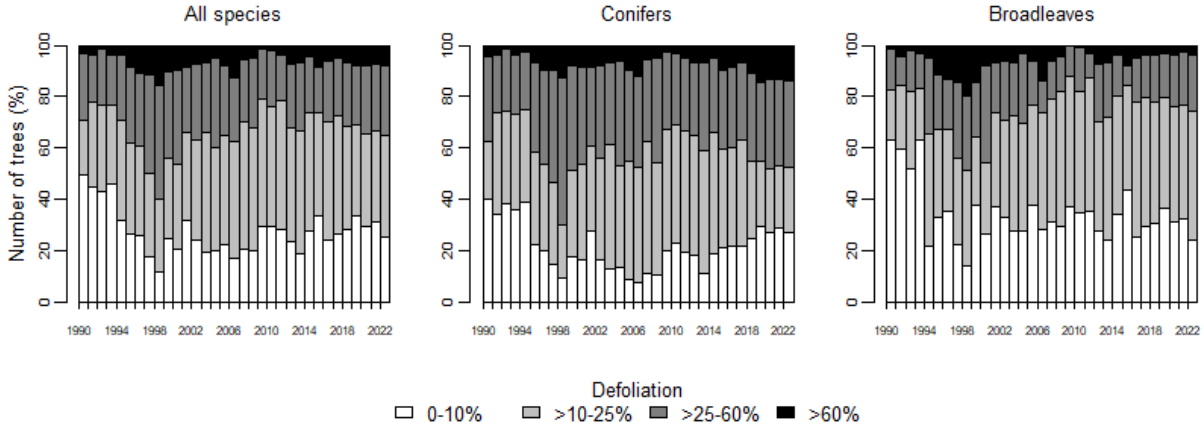
BELARUS



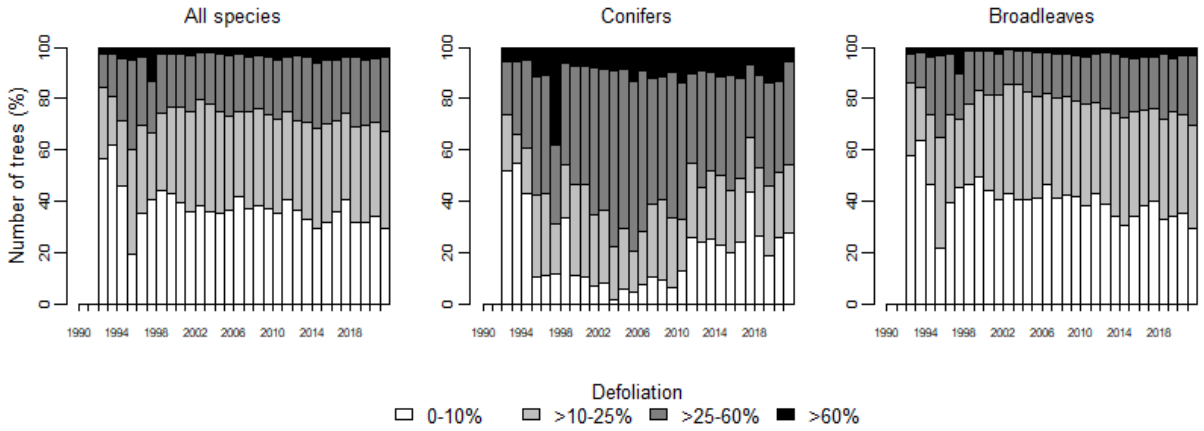
BELGIUM



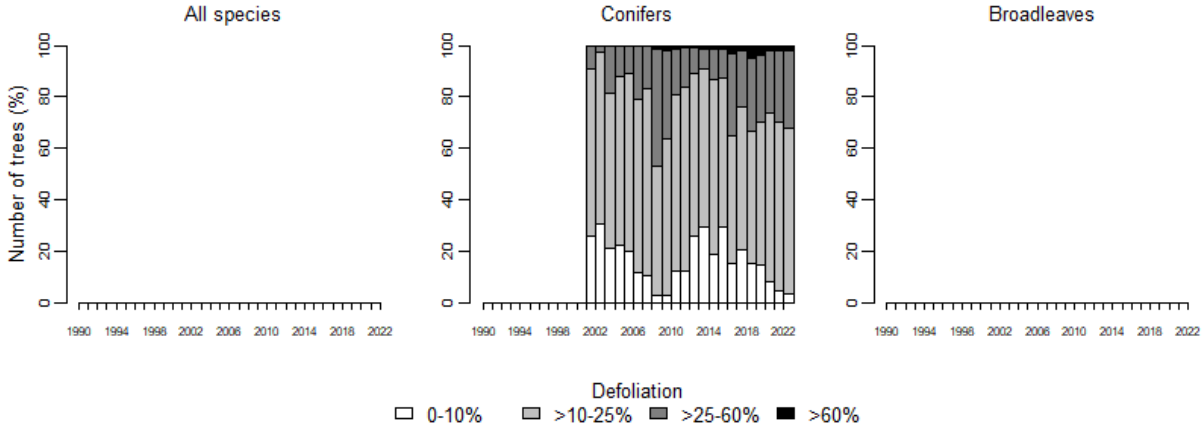
BULGARIA



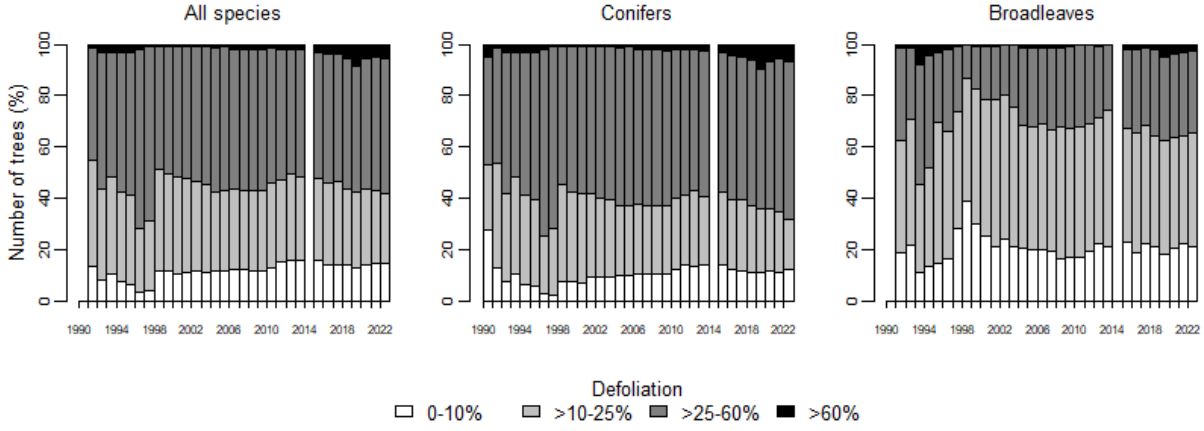
CROATIA



CYPRUS



CZECHIA



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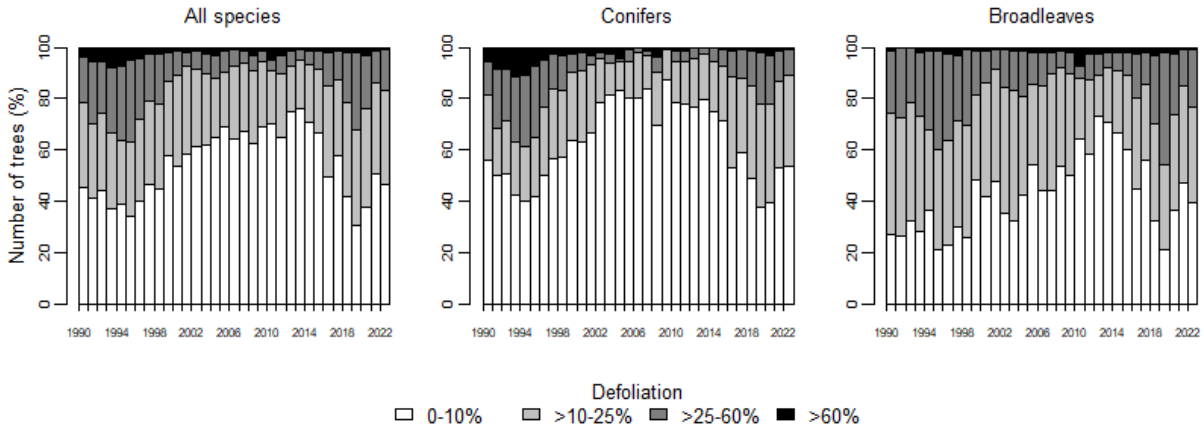

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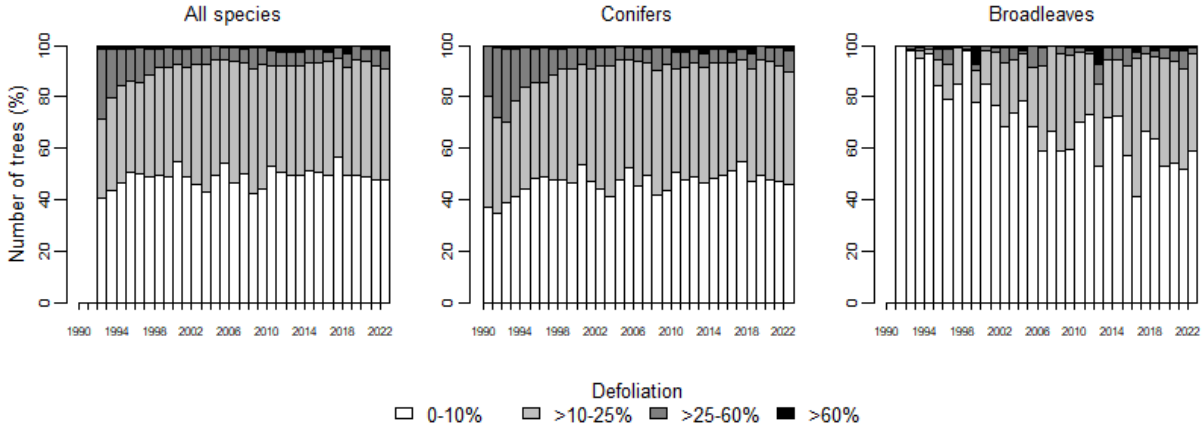

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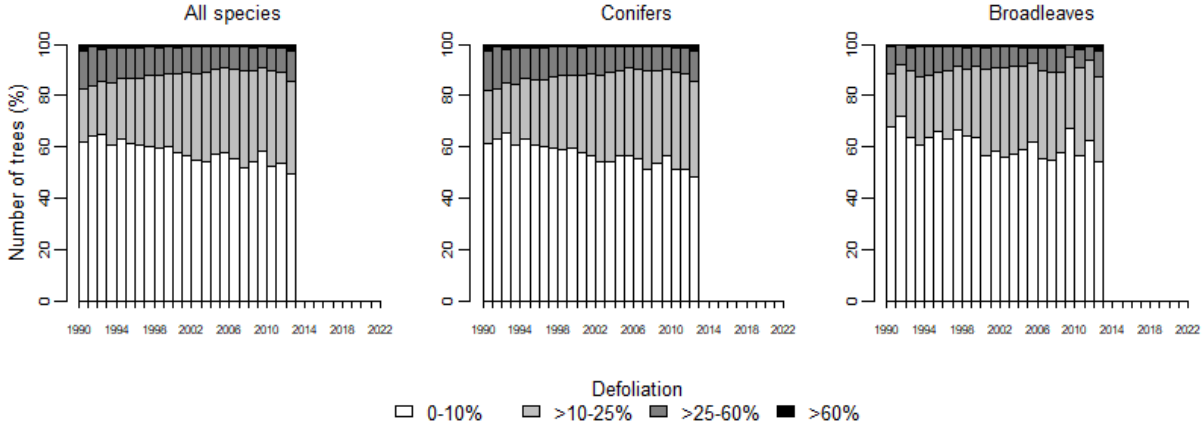
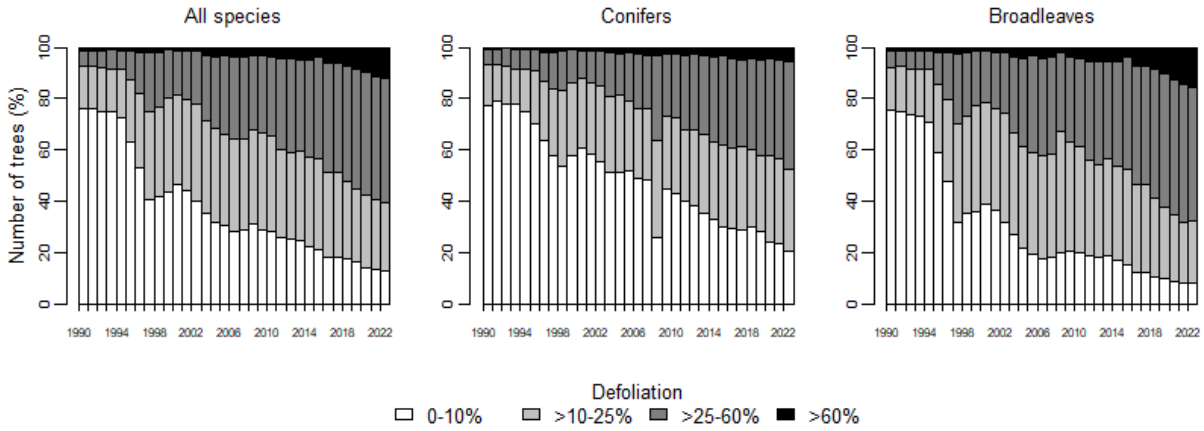
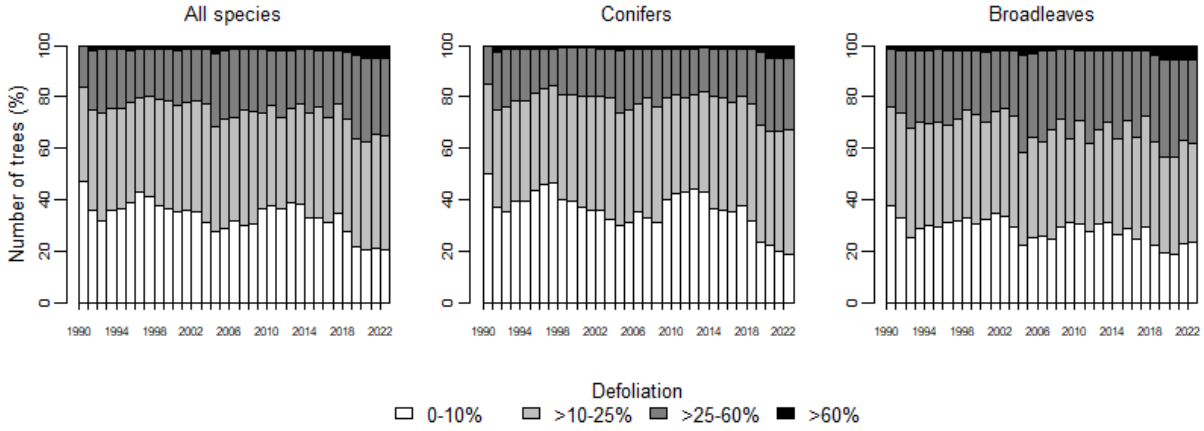


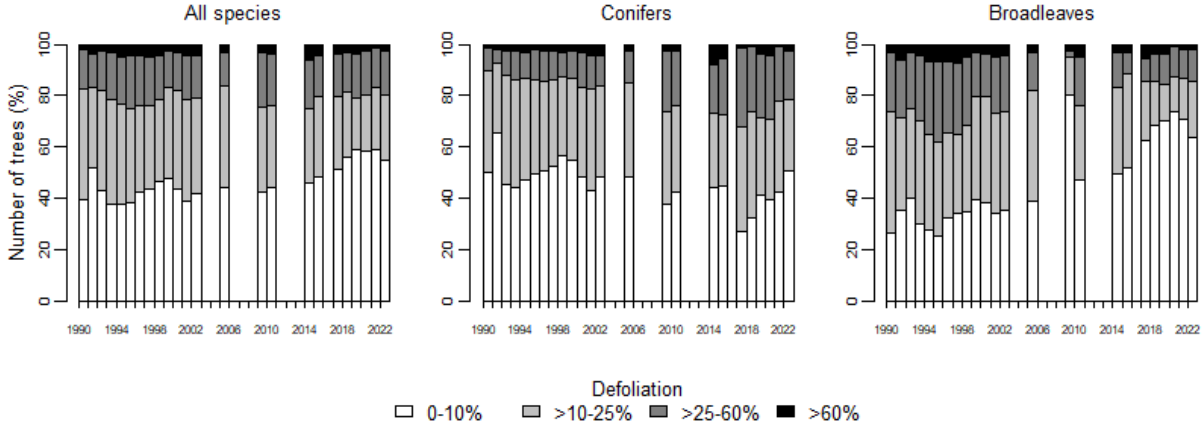
FRANCE



GERMANY



GREECE



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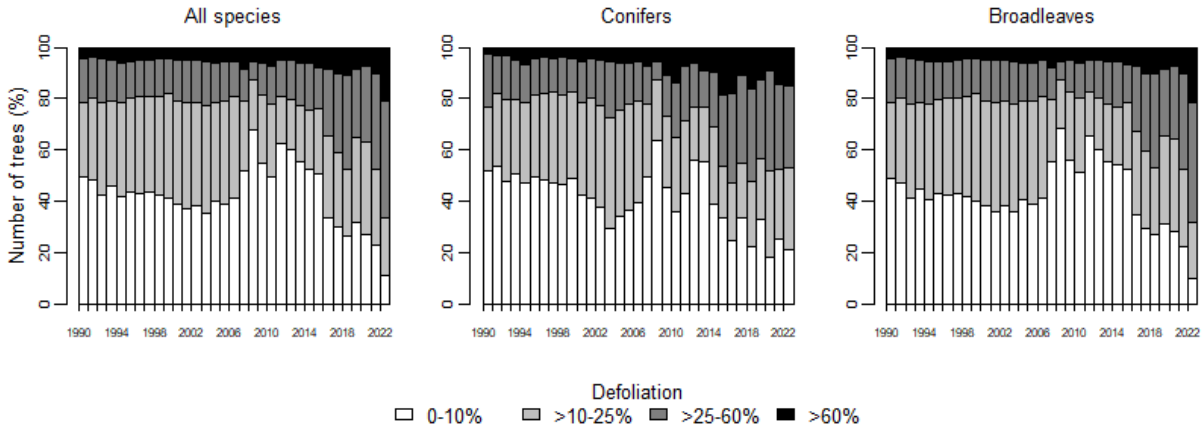

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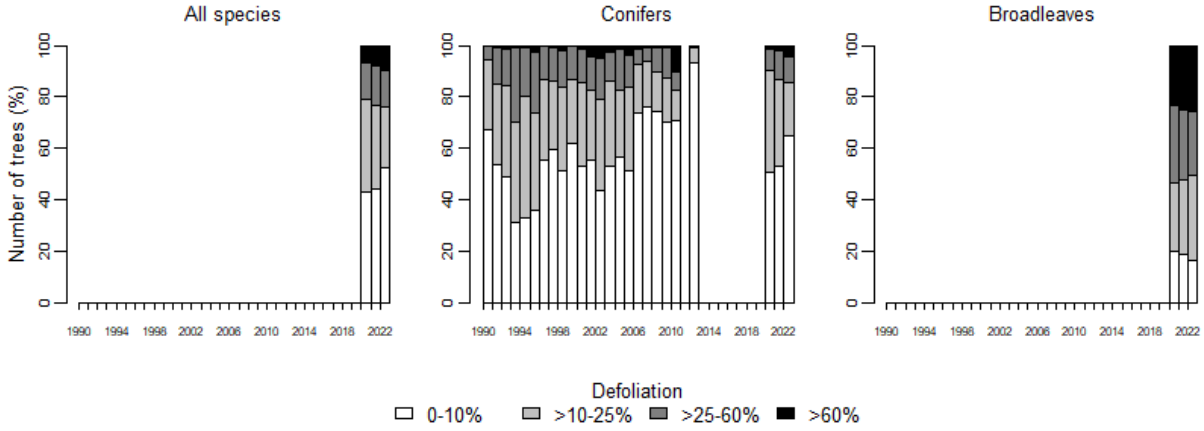

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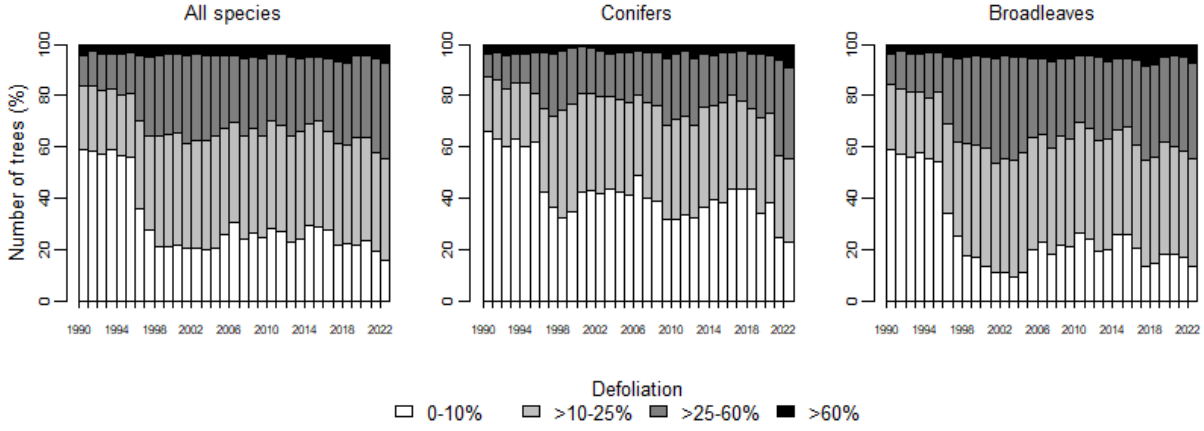

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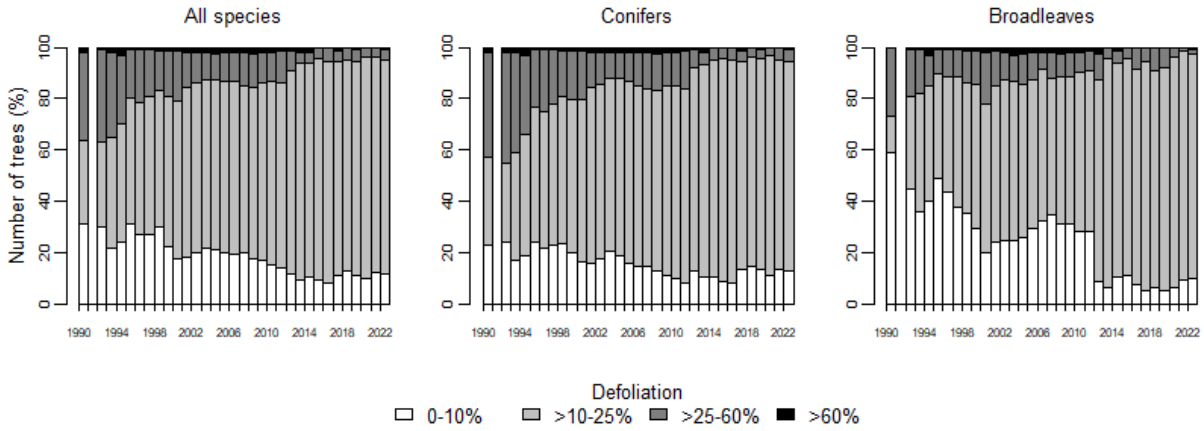

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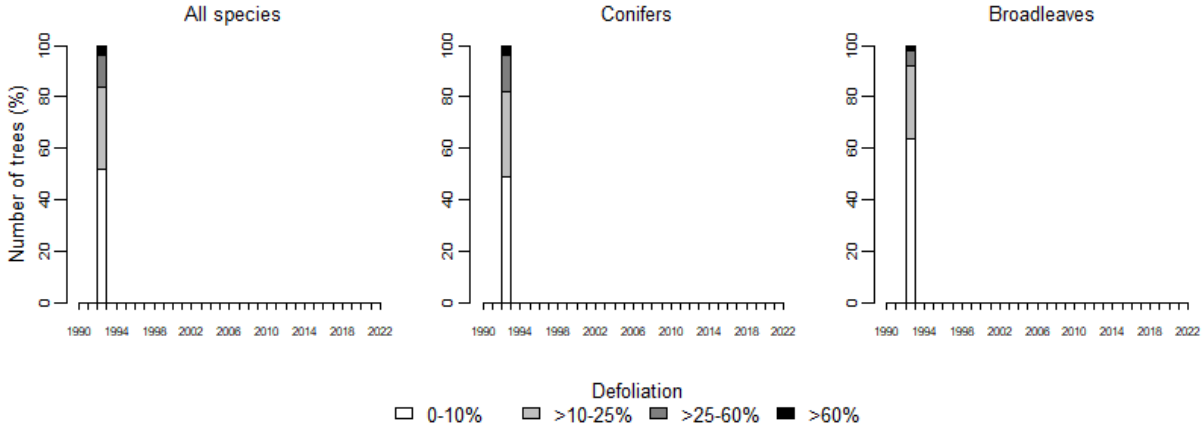

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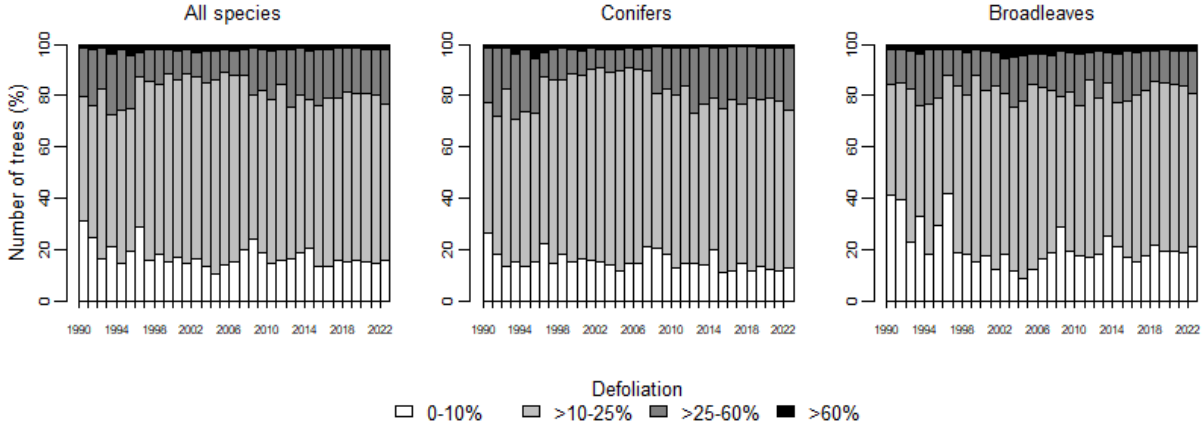

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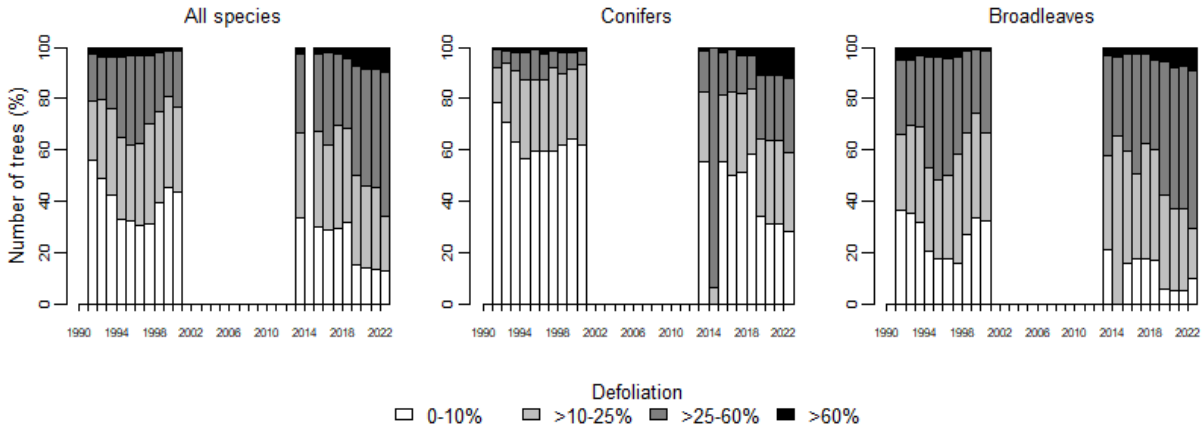

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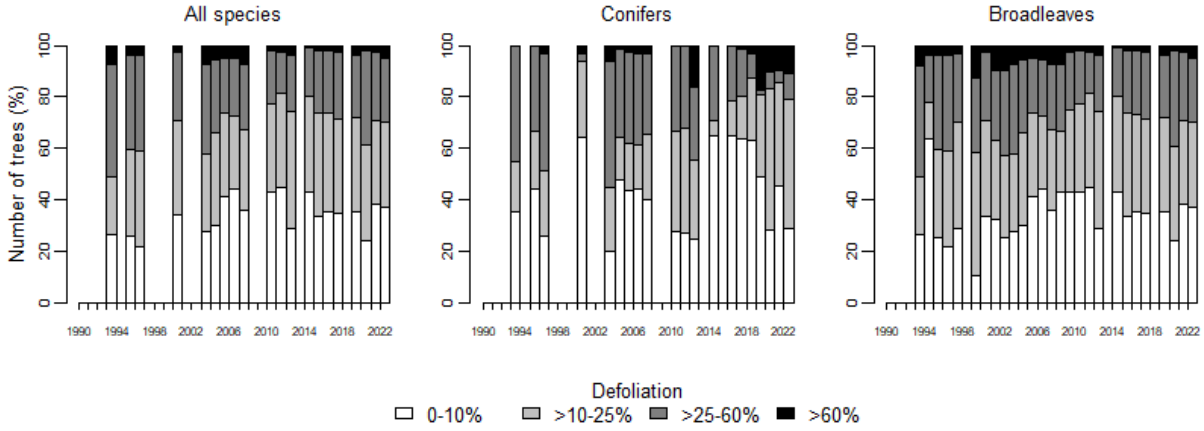

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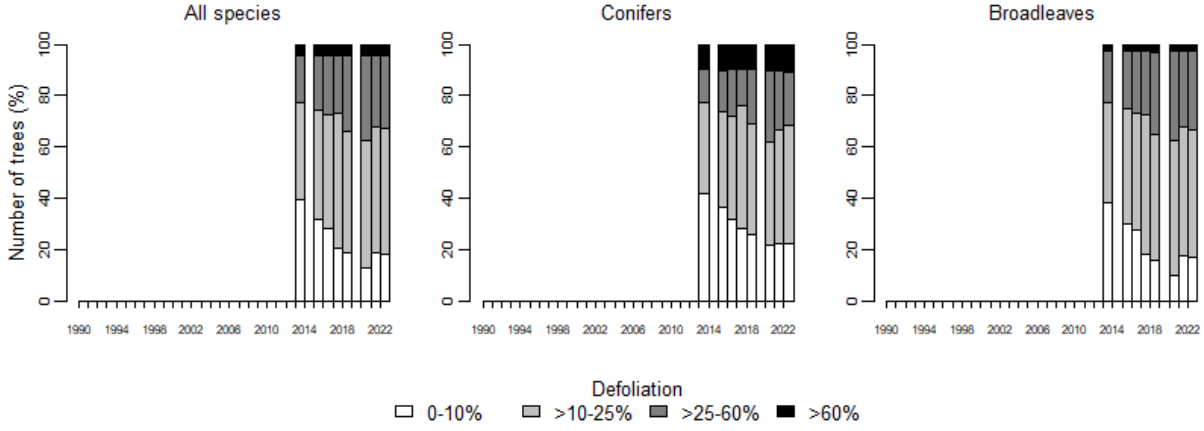

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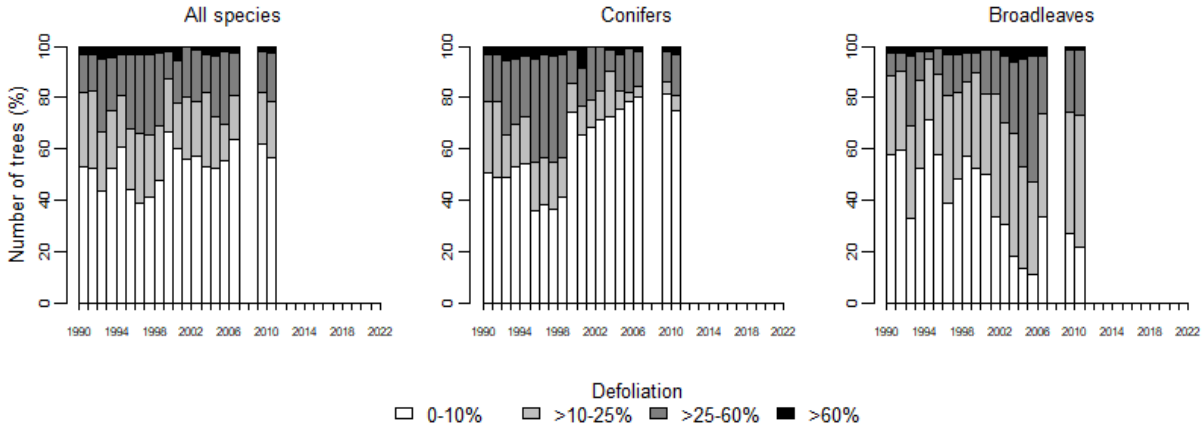

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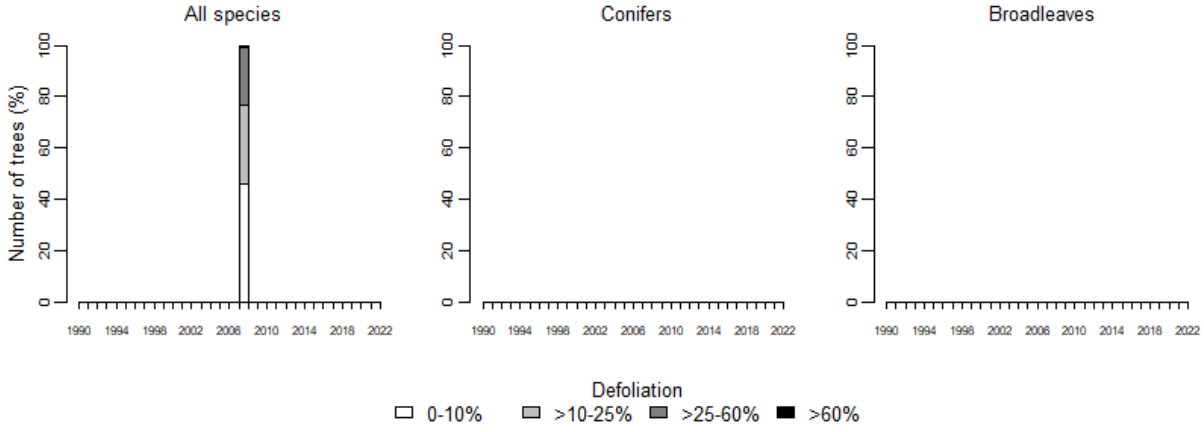

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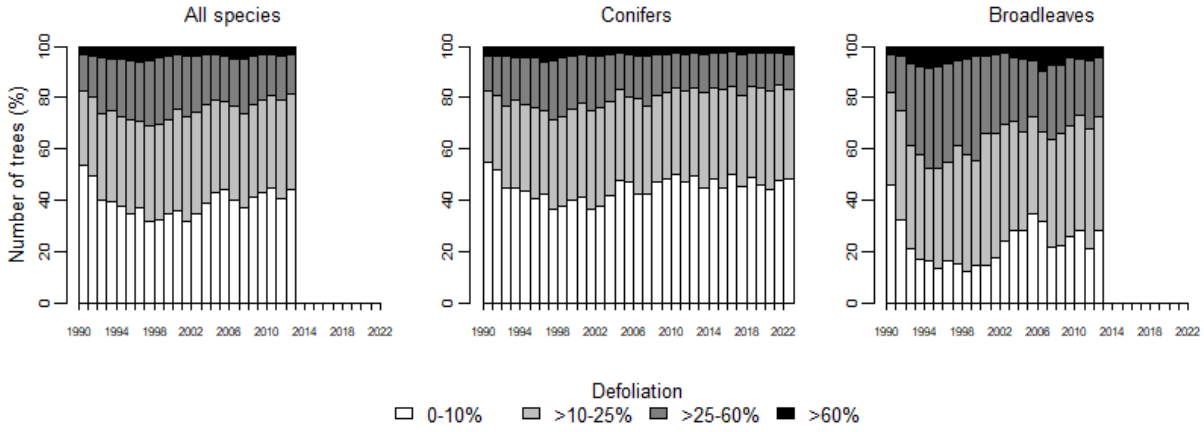

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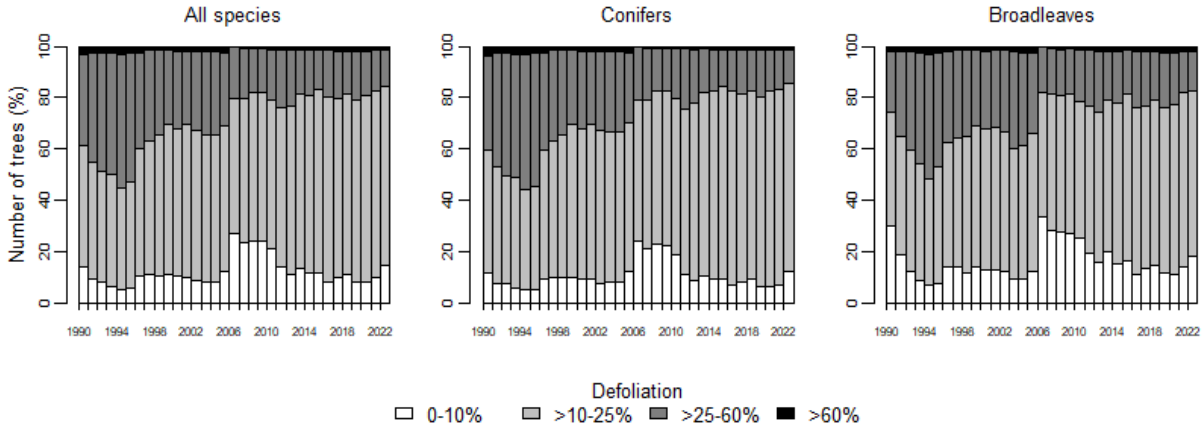

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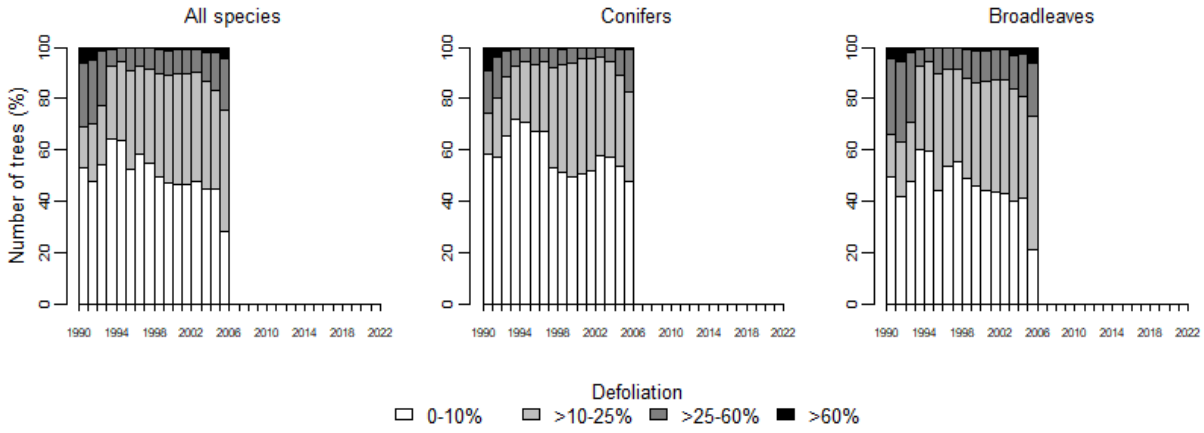

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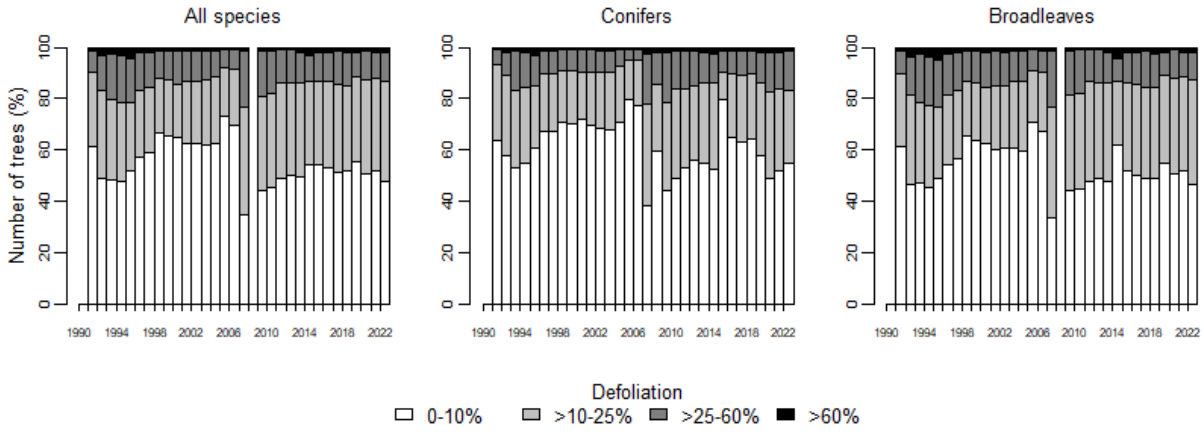
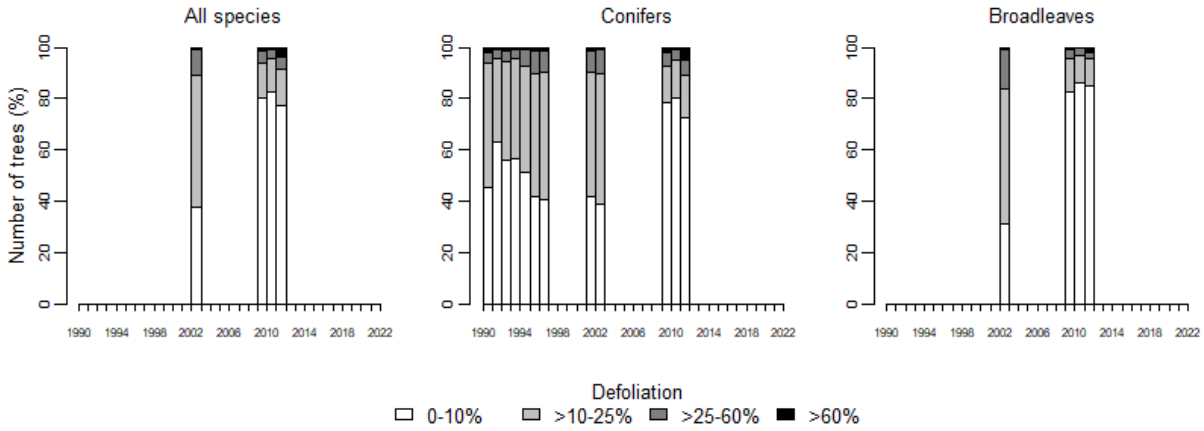


RUSSIAN FEDERATION



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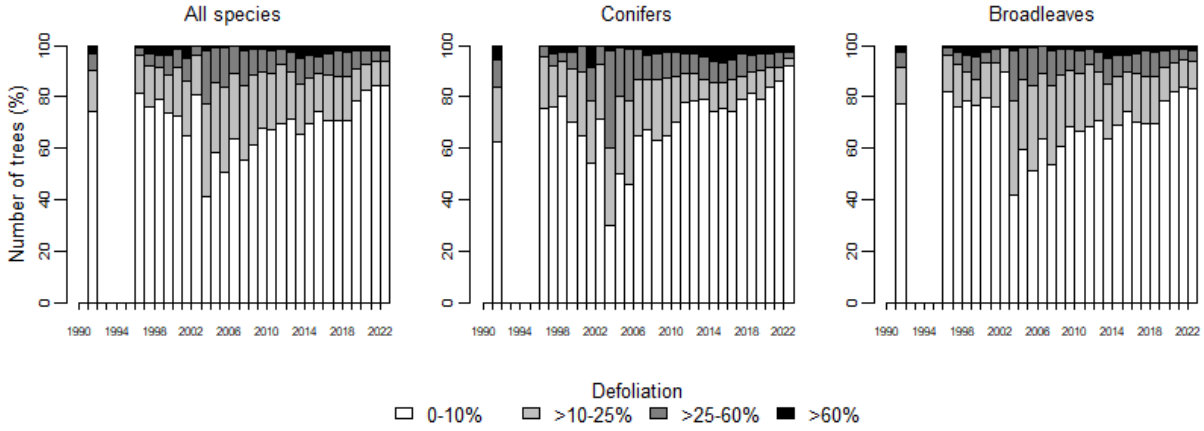

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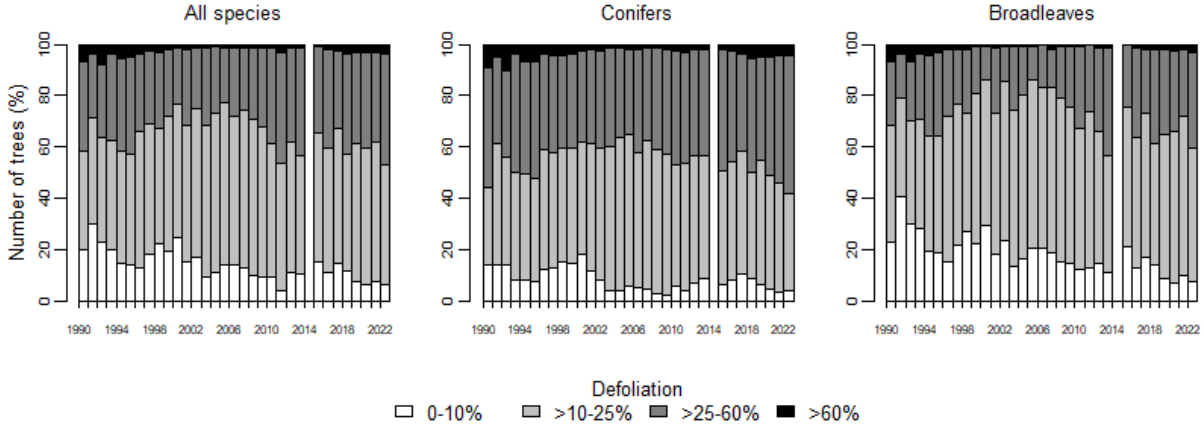

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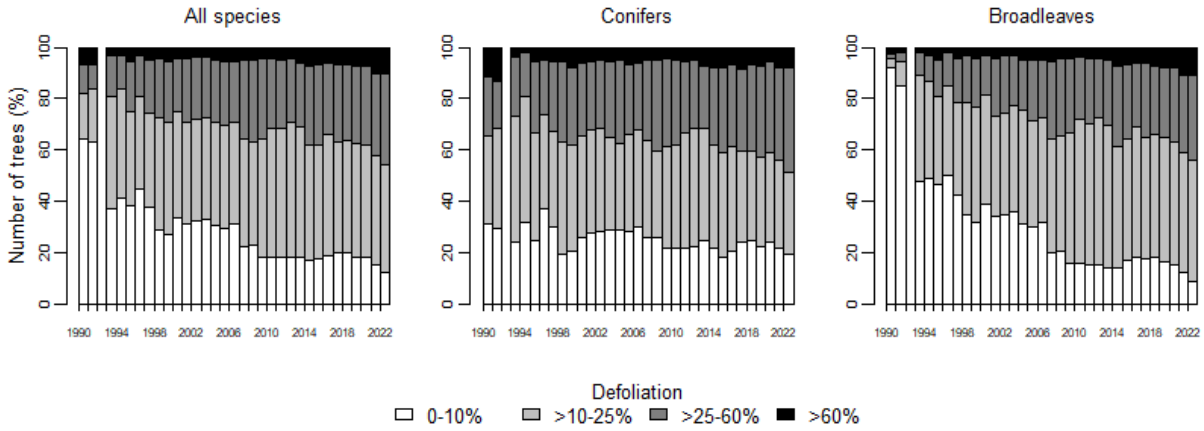

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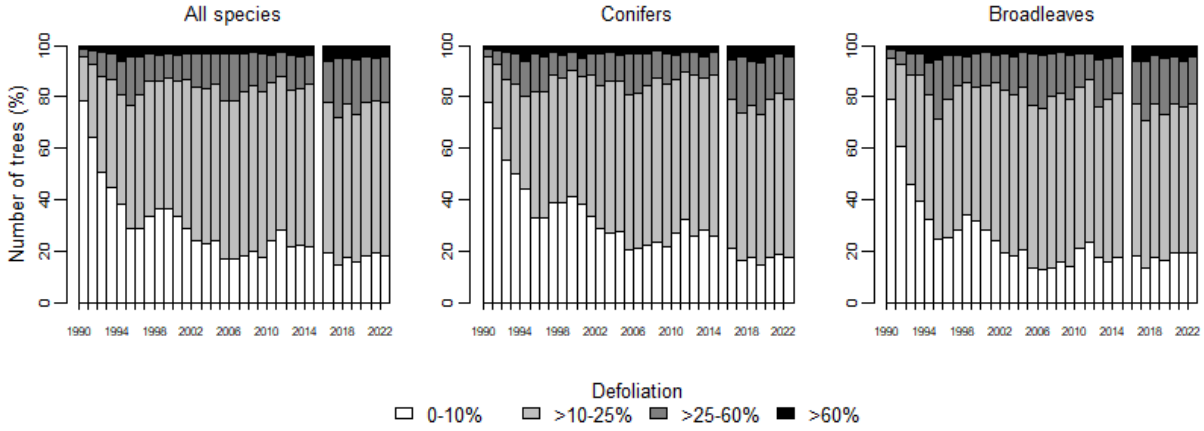

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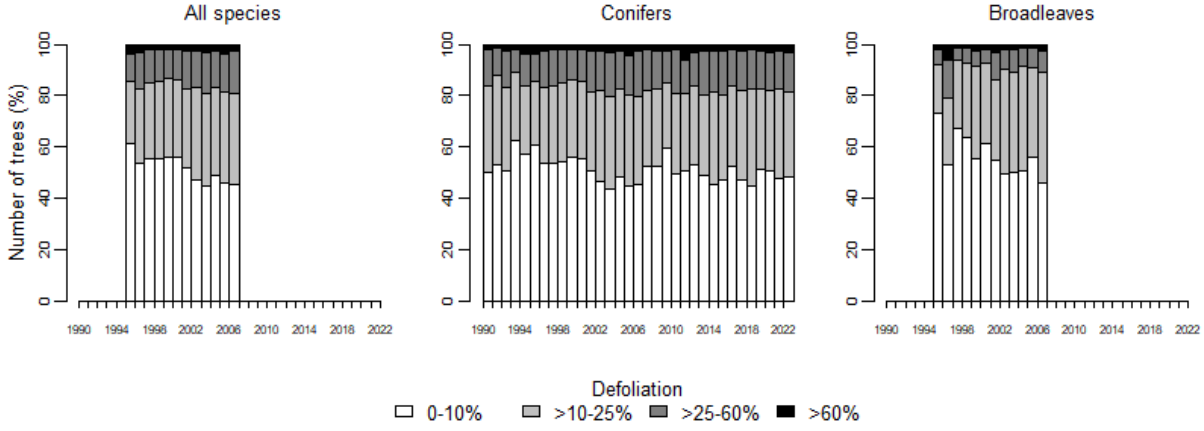

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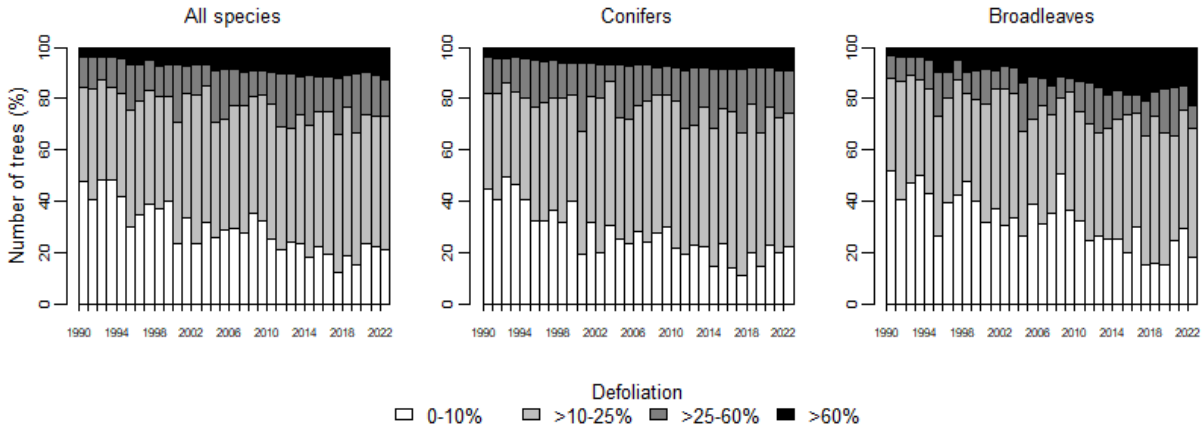
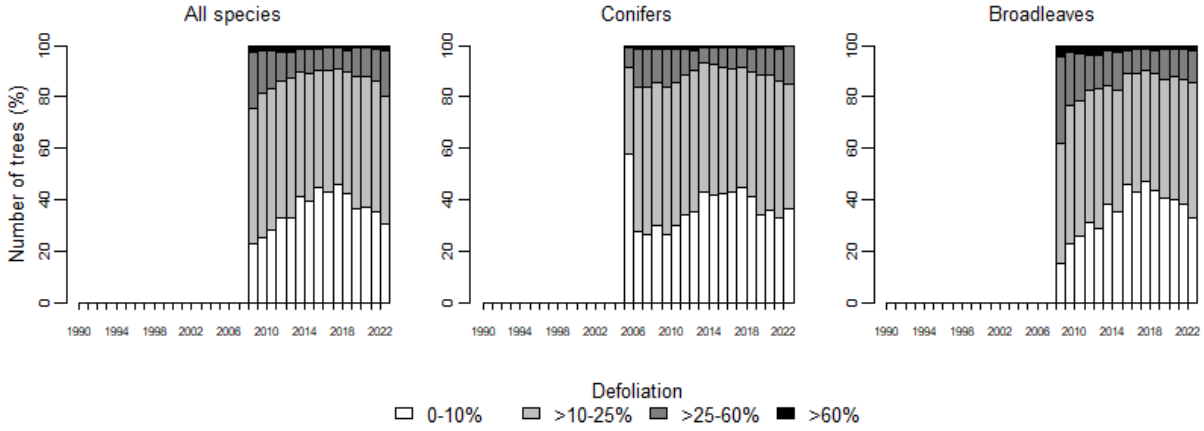
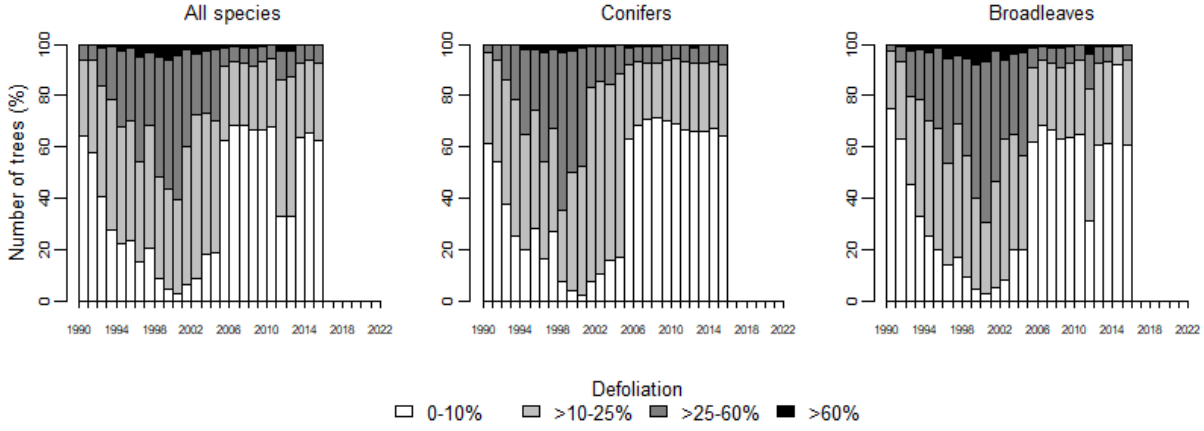


TÜRKIYE



UKRAINE



UNITED KINGDOM