

# Forest Condition in Europe

## 2018 Technical Report of ICP Forests

### Online Supplementary Material

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

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# S1 TREE CROWN CONDITION AND DAMAGE CAUSES – ADDITIONAL MAPS

## S1-1 Mean plot defoliation of main tree species in 2017

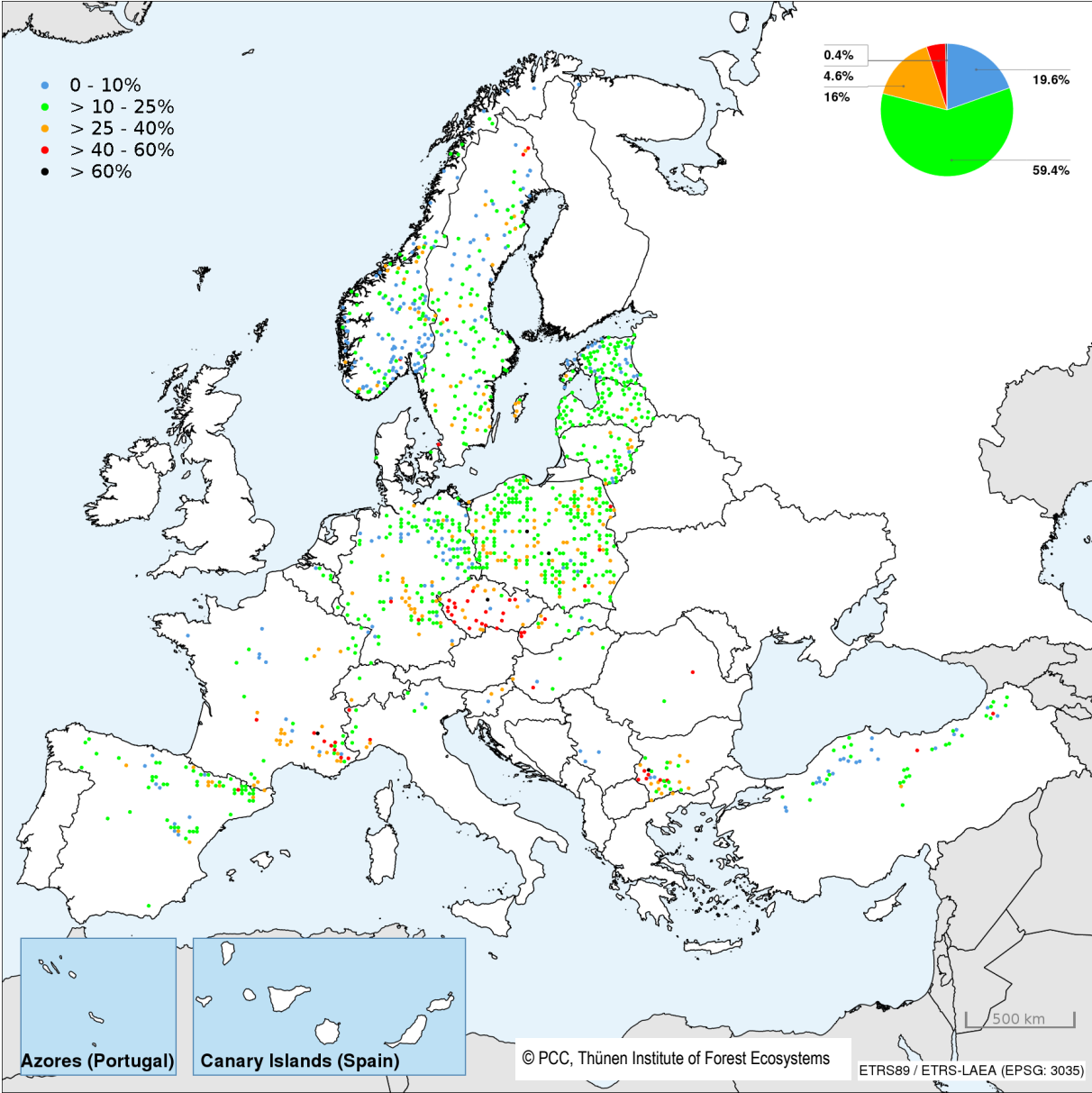
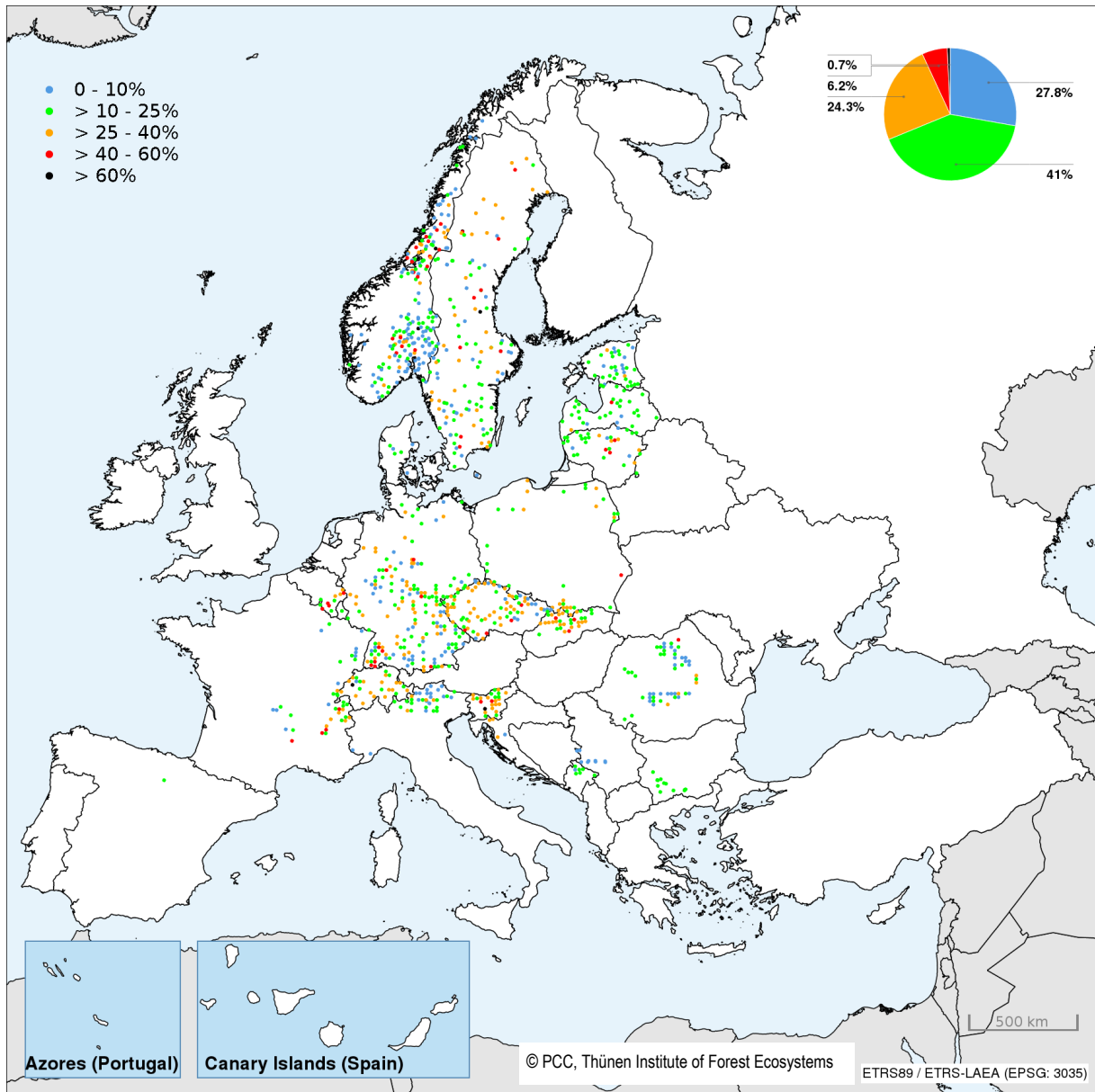


Figure S1-1: Mean plot defoliation of Scots pine (*Pinus sylvestris*) in 2017



**Figure S1-2: Mean plot defoliation of Norway spruce (*Picea abies*) in 2017**



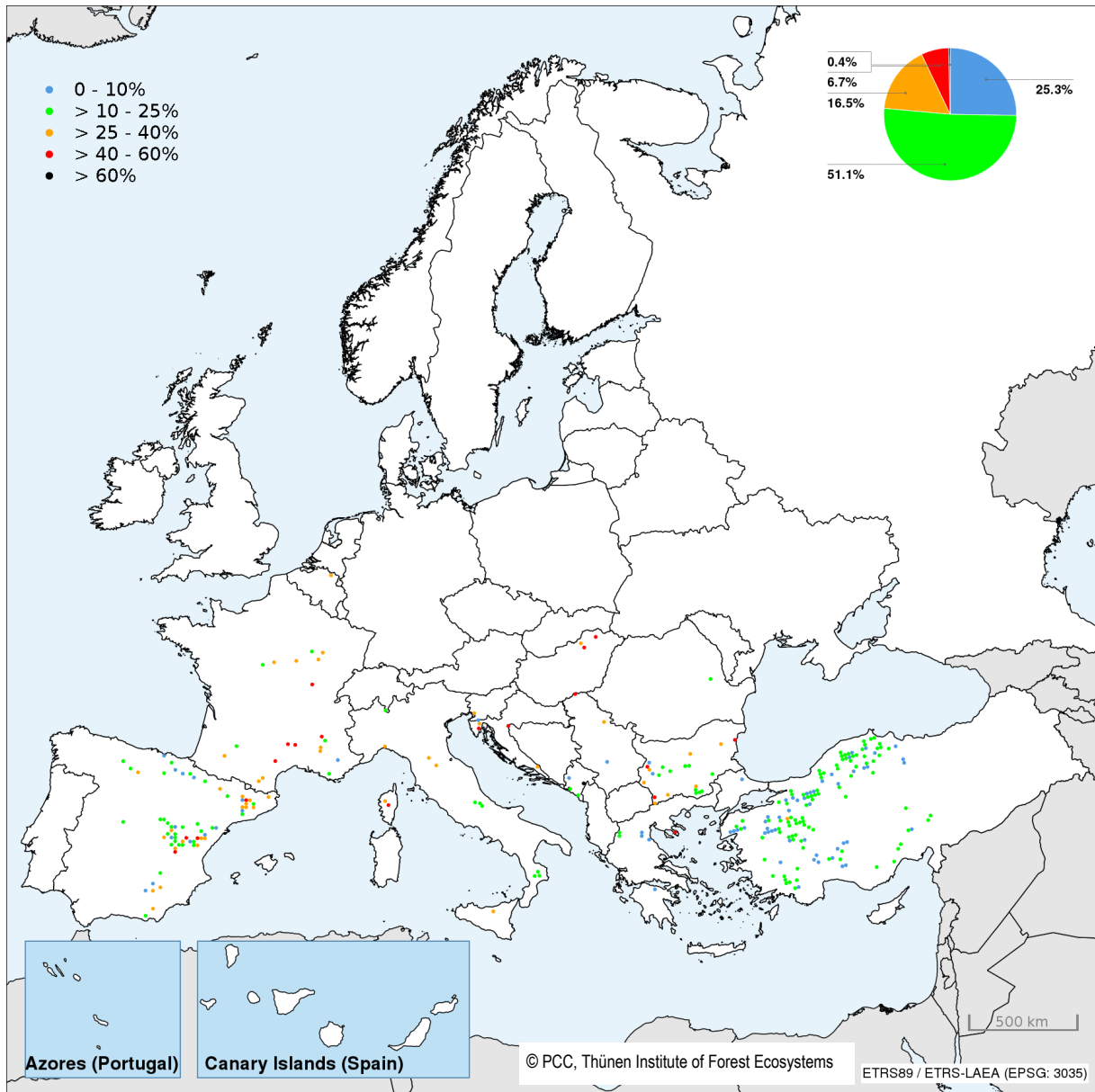


Figure S1-3: Mean plot defoliation of Austrian pine (*Pinus nigra*) in 2017

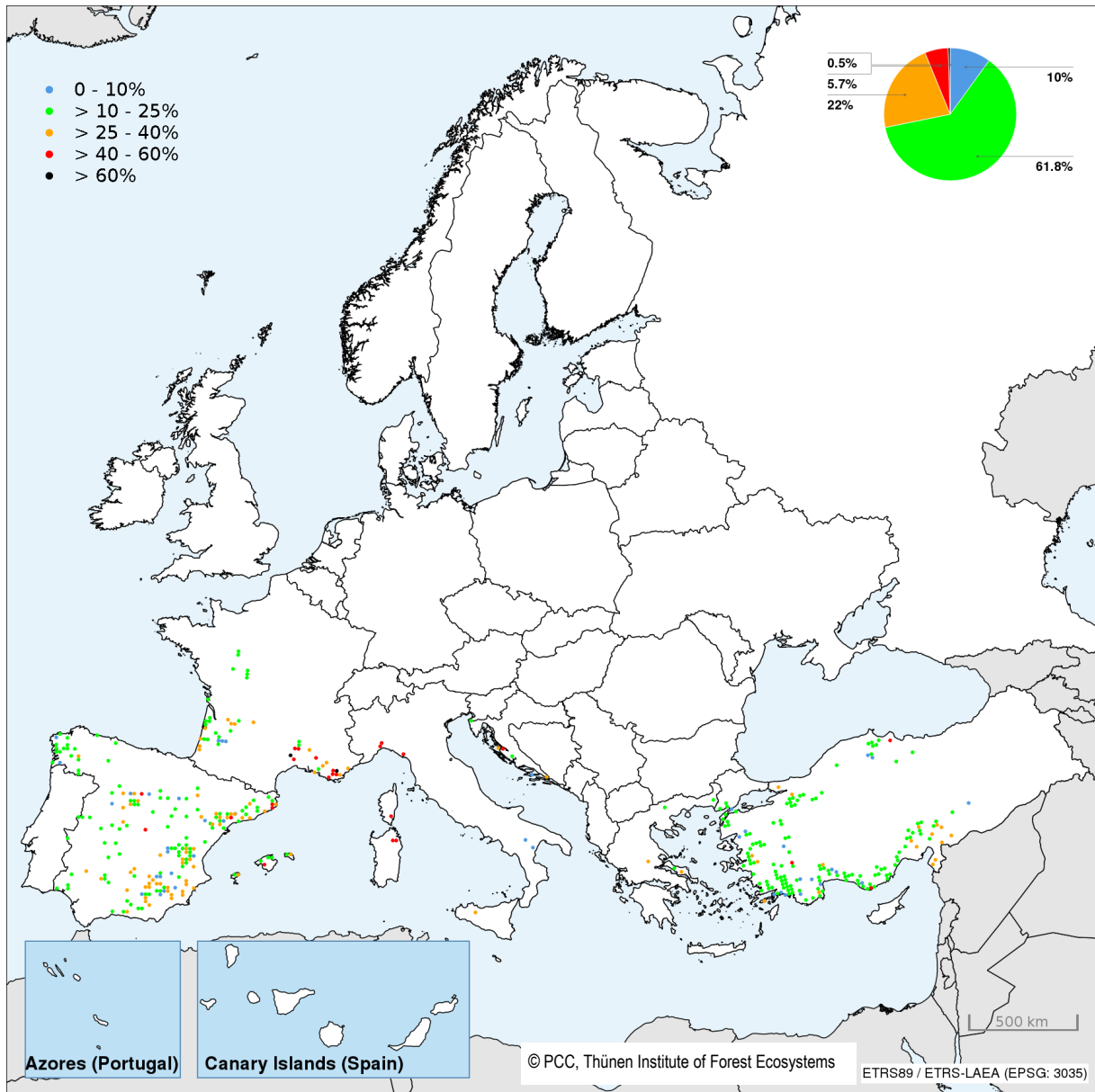


Figure S1-4: Mean plot defoliation of Mediterranean lowland pines (*Pinus halepensis*, *P. pinaster*, *P. pinea*, *P. brutia*) in 2017

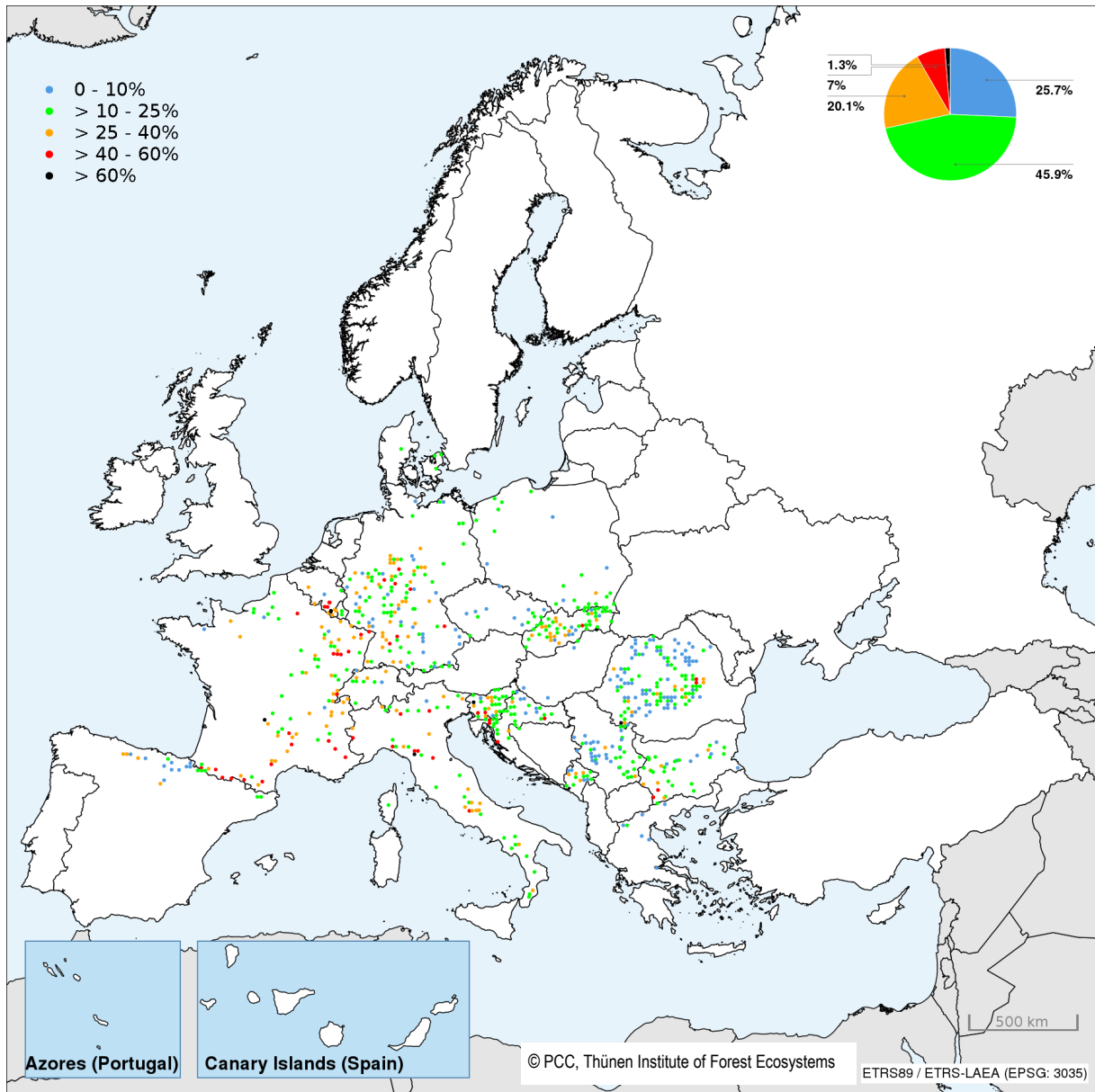


Figure S1-5: Mean plot defoliation of common beech (*Fagus sylvatica*) in 2017

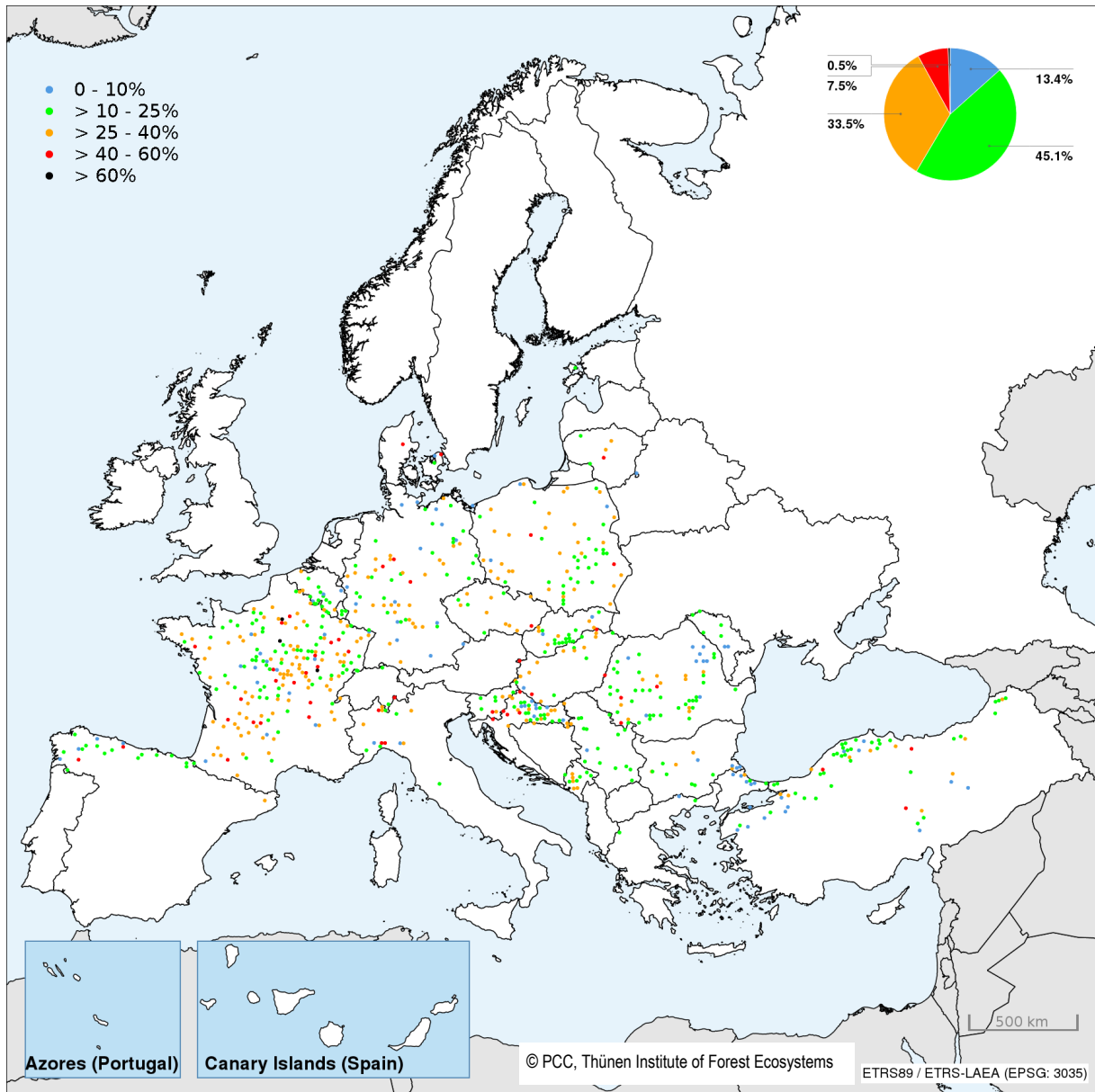


Figure S1-6: Mean plot defoliation of deciduous temperate oaks (*Quercus robur* and *Q. petraea*) in 2017

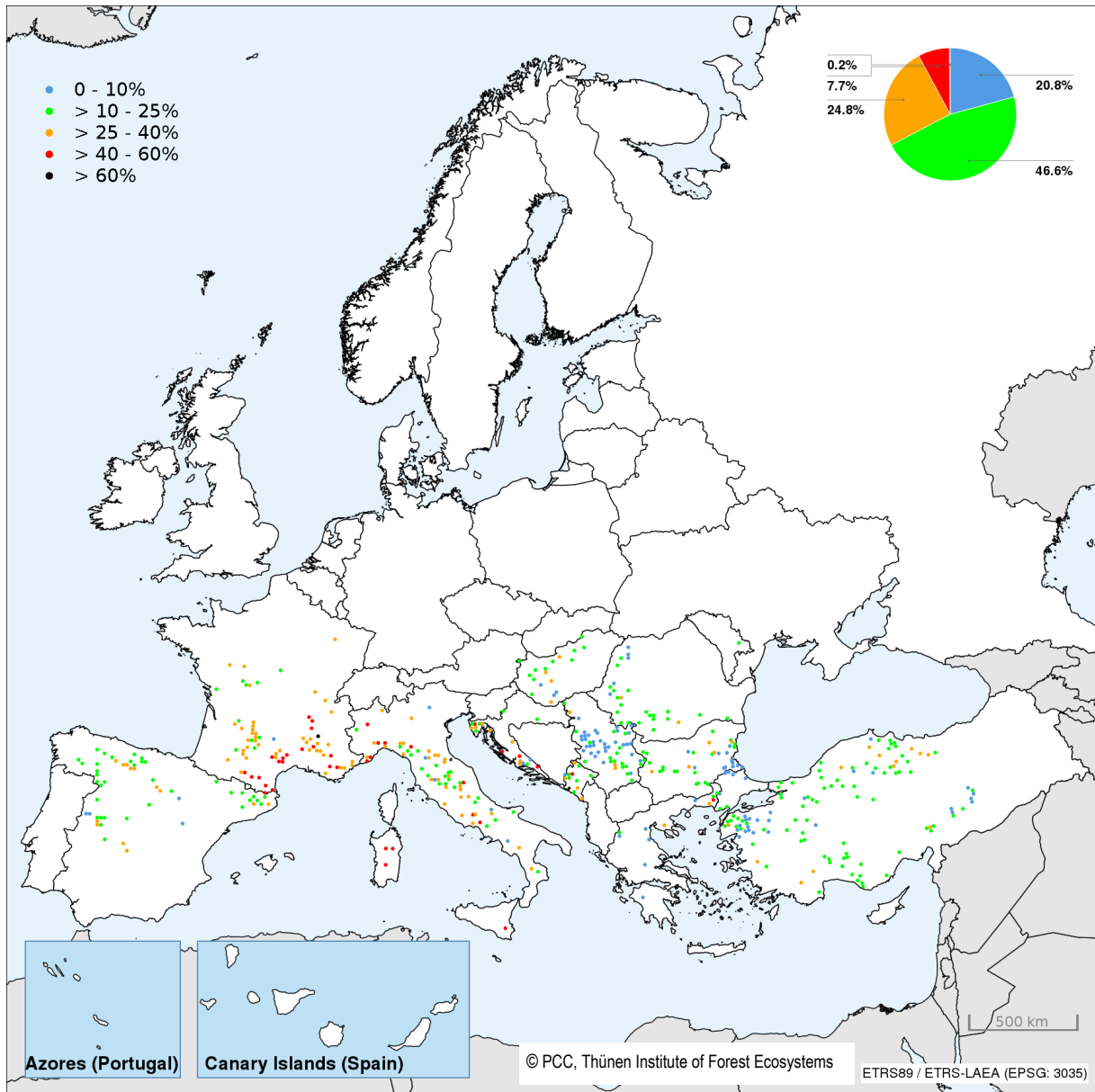


Figure S1-7: Mean plot defoliation of deciduous (sub-) Mediterranean oaks (*Quercus cerris*, *Q. frainetto*, *Q. pubescens*, *Q. pyrenaica*) in 2017

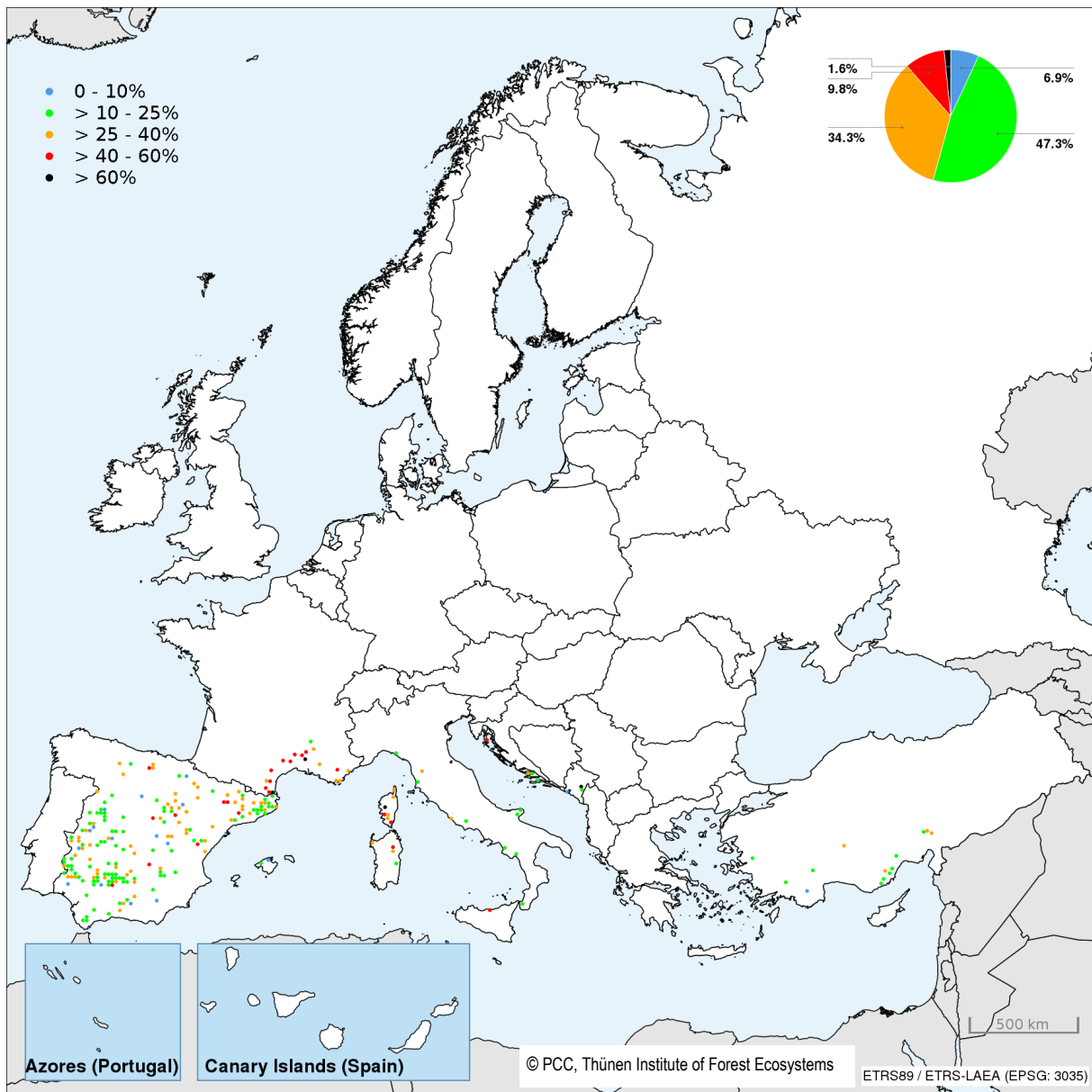


Figure S1-8: Mean plot defoliation of evergreen oaks (*Quercus coccifera*, *Q. ilex*, *Q. rotundifolia*, *Q. suber*) in 2017

## S1-2 Trends in mean plot defoliation of the main tree species 2011–2017

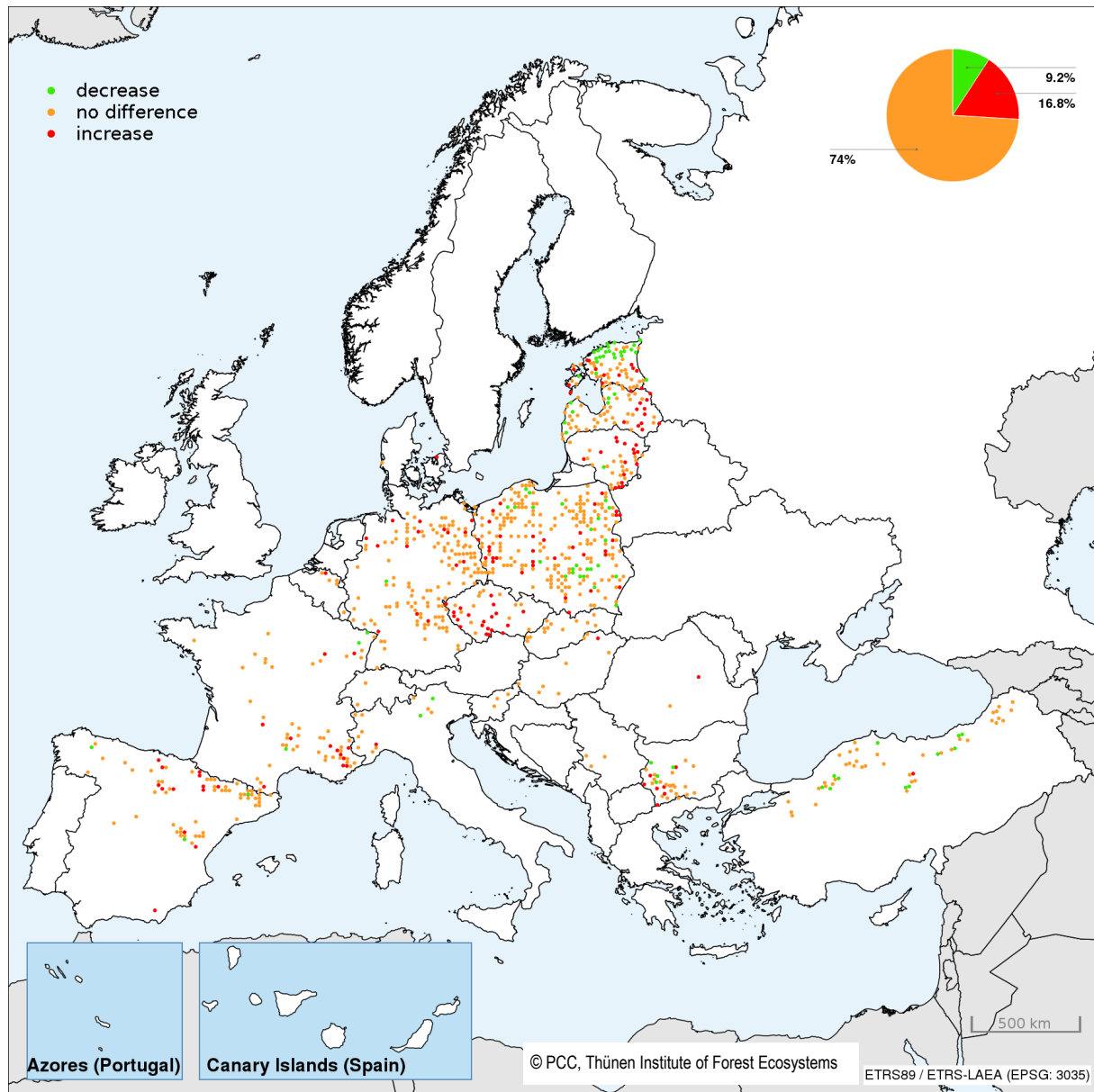
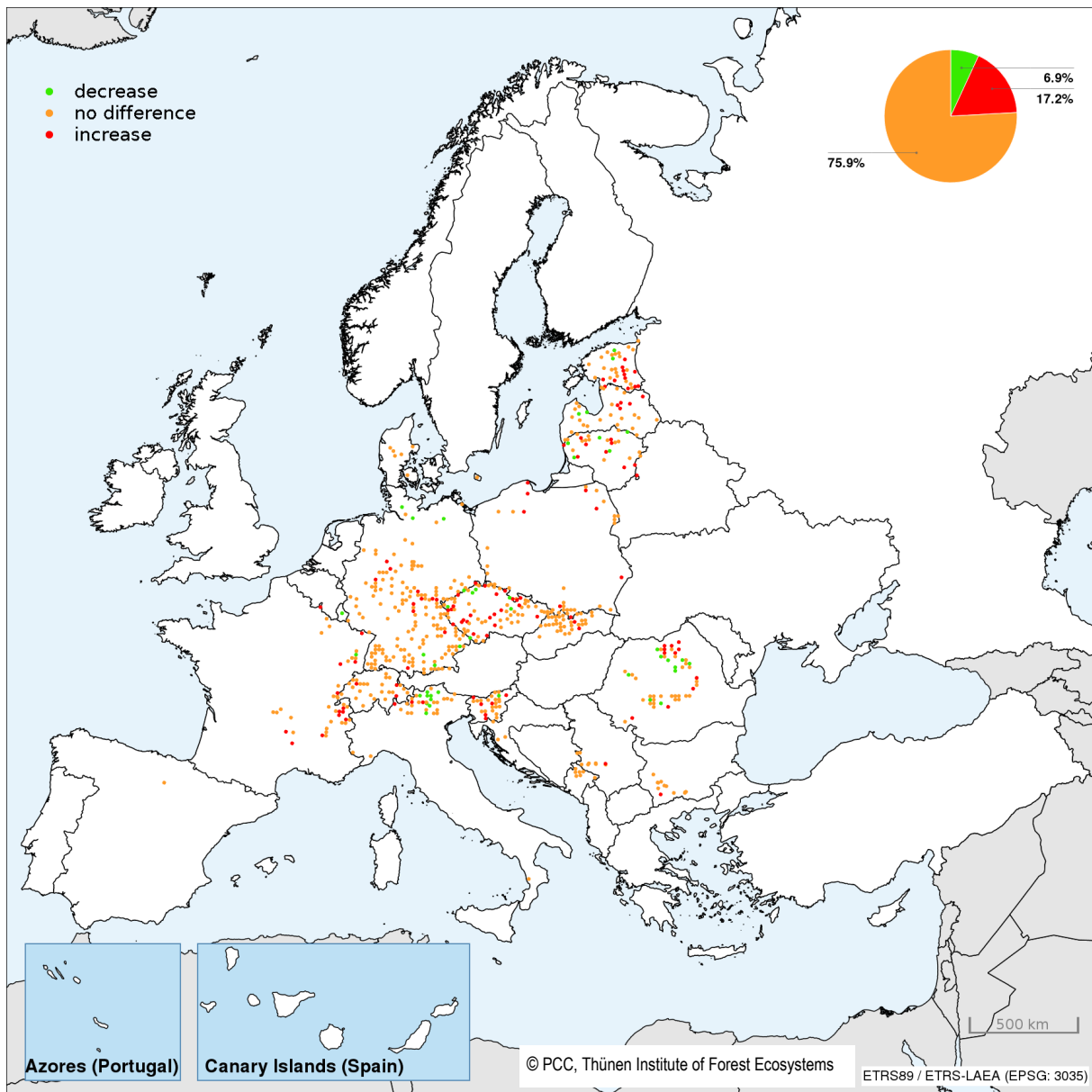


Figure S1-9: Trends in mean plot defoliation of Scots pine (*Pinus sylvestris*) between 2011 and 2017. Plots were included if assessments were available for at least 80% of the period.





**Figure S1-10: Trends in mean plot defoliation of Norway spruce (*Picea abies*) between 2011 and 2017. Plots were included if assessments were available for at least 80% of the period.**



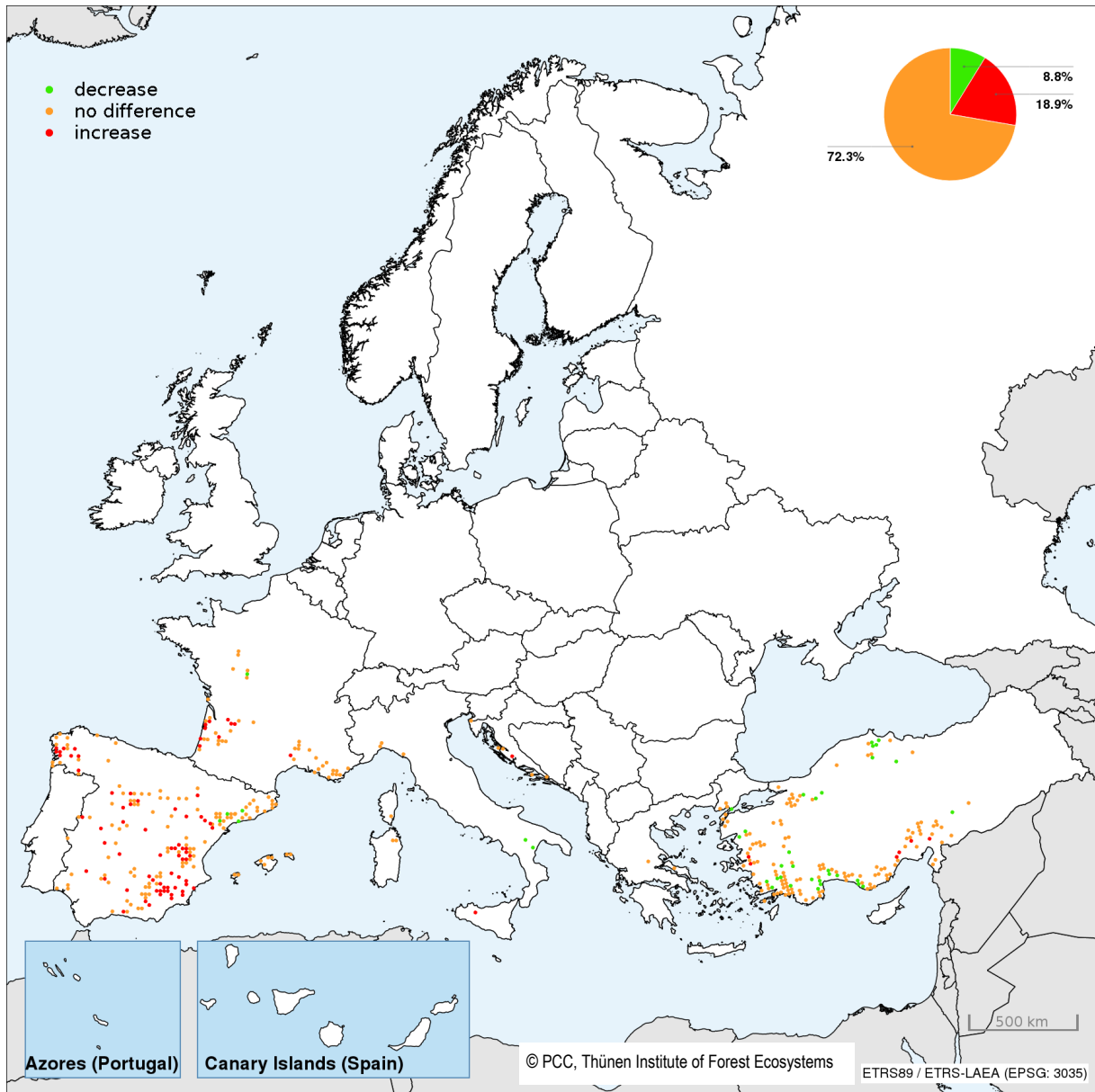
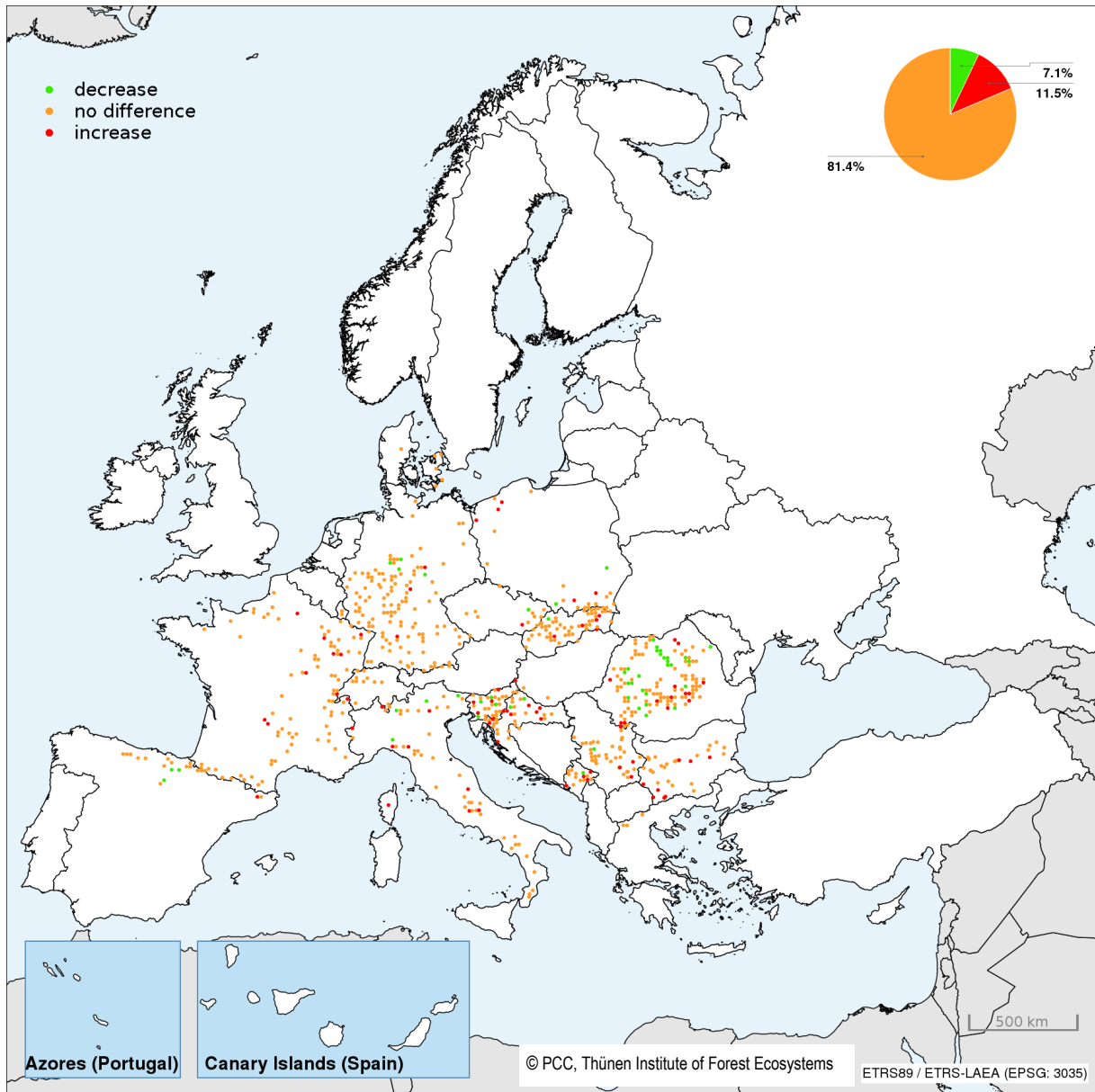


Figure S1-11: Trends in mean plot defoliation of Mediterranean lowland pines (*Pinus brutia*, *P. halepensis*, *P. pinaster*, *P. pinea*) between 2011 and 2017. Plots were included if assessments were available for at least 80% of the period.



**Figure S1-12: Trends in mean plot defoliation of common beech (*Fagus sylvatica*) between 2011 and 2017. Plots were included if assessments were available for at least 80% of the period.**

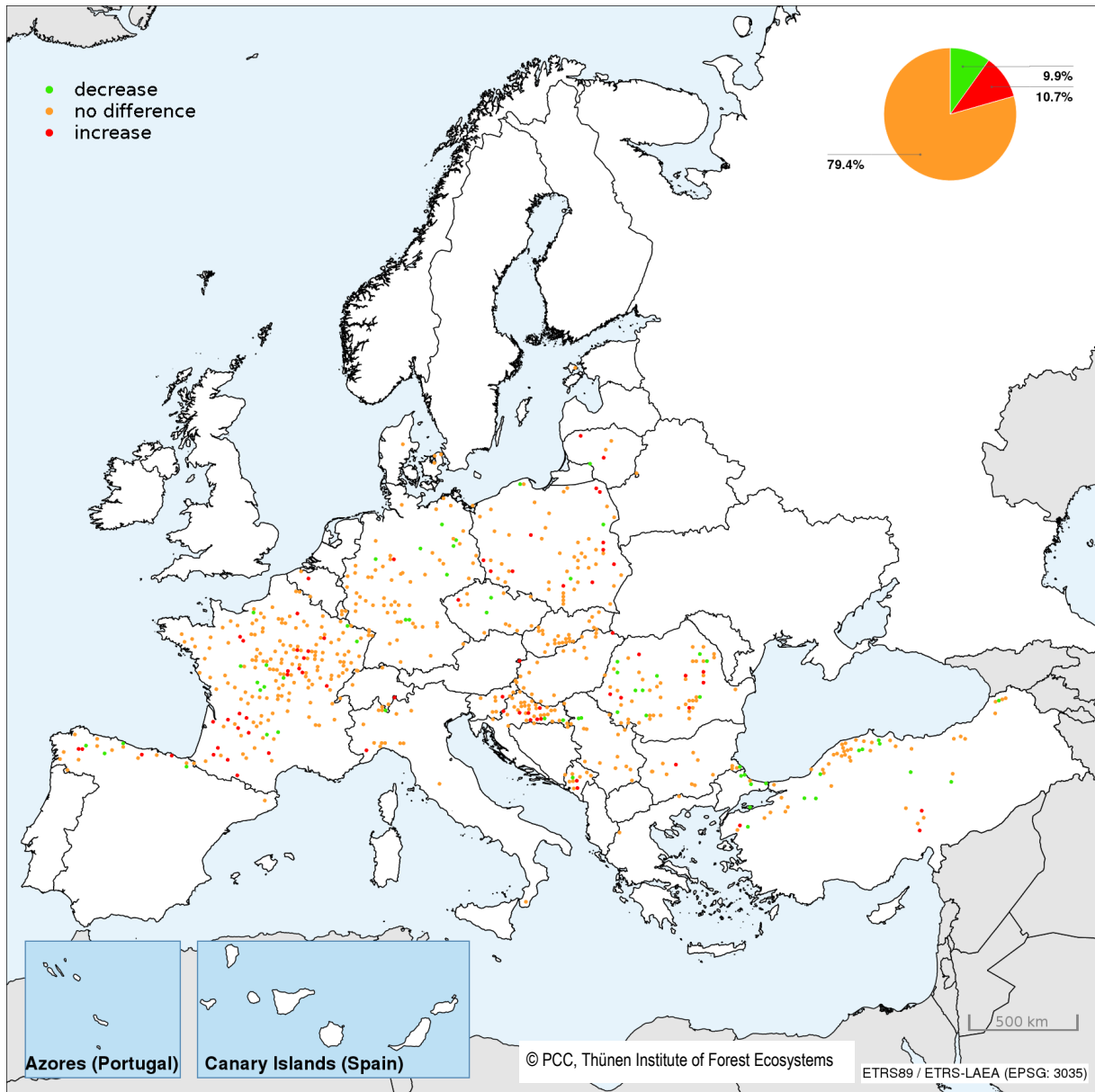


Figure S1-13: Trends in mean plot defoliation of deciduous temperate oaks (*Quercus robur* and *Q. petraea*) between 2011 and 2017. Plots were included if assessments were available for at least 80% of the period.

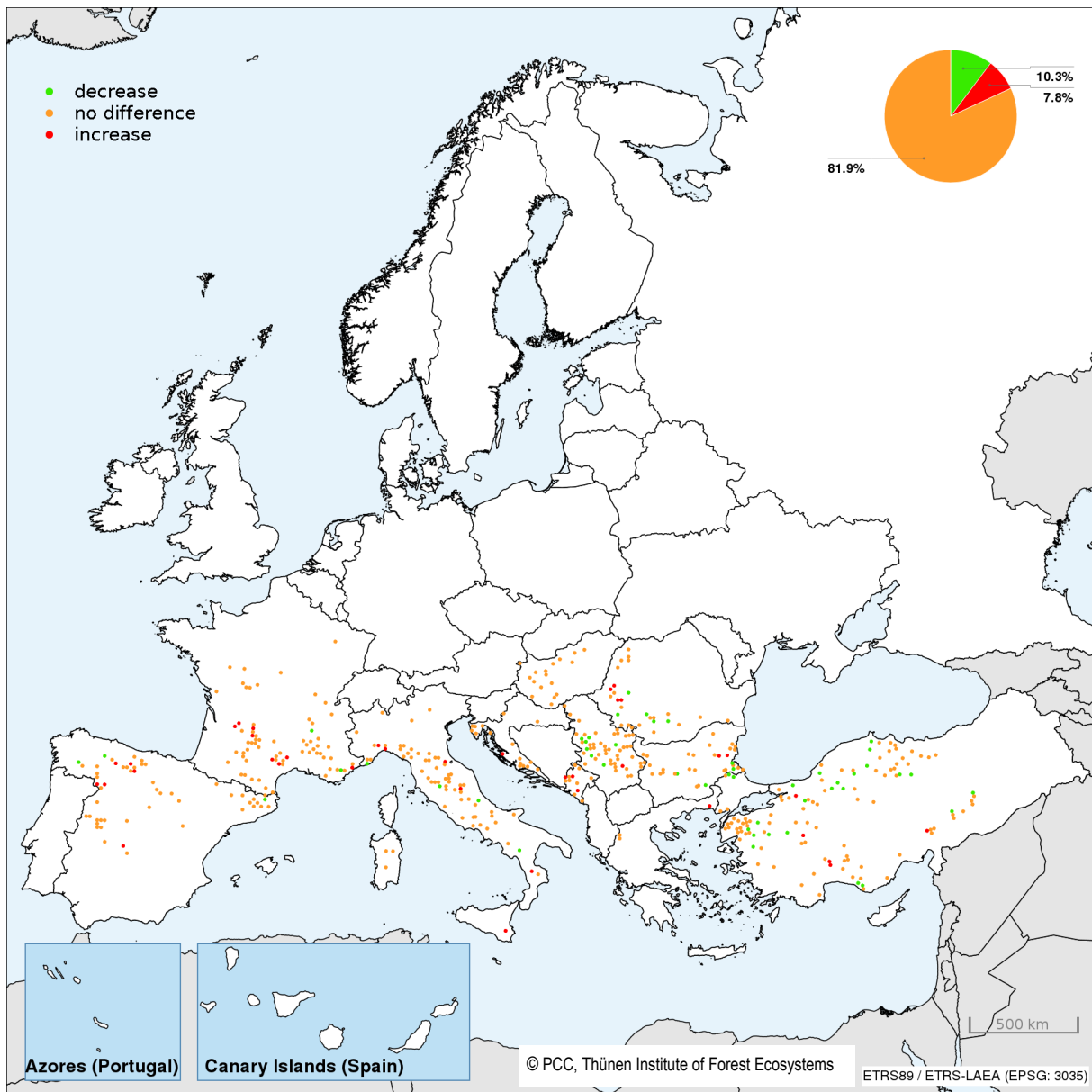


Figure S1-14: Trends in mean plot defoliation of deciduous (sub-) Mediterranean oaks (*Quercus cerris*, *Q. frainetto*, *Q. pubescens*, *Q. pyrenaica*) between 2011 and 2017. Plots were included if assessments were available for at least 80% of the period.

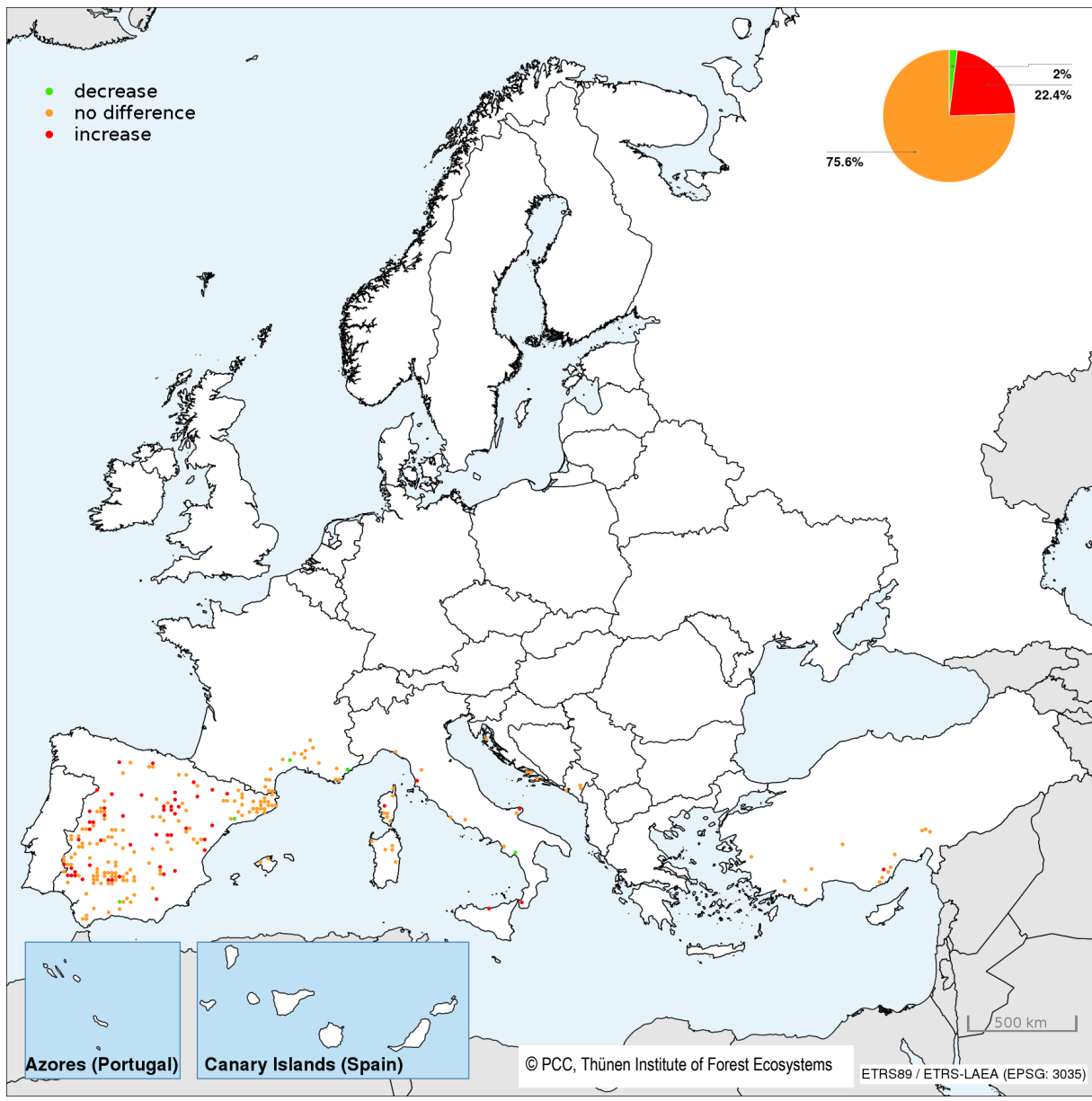


Figure S1-15: Trends in mean plot defoliation of evergreen oaks (*Quercus coccifera*, *Q ilex*, *Q. rotundifolia*, *Q. suber*) between 2011 and 2017. . Plots were included if assessments were available for at least 80% of the period.

S1-3 Occurrence of various damaging agent groups in 2017

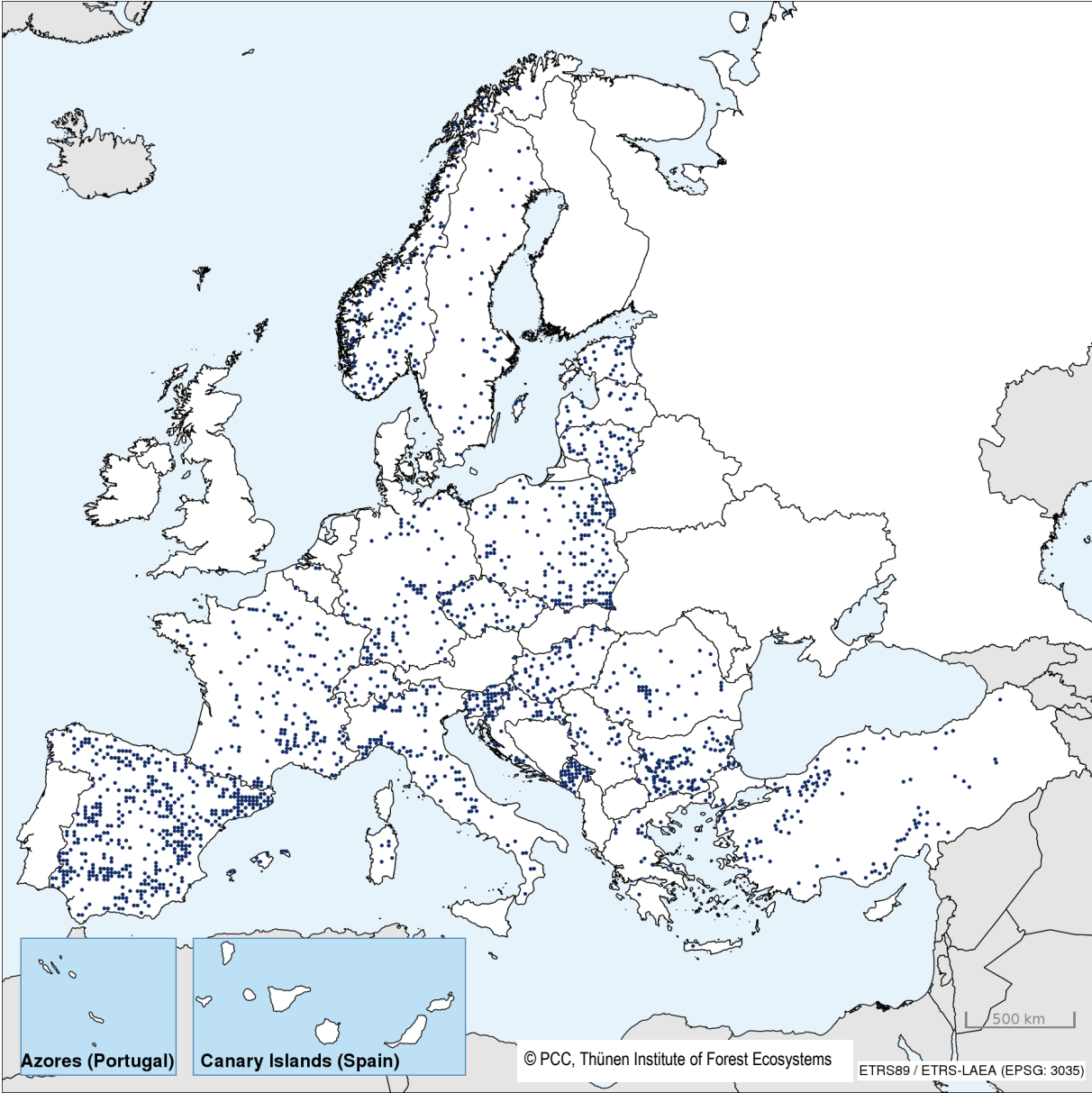


Figure S1-16: Occurrence of damaging agent group *Abiotic factors* in 2017

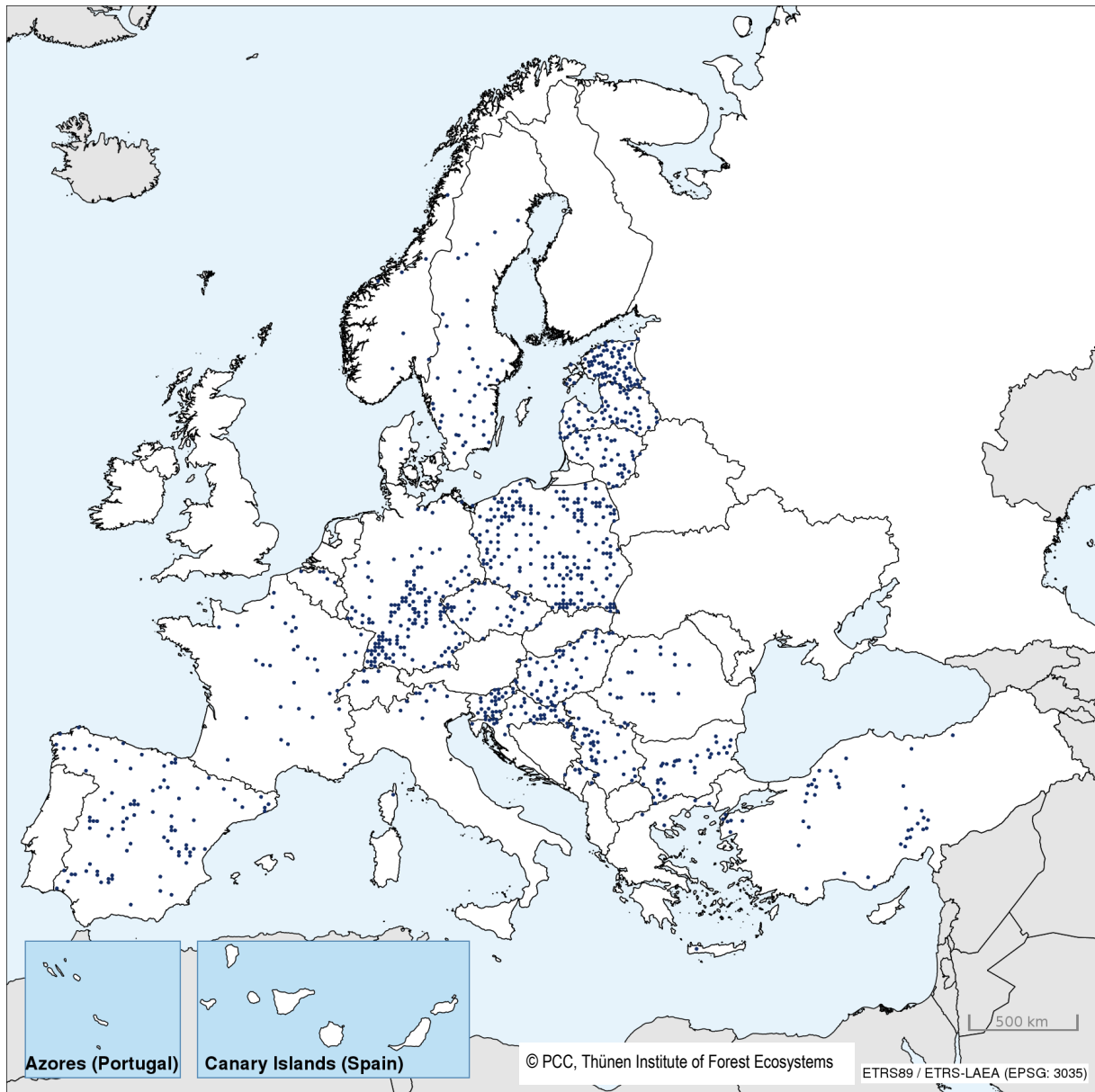


Figure S1-17: Occurrence of damaging agent group *Direct action of man* in 2017





**Figure S1-18: Occurrence of damaging agent group *Fire* in 2017**



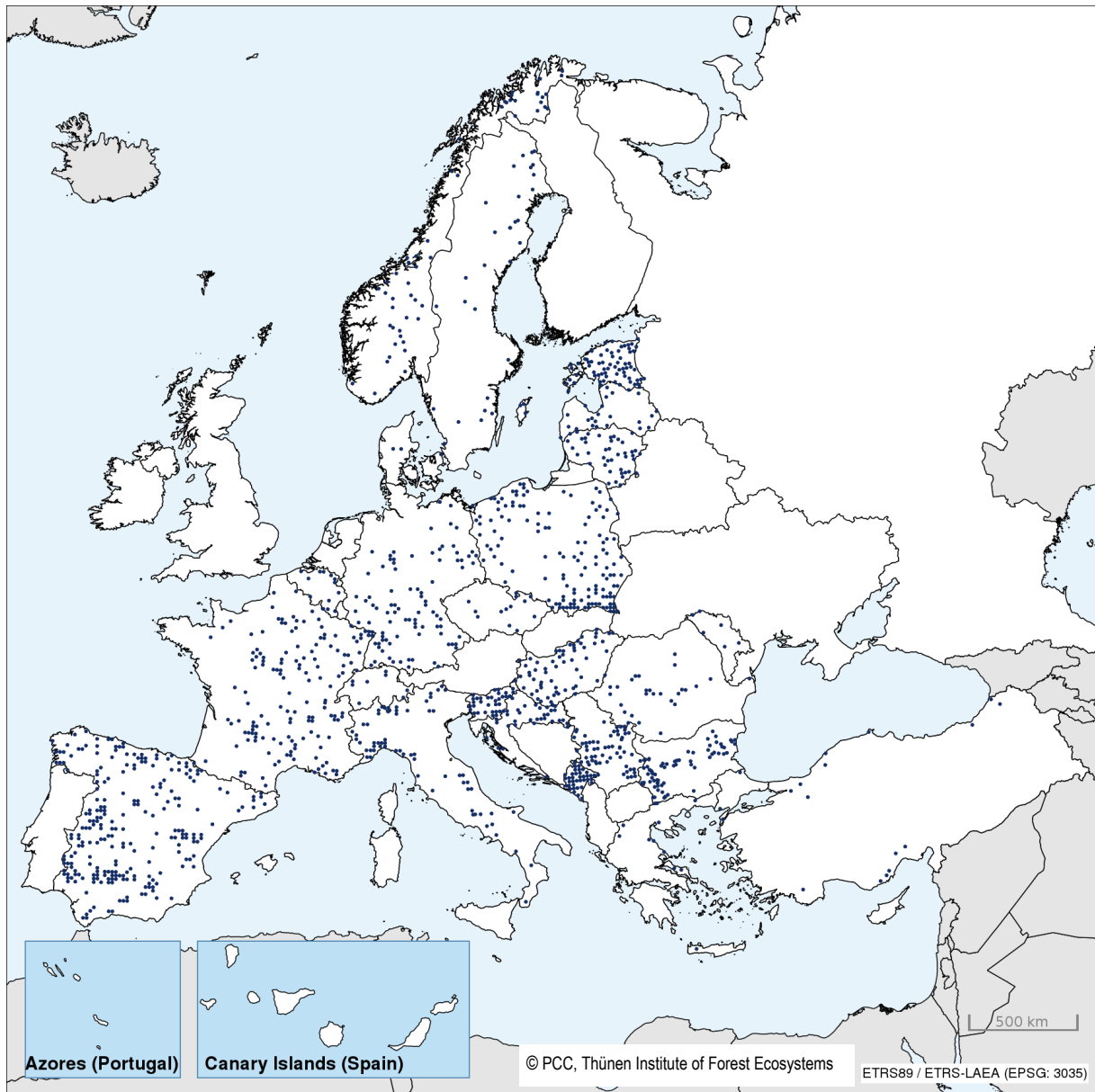


Figure S1-19: Occurrence of damaging agent group *Fungii* in 2017

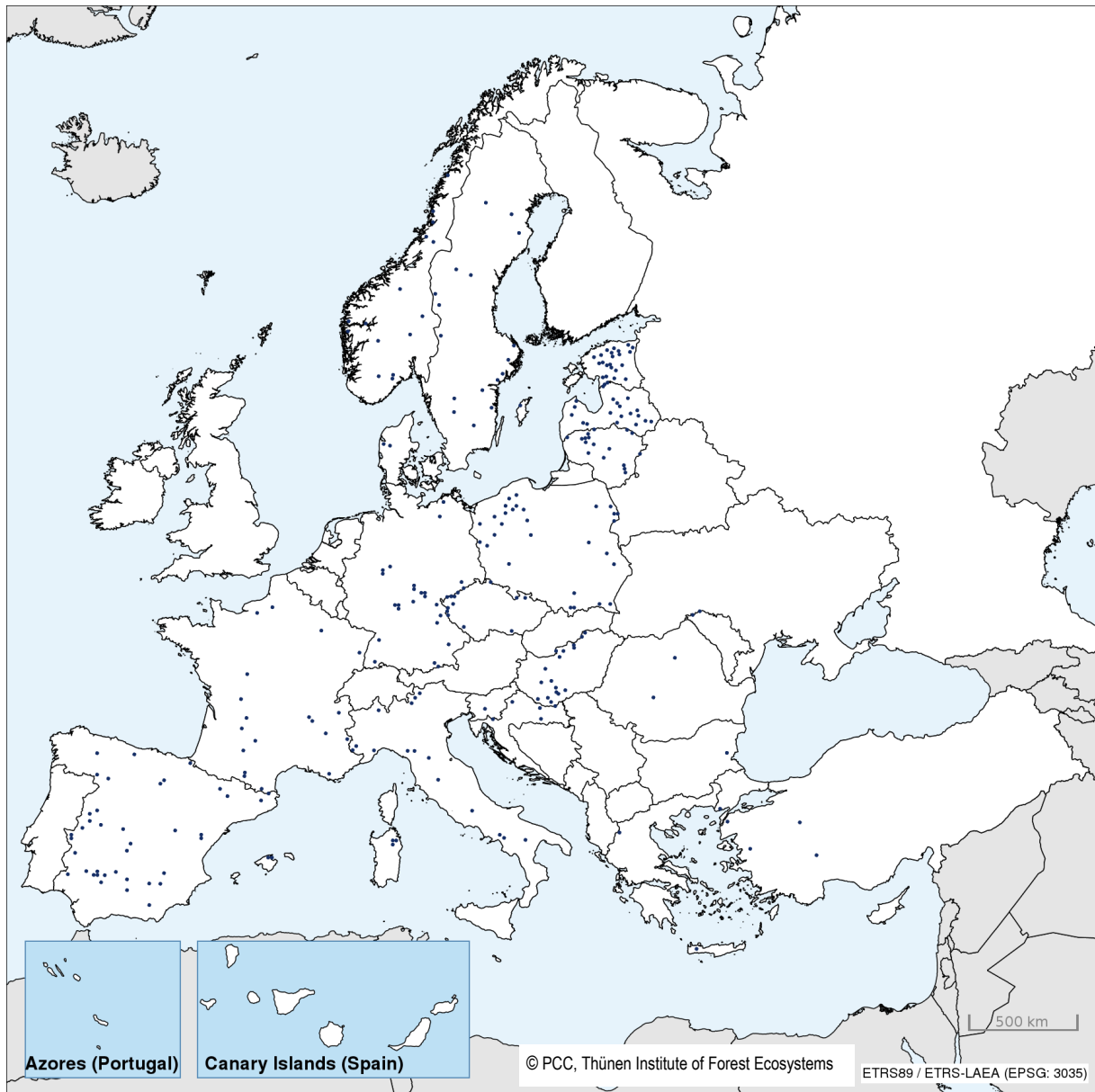


Figure S1-20: Occurrence of damaging agent group *Game and grazing* in 2017

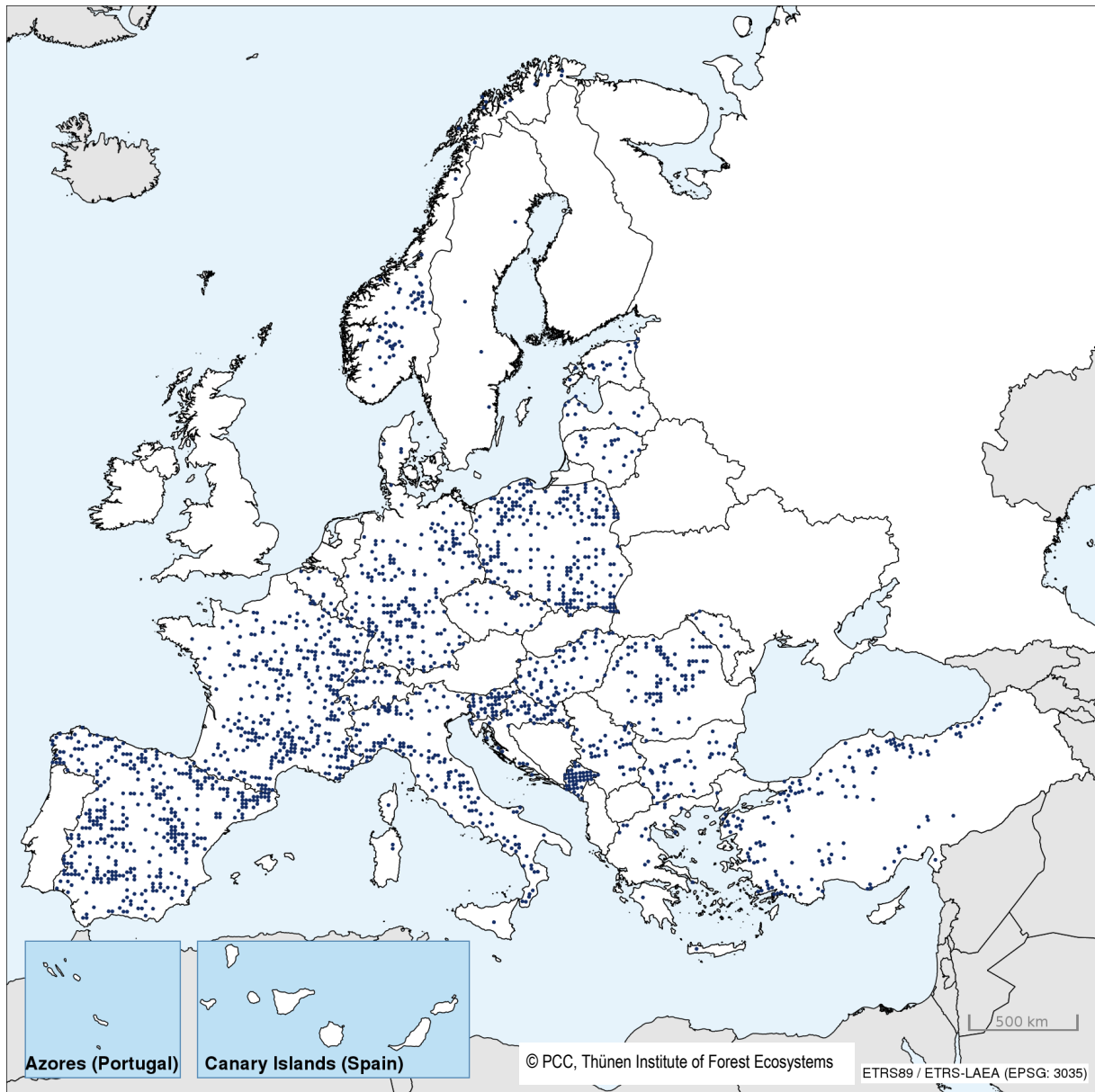


Figure S1-21: Occurrence of damaging agent group *Insects* in 2017

## S2 RESULTS OF THE NATIONAL CROWN CONDITION SURVEYS

### S2-1 Tree defoliation (%) in different defoliation classes from national crown condition surveys in 2017

| Participating country   | No. of sample trees | Defoliation classes |              |                |              |            |                   |
|-------------------------|---------------------|---------------------|--------------|----------------|--------------|------------|-------------------|
|                         |                     | 0 none (%)          | 1 slight (%) | 2 moderate (%) | 3 severe (%) | 4 dead (%) | 2-4 mod.-dead (%) |
| <b>Andorra</b>          |                     |                     |              |                |              |            |                   |
| Broadleaves             | 5                   | 40.0                | 60.0         | 0.0            | 0.0          | 0.0        | 0.0               |
| Conifers                | 283                 | 50.5                | 42.4         | 6.0            | 1.1          | 0.0        | 7.1               |
| All trees               | 288                 | 50.3                | 42.7         | 5.9            | 1.0          | 0.0        | 7.0               |
| <b>Belgium-Flanders</b> |                     |                     |              |                |              |            |                   |
| Broadleaves             | 852                 | 12.1                | 64.8         | 17.1           | 4.0          | 2.0        | 23.1              |
| Conifers                | 686                 | 5.1                 | 76.3         | 18.2           | 0.3          | 0.1        | 18.6              |
| All trees               | 1538                | 9.0                 | 69.9         | 17.6           | 2.3          | 1.2        | 21.1              |
| <b>Belgium-Wallonia</b> |                     |                     |              |                |              |            |                   |
| Broadleaves             | 197                 | 25.3                | 35.1         | 29.8           | 9.8          | 0.0        | 39.6              |
| Conifers                | 178                 | 11.1                | 30.7         | 53.4           | 4.9          | 0.0        | 58.3              |
| All trees               | 375                 | 18.6                | 33.0         | 41.0           | 7.5          | 0.0        | 48.5              |
| <b>Bulgaria</b>         |                     |                     |              |                |              |            |                   |
| Broadleaves             | 3166                | 29.7                | 49.8         | 16.7           | 1.7          | 2.2        | 20.5              |
| Conifers                | 2422                | 22.0                | 41.0         | 30.6           | 4.2          | 2.3        | 37.0              |
| All trees               | 5588                | 26.3                | 46.0         | 22.7           | 2.7          | 2.2        | 27.7              |
| <b>Croatia</b>          |                     |                     |              |                |              |            |                   |
| Broadleaves             | 2013                | 40.2                | 35.9         | 20.4           | 2.6          | 0.9        | 24.0              |
| Conifers                | 363                 | 43.5                | 21.5         | 28.4           | 6.3          | 0.3        | 35.0              |
| All trees               | 2376                | 40.7                | 33.7         | 21.6           | 3.2          | 0.8        | 25.6              |
| <b>Cyprus</b>           |                     |                     |              |                |              |            |                   |
| Broadleaves             | N/A                 | N/A                 | N/A          | N/A            | N/A          | N/A        | N/A               |
| Conifers                | 360                 | 20.3                | 56.1         | 21.9           | 1.7          | 0.0        | 23.6              |
| All trees               | 360                 | 20.3                | 56.1         | 21.9           | 1.7          | 0.0        | 23.6              |
| <b>Czechia</b>          |                     |                     |              |                |              |            |                   |
| Broadleaves             | 1192                | 22.1                | 46.3         | 30.3           | 0.9          | 0.4        | 31.6              |
| Conifers                | 3868                | 11.5                | 28.2         | 55.6           | 4.6          | 0.2        | 60.3              |
| All trees               | 5060                | 14.0                | 32.4         | 49.6           | 3.7          | 0.2        | 53.6              |
| <b>Denmark</b>          |                     |                     |              |                |              |            |                   |
| Broadleaves             | 773                 | 55.9                | 29.8         | 12.5           | 1.9          | 0.0        | 14.4              |
| Conifers                | 992                 | 59.3                | 28.9         | 11.1           | 0.6          | 0.2        | 11.8              |
| All trees               | 1765                | 57.8                | 29.3         | 11.7           | 1.1          | 0.1        | 12.9              |
| <b>Estonia</b>          |                     |                     |              |                |              |            |                   |
| Broadleaves             | 343                 | 66.5                | 30.2         | 2.9            | 0.2          | 0.2        | 3.3               |
| Conifers                | 2063                | 54.7                | 39.9         | 4.4            | 0.2          | 0.9        | 5.5               |
| All trees               | 2406                | 56.4                | 38.5         | 4.2            | 0.2          | 0.8        | 5.2               |

| Participating country | No. of sample trees | Defoliation classes |              |                |              |            |                   |
|-----------------------|---------------------|---------------------|--------------|----------------|--------------|------------|-------------------|
|                       |                     | 0 none (%)          | 1 slight (%) | 2 moderate (%) | 3 severe (%) | 4 dead (%) | 2-4 mod.-dead (%) |
| <b>France</b>         |                     |                     |              |                |              |            |                   |
| Broadleaves           | 7028                | 12.4                | 34.4         | 47.1           | 6.7          | 0.4        | 54.2              |
| Conifers              | 3784                | 28.6                | 32.6         | 34.0           | 4.6          | 0.2        | 38.8              |
| All trees             | 10812               | 18.1                | 33.1         | 42.5           | 6.0          | 0.3        | 48.8              |
| <b>Germany</b>        |                     |                     |              |                |              |            |                   |
| Broadleaves           | 4020                | 29.4                | 43.1         | 25.3           | 1.8          | 0.4        | 27.5              |
| Conifers              | 5982                | 38.0                | 42.5         | 17.9           | 1.1          | 0.5        | 19.5              |
| All trees             | 10002               | 34.6                | 42.8         | 20.9           | 1.4          | 0.5        | 22.7              |
| <b>Greece</b>         |                     |                     |              |                |              |            |                   |
| Broadleaves           | 581                 | 62.7                | 22.7         | 9.3            | 2.1          | 3.3        | 14.6              |
| Conifers              | 274                 | 27.0                | 40.9         | 31.0           | 0.7          | 0.4        | 32.1              |
| All trees             | 855                 | 51.2                | 28.5         | 16.3           | 1.6          | 2.3        | 20.2              |
| <b>Hungary</b>        |                     |                     |              |                |              |            |                   |
| Broadleaves           | 1670                | 29.4                | 29.9         | 30.6           | 8.3          | 1.7        | 40.6              |
| Conifers              | 174                 | 33.9                | 21.3         | 33.9           | 5.2          | 5.8        | 44.9              |
| All trees             | 1844                | 29.9                | 29.1         | 31.0           | 8.0          | 2.0        | 41.0              |
| <b>Italy</b>          |                     |                     |              |                |              |            |                   |
| Broadleaves           | 3502                | 13.4                | 41.7         | 36.4           | 8.1          | 0.4        | 44.9              |
| Conifers              | 1281                | 43.7                | 34.0         | 20.0           | 2.1          | 0.2        | 22.3              |
| All trees             | 4783                | 21.6                | 39.6         | 32.0           | 6.5          | 0.3        | 38.8              |
| <b>Latvia</b>         |                     |                     |              |                |              |            |                   |
| Broadleaves           | 404                 | 5.2                 | 89.6         | 5.0            | 0.3          | 0.0        | 5.2               |
| Conifers              | 1337                | 13.2                | 81.5         | 4.0            | 0.2          | 1.1        | 5.3               |
| All trees             | 1741                | 11.4                | 83.3         | 4.3            | 0.2          | 0.9        | 5.3               |
| <b>Lithuania</b>      |                     |                     |              |                |              |            |                   |
| Broadleaves           | 2505                | 17.4                | 64.8         | 15.4           | 1.1          | 1.3        | 17.8              |
| Conifers              | 3552                | 14.9                | 61.6         | 22.6           | 0.5          | 0.4        | 23.5              |
| All trees             | 6057                | 15.9                | 63.0         | 19.6           | 0.7          | 0.8        | 21.1              |
| <b>Luxembourg</b>     |                     |                     |              |                |              |            |                   |
| Broadleaves           | 776                 | 17.7                | 45.1         | 34.9           | 2.1          | 0.3        | 37.2              |
| Conifers              | 424                 | 51.4                | 30.9         | 14.9           | 1.7          | 1.2        | 17.7              |
| All trees             | 1200                | 29.6                | 40.1         | 27.8           | 1.9          | 0.6        | 30.3              |
| <b>Montenegro</b>     |                     |                     |              |                |              |            |                   |
| Broadleaves           | 888                 | 18.1                | 54.3         | 24.9           | 2.7          | 0.0        | 27.6              |
| Conifers              | 288                 | 28.1                | 48.2         | 13.9           | 9.7          | 0.0        | 23.6              |
| All trees             | 1176                | 20.6                | 52.8         | 22.2           | 4.4          | 0.0        | 26.6              |
| <b>Norway</b>         |                     |                     |              |                |              |            |                   |
| Broadleaves           | N/A                 | N/A                 | N/A          | N/A            | N/A          | N/A        | N/A               |
| Conifers              | 9774                | 45.7                | 35.4         | 15.7           | 3.1          | 0.2        | 19.0              |
| All trees             | 9774                | 45.7                | 35.4         | 15.7           | 3.1          | 0.2        | 19.0              |

| Participating country      | No. of sample trees | Defoliation classes |              |                |              |            |                   |
|----------------------------|---------------------|---------------------|--------------|----------------|--------------|------------|-------------------|
|                            |                     | 0 none (%)          | 1 slight (%) | 2 moderate (%) | 3 severe (%) | 4 dead (%) | 2-4 mod.-dead (%) |
| <b>Poland</b>              |                     |                     |              |                |              |            |                   |
| Broadleaves                | 14519               | 13.7                | 63.1         | 21.2           | 1.3          | 0.7        | 23.3              |
| Conifers                   | 25661               | 7.9                 | 73.7         | 17.0           | 0.9          | 0.5        | 18.4              |
| All trees                  | 40180               | 10.0                | 69.8         | 18.5           | 1.1          | 0.6        | 20.2              |
| <b>Republic of Moldova</b> |                     |                     |              |                |              |            |                   |
| Broadleaves                | 14172               | 34.5                | 36.8         | 26.0           | 1.1          | 1.6        | 28.7              |
| Conifers                   | 61                  | 64.0                | 16.4         | 18.0           | 0.0          | 1.6        | 19.6              |
| All trees                  | 14233               | 34.7                | 36.6         | 26.0           | 1.1          | 1.6        | 28.7              |
| <b>Romania</b>             |                     |                     |              |                |              |            |                   |
| Broadleaves                | 4785                | 48.8                | 35.9         | 13.8           | 1.3          | 0.2        | 15.3              |
| Conifers                   | 1092                | 63.3                | 26.0         | 9.6            | 1.1          | 0.0        | 10.7              |
| All trees                  | 5877                | 51.5                | 34.0         | 13.0           | 1.2          | 0.2        | 14.5              |
| <b>Serbia</b>              |                     |                     |              |                |              |            |                   |
| Broadleaves                | 2597                | 69.6                | 18.6         | 10.0           | 1.7          | 0.1        | 11.8              |
| Conifers                   | 326                 | 79.2                | 8.9          | 8.9            | 3.1          | 0.0        | 12.0              |
| All trees                  | 2923                | 70.7                | 17.5         | 9.9            | 1.8          | 0.1        | 11.8              |
| <b>Slovakia</b>            |                     |                     |              |                |              |            |                   |
| Broadleaves                | 2322                | 17.1                | 56.1         | 25.1           | 1.3          | 0.4        | 26.7              |
| Conifers                   | 1415                | 10.8                | 47.6         | 37.7           | 3.6          | 0.4        | 41.6              |
| All trees                  | 3737                | 14.6                | 52.7         | 30.1           | 2.2          | 0.4        | 32.6              |
| <b>Slovenia</b>            |                     |                     |              |                |              |            |                   |
| Broadleaves                | 689                 | 17.9                | 47.0         | 29.0           | 5.7          | 0.4        | 35.1              |
| Conifers                   | 367                 | 24.0                | 35.4         | 32.2           | 4.4          | 4.1        | 40.6              |
| All trees                  | 1056                | 20.0                | 43.0         | 30.1           | 5.2          | 1.7        | 37.0              |
| <b>Spain</b>               |                     |                     |              |                |              |            |                   |
| Broadleaves                | 7465                | 13.2                | 57.5         | 23.2           | 2.7          | 3.4        | 29.3              |
| Conifers                   | 7415                | 16.7                | 57.2         | 22.0           | 1.6          | 2.6        | 26.2              |
| All trees                  | 14880               | 14.9                | 57.4         | 22.6           | 2.2          | 3.0        | 27.8              |
| <b>Sweden</b>              |                     |                     |              |                |              |            |                   |
| Broadleaves                | NA                  | NA                  | NA           | NA             | NA           | NA         | NA                |
| Conifers                   | 7965                | 46.9                | 34.9         | 15.9           | 2.2          | 0.1        | 18.2              |
| All trees                  | 7965                | 46.9                | 34.9         | 15.9           | 2.2          | 0.1        | 18.2              |
| <b>Switzerland</b>         |                     |                     |              |                |              |            |                   |
| Broadleaves                | 287                 | 15.0                | 50.3         | 13.7           | 3.4          | 17.6       | 34.7              |
| Conifers                   | 757                 | 11.4                | 55.2         | 25.0           | 0.1          | 8.3        | 33.4              |
| All trees                  | 1044                | 12.5                | 53.7         | 21.5           | 1.1          | 11.1       | 33.7              |
| <b>Turkey</b>              |                     |                     |              |                |              |            |                   |
| Broadleaves                | 5322                | 47.4                | 42.9         | 8.5            | 0.9          | 0.4        | 9.8               |
| Conifers                   | 8470                | 44.9                | 46.8         | 7.5            | 0.4          | 0.3        | 8.2               |
| All trees                  | 13792               | 45.9                | 45.3         | 7.9            | 0.6          | 0.3        | 8.8               |

## S2-2 Percentage of moderately to severely defoliated trees (defoliation classes 2–4) between 2008 and 2017 – All species

| Participating countries | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Change % points 2016/17 |
|-------------------------|------|------|------|------|------|------|------|------|------|------|-------------------------|
| Albania                 |      |      |      |      |      | 21.0 |      |      |      |      | N/A                     |
| Andorra                 | 15.3 | 6.8  | 15.3 | 8.3  | 5.6  | 3.4  | 5.3  | 4.5  | 3.4  | 7.0  | +3.6                    |
| Austria                 |      |      | 14.2 |      |      |      |      |      |      |      | N/A                     |
| Belarus                 | 8.0  | 8.4  | 7.4  | 6.1  |      |      |      |      |      |      | N/A                     |
| Belgium                 | 14.5 | 20.2 | 22.1 | 23.5 | 28.2 | 27.6 | 27.5 | 26.4 | 26.1 | 26.6 | +0.5                    |
| Bulgaria                | 31.9 | 21.1 | 23.8 | 21.6 | 32.3 | 33.5 | 26.0 | 26.2 | 29.9 | 27.7 | -2.2                    |
| Croatia                 | 23.9 | 26.3 | 27.9 | 25.2 | 28.5 | 29.1 | 31.5 | 29.7 | 28.5 | 25.6 | -2.9                    |
| Cyprus                  | 47.0 | 36.2 | 19.2 | 16.4 | 10.6 | 8.9  | 13.3 | 12.5 | 35.0 | 23.6 | -11.4                   |
| Czechia                 | 56.7 | 56.8 | 54.2 | 52.7 | 50.3 | 51.7 |      | 52.0 | 54.3 | 53.6 | -0.7                    |
| Denmark                 | 9.1  | 5.5  | 9.3  | 10.0 | 7.3  | 4.9  | 7.0  | 8.7  | 14.8 | 12.9 | -1.9                    |
| Estonia                 | 9.0  | 7.2  | 8.1  | 8.1  | 7.8  | 8.0  | 6.7  | 6.7  | 6.4  | 5.2  | -1.2                    |
| Finland                 | 10.2 | 9.1  | 10.5 | 10.6 | 14.3 |      |      |      |      |      | N/A                     |
| France                  | 32.4 | 33.5 | 34.6 | 39.9 | 41.4 | 40.1 | 42.8 | 43.4 | 48.6 | 48.8 | +0.2                    |
| Germany                 | 25.7 | 26.5 | 23.2 | 28.0 | 24.6 | 22.7 | 26.2 | 23.8 | 28.0 | 22.7 | -5.3                    |
| Greece                  |      | 24.3 | 23.8 |      |      |      | 24.8 | 20.2 |      | 20.2 | N/A                     |
| Hungary                 | 12.4 | 18.4 | 21.8 | 18.9 | 20.2 | 22.4 | 24.2 | 24.0 | 34.6 | 41.0 | +5.4                    |
| Ireland                 | 10.0 | 12.5 | 17.5 |      | 1.0  |      |      |      |      |      | N/A                     |
| Italy                   | 32.8 | 35.8 | 29.8 | 31.3 | 35.7 | 33.7 | 30.8 | 29.8 | 34.7 | 39.0 | +4.3                    |
| Latvia                  | 15.3 | 13.8 | 13.4 | 14.0 | 9.2  | 6.4  | 5.1  | 4.4  | 5.7  | 5.3  | -0.4                    |
| Lithuania               | 19.6 | 17.7 | 21.3 | 15.4 | 24.5 | 19.7 | 21.7 | 23.8 | 21.0 | 21.1 | +0.1                    |
| Luxembourg              |      |      |      |      |      | 33.2 |      | 32.6 | 38.2 | 30.3 | -7.9                    |
| Rep. of Moldova         | 33.6 | 25.2 | 22.5 | 18.4 | 25.6 |      | 19.9 | 26.1 | 26.5 | 28.7 | +2.2                    |
| Montenegro              |      |      |      |      |      | 22.7 |      | 25.4 | 27.3 | 26.6 | -0.7                    |
| Netherlands             |      | 18.2 | 21.6 |      |      |      |      |      |      |      | 0.7                     |
| Norway                  | 22.7 | 21.0 | 18.9 | 20.9 | 18.8 | 17.7 | 15.9 | 16.5 | 15.5 | 19.0 | +4.5                    |
| Poland                  | 18.0 | 17.7 | 20.7 | 24.0 | 23.4 | 18.8 | 18.9 | 16.7 | 19.5 | 20.2 | +0.7                    |
| Romania                 |      | 18.9 | 17.8 | 13.9 | 13.9 | 13.6 | 13.5 | 13.1 | 13.4 | 14.5 | +1.1                    |
| Russian Fed.            |      | 6.2  | 4.4  | 8.3  |      |      |      |      |      |      | N/A                     |
| Serbia                  | 11.5 | 10.3 | 10.8 | 7.6  | 10.3 | 14.7 | 12.4 | 10.7 | 11.3 | 11.8 | +0.5                    |
| Slovakia                | 29.3 | 32.1 | 38.6 | 34.7 | 37.9 | 43.4 |      | 34.5 | 40.3 | 32.6 | -7.7                    |
| Slovenia                | 36.9 | 35.5 | 31.8 | 31.4 | 29.1 | 30.9 | 38.3 | 37.8 | 33.9 | 37.0 | +3.1                    |
| Spain                   | 15.6 | 17.7 | 14.6 | 11.8 | 17.5 | 16.6 | 14.9 |      | 21.9 | 27.8 | +5.9                    |
| Sweden                  | 17.3 | 15.1 | 19.2 | 18.9 | 15.9 | 19.9 |      | 19.8 | 16.4 | 18.2 | +1.8                    |
| Switzerland             | 19.0 | 18.3 | 22.2 | 30.9 | 31.3 | 26.0 | 30.6 | 24.8 | 25.2 | 33.7 | +8.5                    |
| Turkey                  | 24.6 | 18.7 | 16.8 | 13.6 | 12.4 | 10.2 | 11.0 | 9.5  | 9.8  | 8.8  | -1.0                    |
| Ukraine                 | 8.2  | 6.8  | 5.8  | 6.8  | 7.5  | 7.1  | 6.0  | 7.1  |      |      | N/A                     |
| United Kingdom          |      |      | 48.5 |      |      |      |      |      |      |      | N/A                     |

*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.*

## S2-3 Percentage of moderately to severely defoliated trees (defoliation classes 2–4) between 2008 and 2017 – Conifers

| Participating countries | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014  | 2015 | 2016 | 2017 | Change % points 2016/17 |
|-------------------------|------|------|------|------|------|------|-------|------|------|------|-------------------------|
| Albania                 |      |      |      |      |      | 21.0 |       |      |      |      | N/A                     |
| Andorra                 | 15.3 | 6.8  | 15.3 | 8.3  | 5.6  | 3.1  | 5.4   | 4.3  | 3.5  | 7.1  | +3.6                    |
| Austria                 |      |      | 14.5 |      |      |      |       |      |      |      | N/A                     |
| Belarus                 | 8.1  | 8.3  | 7.7  | 5.8  |      |      |       |      |      |      | N/A                     |
| Belgium                 | 13.2 | 13.6 | 16.2 | 15.2 | 20.3 | 19.7 | 22.8  | 27.9 | 24.6 | 26.8 | +2.2                    |
| Bulgaria                | 45.6 | 33.0 | 31.1 | 33.3 | 35.1 | 40.8 | 34.1  | 40.1 | 39.9 | 37.0 | -2.9                    |
| Croatia                 | 59.1 | 66.5 | 56.9 | 45.1 | 54.7 | 48.3 | 49.7  | 56.0 | 51.0 | 35.0 | -16.0                   |
| Cyprus                  | 46.9 | 36.2 | 19.2 | 16.4 | 10.6 | 8.9  | 13.3  | 12.5 | 35.0 | 23.6 | -11.4                   |
| Czechia                 | 62.8 | 63.1 | 60.1 | 58.9 | 56.9 | 59.2 |       | 57.8 | 60.3 | 60.3 | +/-0.0                  |
| Denmark                 | 9.9  | 1.0  | 5.4  | 5.7  | 4.6  | 2.8  | 5.3   | 7.4  | 11.3 | 11.8 | +0.5                    |
| Estonia                 | 9.3  | 7.5  | 9.0  | 8.7  | 6.6  | 8.5  | 6.9   | 6.5  | 6.7  | 5.5  | -1.2                    |
| Finland                 | 10.1 | 9.9  | 10.6 | 11.7 | 14.6 |      |       |      |      |      | N/A                     |
| France                  | 25.1 | 26.8 | 27.4 | 31.9 | 32.2 | 33.7 | 36.6  | 38.0 | 39.3 | 38.8 | -0.5                    |
| Germany                 | 24.1 | 20.3 | 19.2 | 20.3 | 19.3 | 18.1 | 19.7  | 20.3 | 22.3 | 19.5 | -2.8                    |
| Greece                  |      | 26.3 | 23.7 |      |      |      | 26.7  | 27.2 |      | 32.1 | N/A                     |
| Hungary                 | 12.9 | 27.1 | 35.1 | 28.7 | 23.1 | 23.5 | 30.7  | 46.5 | 52.8 | 44.9 | -7.9                    |
| Ireland                 | 10.0 | 12.5 | 17.5 |      | 1.0  |      |       |      |      |      | N/A                     |
| Italy                   | 24.0 | 31.6 | 29.1 | 32.2 | 31.8 | 24.2 | 24.0  | 22.6 | 19.6 | 21.8 | +2.2                    |
| Latvia                  | 16.7 | 14.8 | 15.0 | 16.0 | 7.9  | 6.9  | 4.8   | 4.4  | 4.9  | 5.3  | +0.4                    |
| Lithuania               | 19.1 | 17.4 | 19.8 | 16.3 | 26.9 | 23.1 | 21.1  | 25.0 | 21.7 | 23.5 | +1.8                    |
| Luxembourg              |      |      |      |      |      | 17.5 | 93.3* | 18.7 | 17.4 | 17.7 | +0.3                    |
| Rep. of Moldova         |      |      | 33.3 | 32.1 | 44.3 |      | 29.4  |      | 21.6 | 19.6 | -2.0                    |
| Montenegro              |      |      |      |      |      | 22.6 |       | 26.1 | 28.1 | 23.6 | -4.5                    |
| Netherlands             |      | 14.1 | 18.9 |      |      |      |       |      |      |      | N/A                     |
| Norway                  | 19.2 | 17.9 | 16.4 | 17.3 | 16.1 | 17.7 | 15.9  | 16.5 | 15.5 | 19.0 | +4.5                    |
| Poland                  | 17.5 | 17.2 | 20.3 | 24.2 | 22.3 | 17.8 | 17.2  | 15.7 | 17.1 | 18.4 | +1.3                    |
| Romania                 |      | 21.7 | 16.1 | 15.9 | 14.9 | 13.9 | 13.7  | 8.0  | 10.4 | 10.7 | +0.3                    |
| Russian Fed.            |      | 7.3  | 5.1  | 10.6 |      |      |       |      |      |      | N/A                     |
| Serbia                  | 13.0 | 12.6 | 12.0 | 11.1 | 11.0 | 13.0 | 14.6  | 14.5 | 13.5 | 12.0 | -1.5                    |
| Slovakia                | 41.1 | 42.7 | 46.8 | 46.6 | 43.5 | 43.3 |       | 49.4 | 45.6 | 41.6 | -4.0                    |
| Slovenia                | 40.7 | 38.8 | 37.8 | 33.6 | 31.3 | 31.3 | 38.1  | 41.0 | 38.6 | 40.6 | +2.0                    |
| Spain                   | 12.9 | 14.9 | 13.1 | 10.4 | 11.4 | 12.6 | 11.4  |      | 20.9 | 26.2 | +5.3                    |
| Sweden                  | 17.3 | 15.1 | 19.2 | 18.9 | 15.9 | 19.9 | 18.8  | 19.8 | 16.4 | 18.2 | +1.8                    |
| Switzerland             | 18.7 | 18.8 | 20.9 | 31.5 | 30.6 | 23.3 | 31.7  | 24.0 | 24.9 | 33.4 | +8.5                    |
| Turkey                  | 16.2 | 16.0 | 14.5 | 11.6 | 9.9  | 6.9  | 7.2   | 8.6  | 9.1  | 8.2  | -0.9                    |
| Ukraine                 | 7.1  | 6.3  | 5.6  | 6.8  | 7.5  | 7.5  | 6.8   | 7.9  |      |      | N/A                     |
| United Kingdom          |      |      | 38.6 |      |      |      |       |      |      |      | N/A                     |

*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.*



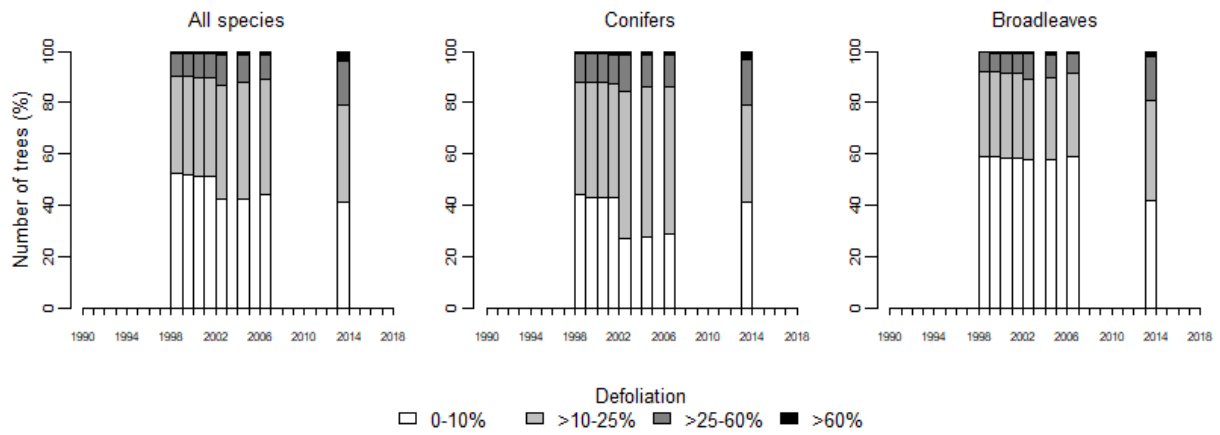
## S2-4 Percentage of moderately to severely defoliated trees (defoliation classes 2–4) between 2008 and 2017 – Broadleaves

| Participating country | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014  | 2015 | 2016 | 2017 | Change points 2016/17 |
|-----------------------|------|------|------|------|------|------|-------|------|------|------|-----------------------|
| Albania               |      |      |      |      |      | 19.0 |       |      |      |      | N/A                   |
| Andorra               |      |      |      |      |      | 20.0 | 20.0  | 16.7 | 0.0  | 0.0  | +/-0.0                |
| Austria               |      |      | 10.5 |      |      |      |       |      |      |      | N/A                   |
| Belarus               | 7.6  | 8.7  | 6.9  | 6.4  |      |      |       |      |      |      | N/A                   |
| Belgium               | 15.3 | 23.4 | 24.6 | 26.7 | 32.9 | 29.4 | 31.4  | 25.1 | 27.4 | 26.2 | -1.2                  |
| Bulgaria              | 17.8 | 12.2 | 18.2 | 12.8 | 29.8 | 28.0 | 20.0  | 15.6 | 22.3 | 20.5 | -1.8                  |
| Croatia               | 19.1 | 20.7 | 21.9 | 21.5 | 23.7 | 25.7 | 28.1  | 25.3 | 24.7 | 24.0 | -0.7                  |
| Cyprus                |      |      |      |      |      |      |       |      | N/A  | N/A  | N/A                   |
| Czechia               | 32.2 | 32.9 | 32.2 | 31.2 | 28.4 | 25.7 |       | 32.7 | 34.7 | 31.6 | -3.1                  |
| Denmark               | 8.0  | 10.0 | 12.1 | 12.8 | 10.9 | 7.9  | 9.0   | 10.8 | 19.7 | 14.4 | -5.3                  |
| Estonia               | 3.4  | 3.5  | 2.5  | 3.0  | 14.9 | 5.3  | 5.7   | 8.0  | 5.2  | 3.3  | -1.9                  |
| Finland               | 10.6 | 4.7  | 9.2  | 6.0  | 12.8 |      |       |      |      |      | N/A                   |
| France                | 36.5 | 37.1 | 38.7 | 44.3 | 45.9 | 43.6 | 46.1  | 47.0 | 53.5 | 54.2 | +0.7                  |
| Germany               | 28.4 | 36.1 | 29.4 | 38.0 | 32.5 | 29.8 | 36.1  | 29.0 | 35.7 | 27.5 | -8.2                  |
| Greece                |      | 5.2  | 23.9 |      |      |      | 16.7  | 11.3 |      | 14.6 | N/A                   |
| Hungary               | 12.4 | 17.1 | 19.7 | 17.3 | 19.9 | 22.3 | 23.3  | 21.4 | 32.5 | 40.6 | +8.1                  |
| Ireland               |      |      |      |      |      |      |       |      |      |      | N/A                   |
| Italy                 | 35.8 | 36.8 | 30.1 | 32.7 | 37.2 | 37.1 | 33.4  | 32.1 | 39.5 | 45.0 | +5.5                  |
| Latvia                | 11.5 | 11.6 | 9.4  | 8.8  | 12.9 | 4.4  | 6.1   | 4.2  | 8.3  | 5.2  | -3.1                  |
| Lithuania             | 20.3 | 18.4 | 23.7 | 13.8 | 21.0 | 14.7 | 22.5  | 21.9 | 20.0 | 17.8 | -2.2                  |
| Luxembourg            |      |      |      |      |      | 42.4 | *34.6 | 40.3 | 49.0 | 37.2 | -11.8                 |
| Rep. of Moldova       | 33.6 | 25.2 | 22.4 | 18.4 | 25.6 |      | 19.9  | 26.1 | 26.5 | 28.7 | +2.2                  |
| Montenegro            |      |      |      |      |      | 22.8 |       | 25.2 | 27.1 | 27.6 | +0.5                  |
| Netherlands           |      | 25.6 | 26.6 |      |      |      |       |      |      |      | N/A                   |
| Norway                | 33.8 | 31.0 | 26.8 | 32.3 | 27.3 | N/A  | N/A   | N/A  | N/A  | N/A  | N/A                   |
| Poland                | 19.1 | 18.5 | 21.5 | 23.5 | 25.5 | 20.7 | 21.9  | 18.4 | 24.0 | 23.3 | -0.7                  |
| Romania               |      | 18.3 | 18.0 | 13.4 | 13.6 | 13.6 | 13.0  | 13.9 | 14.2 | 15.3 | +1.1                  |
| Russian Fed.          |      | 4.4  | 3.2  | 4.3  |      |      |       |      |      |      | N/A                   |
| Serbia                | 11.3 | 9.9  | 10.7 | 7.2  | 10.2 | 14.9 | 12.1  | 10.1 | 11.0 | 11.8 | +0.8                  |
| Slovakia              | 20.8 | 24.5 | 32.9 | 26.4 | 33.9 | 43.5 | 43.5  | 24.3 | 36.5 | 26.7 | -9.8                  |
| Slovenia              | 34.6 | 33.3 | 28.1 | 30.0 | 27.7 | 30.6 | 38.4  | 35.9 | 31.1 | 35.1 | +4.0                  |
| Spain                 | 18.4 | 20.7 | 16.1 | 13.2 | 23.6 | 20.7 | 18.4  |      | 22.7 | 29.3 | +6.6                  |
| Sweden                |      |      |      |      |      |      |       |      |      | N/A  | N/A                   |
| Switzerland           | 19.6 | 17.4 | 25.2 | 29.6 | 33.3 | 31.5 | 28.0  | 26.4 | 25.9 | 34.7 | +8.8                  |
| Turkey                | 38.3 | 23.4 | 21.2 | 17.2 | 16.8 | 15.7 | 17.2  | 10.8 | 11.0 | 9.8  | -1.2                  |
| Ukraine               | 9.1  | 7.2  | 6.4  | 6.7  | 7.5  | 7.0  | 5.5   | 6.3  |      |      | N/A                   |
| United Kingdom        |      |      | 56.1 |      |      |      |       |      |      |      | N/A                   |

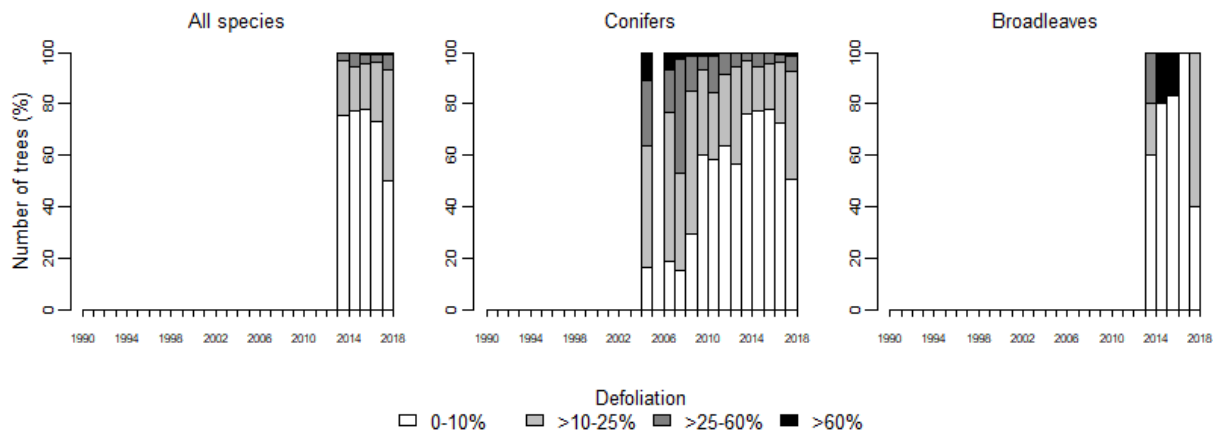
*Note that some differences in the level of defoliation between participating countries may be at least partly due to differences in standards used. This restriction, however, does not affect the reliability of the trends over time. In some countries there has been a change in the monitoring design at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

## S2-5 Change of tree defoliation over time (1990–2017) per country

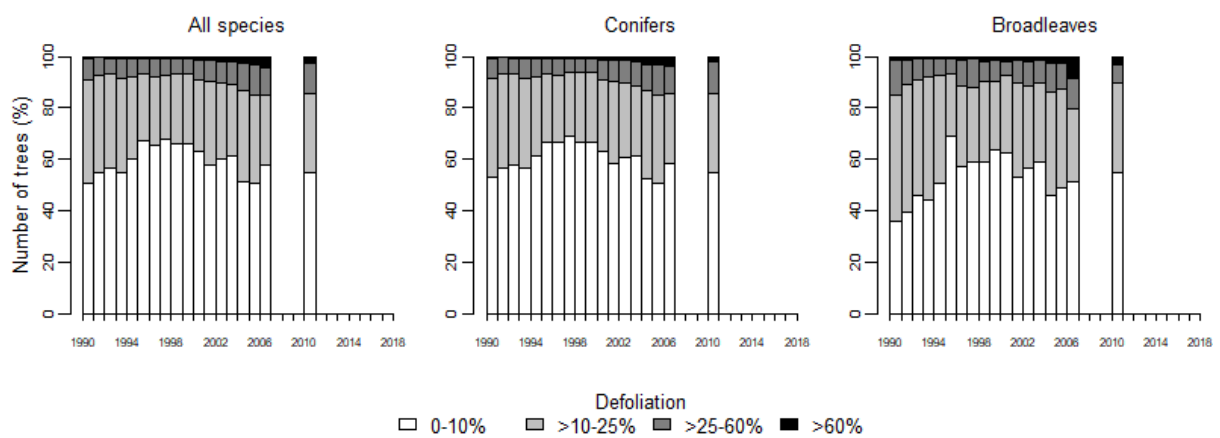
### ALBANIA



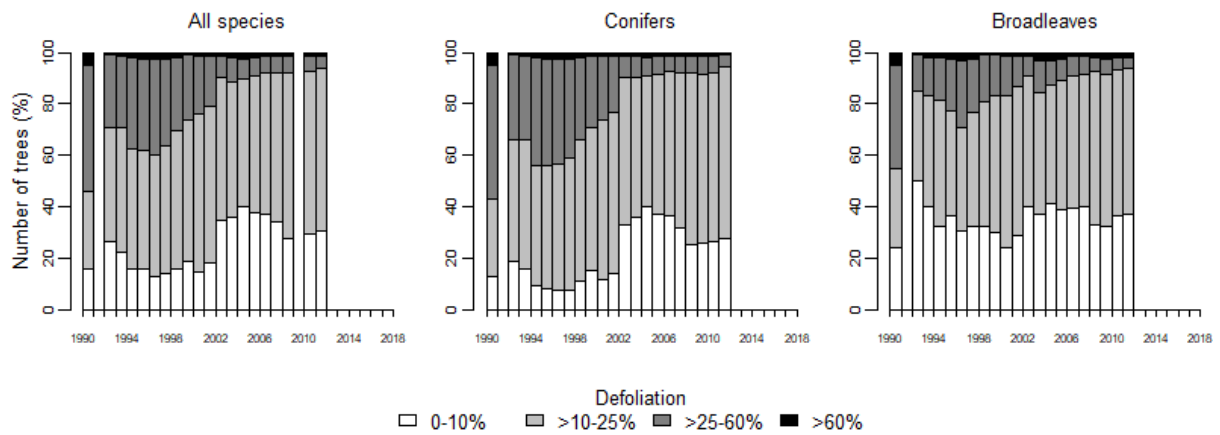
### ANDORRA



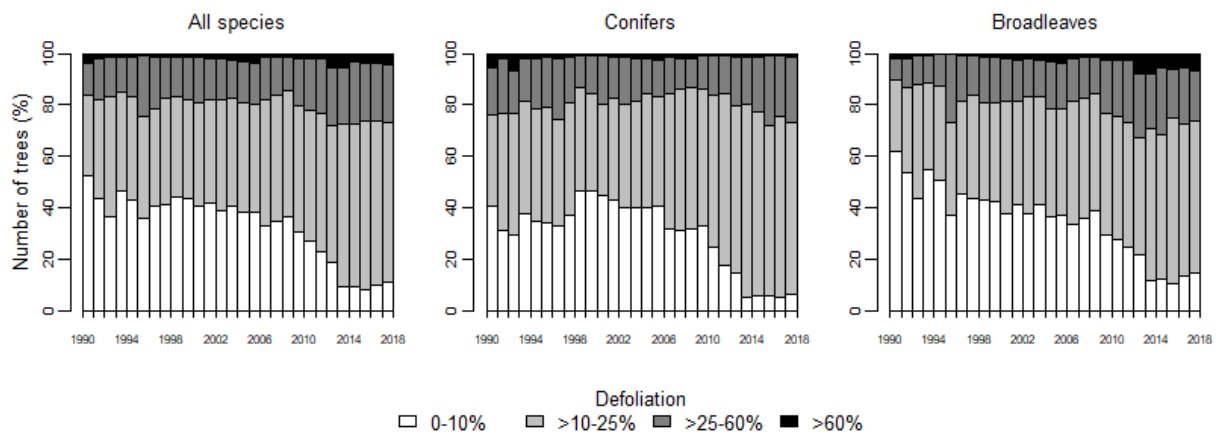
### AUSTRIA



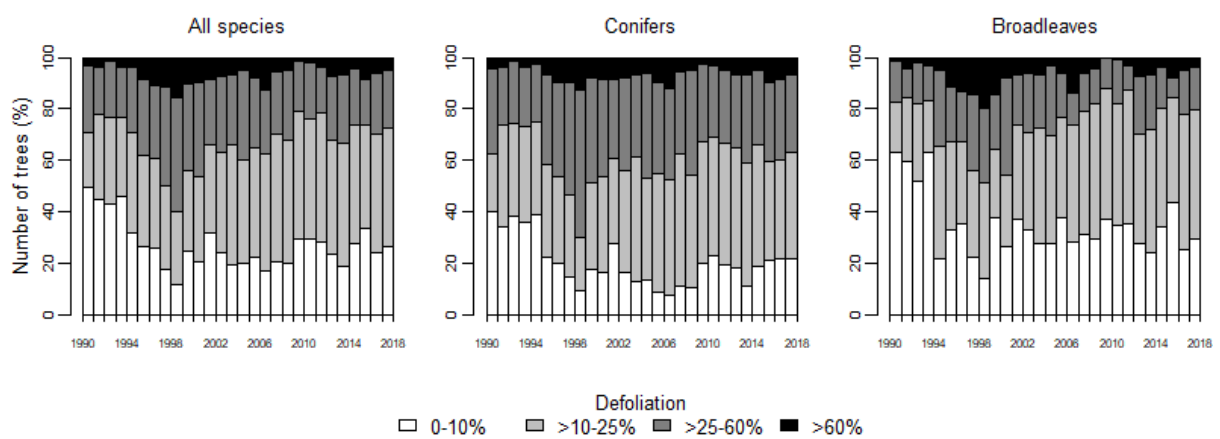
## BELARUS



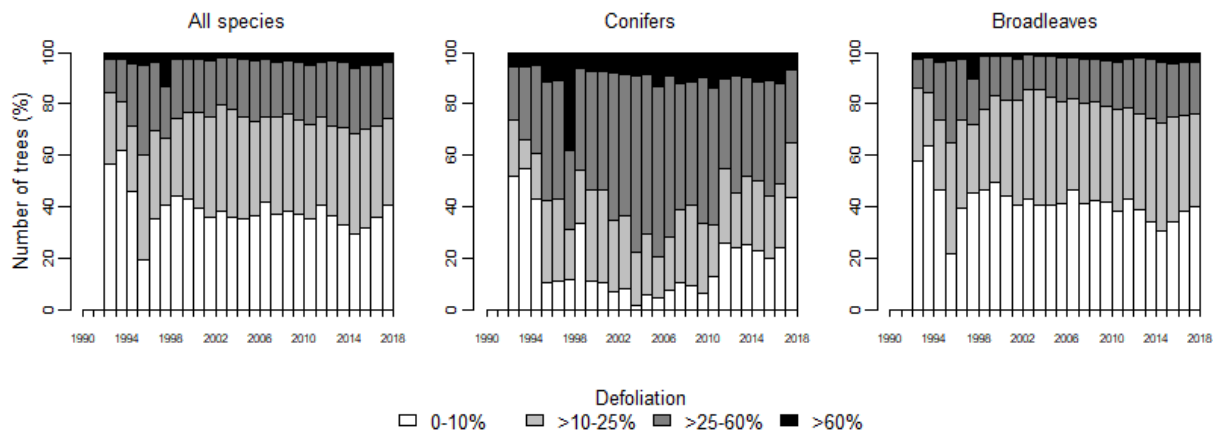
## BELGIUM



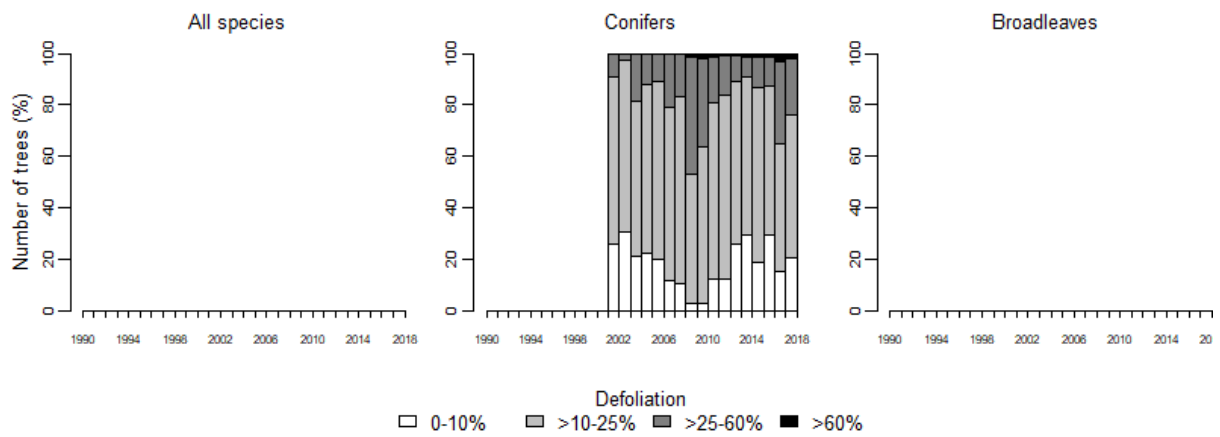
## BULGARIA



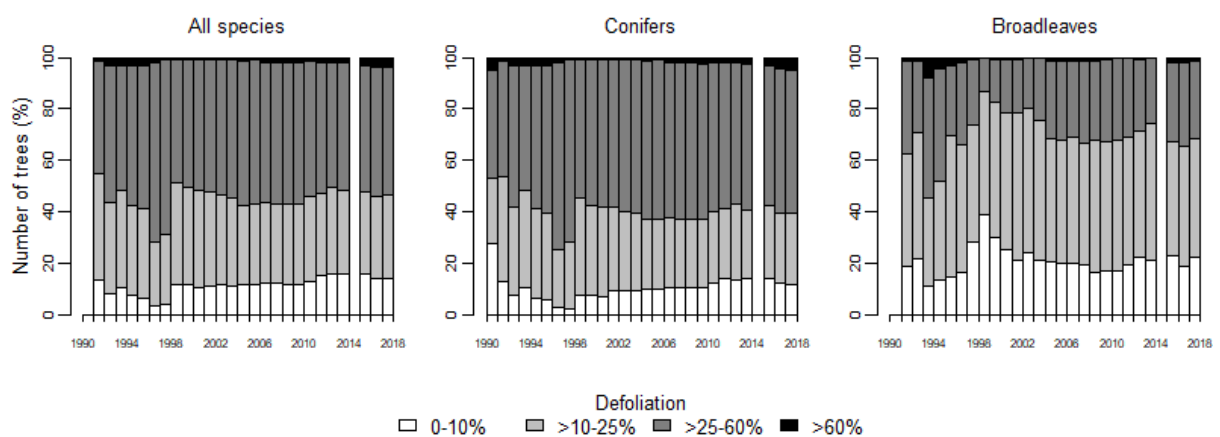
## CROATIA



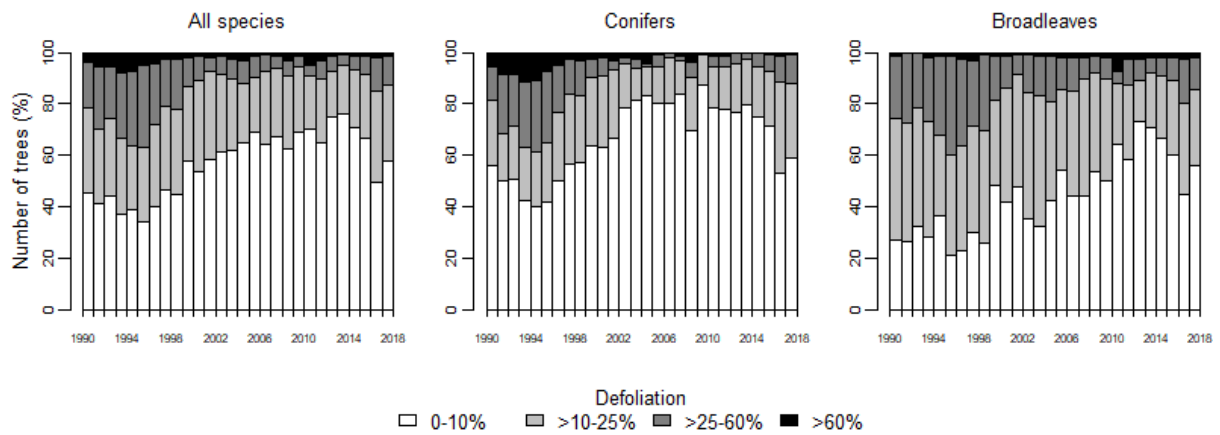
## CYPRUS



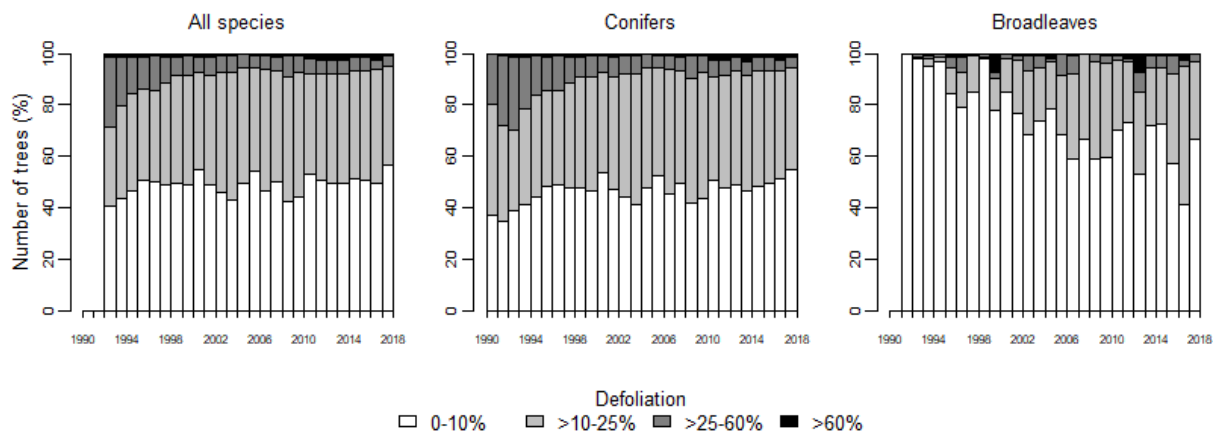
## CZECHIA



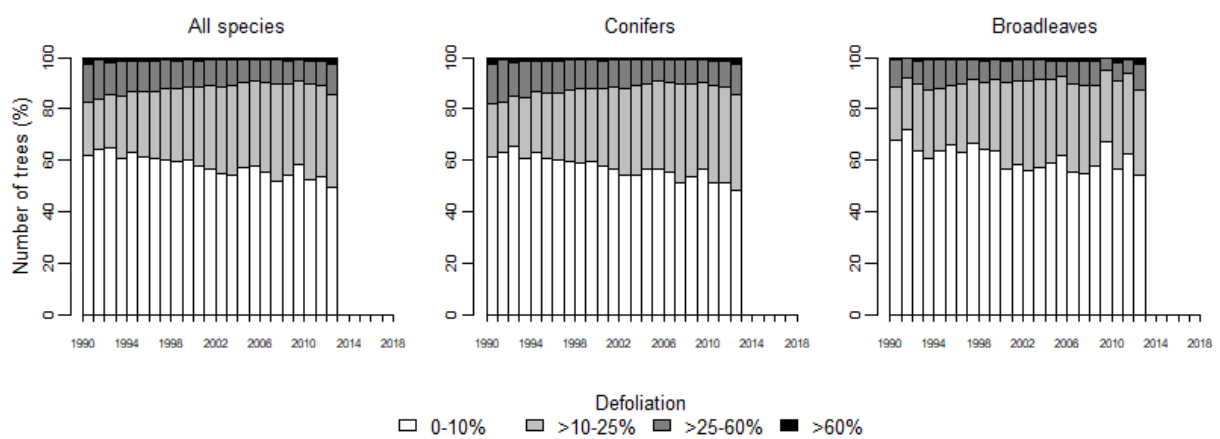
## DENMARK



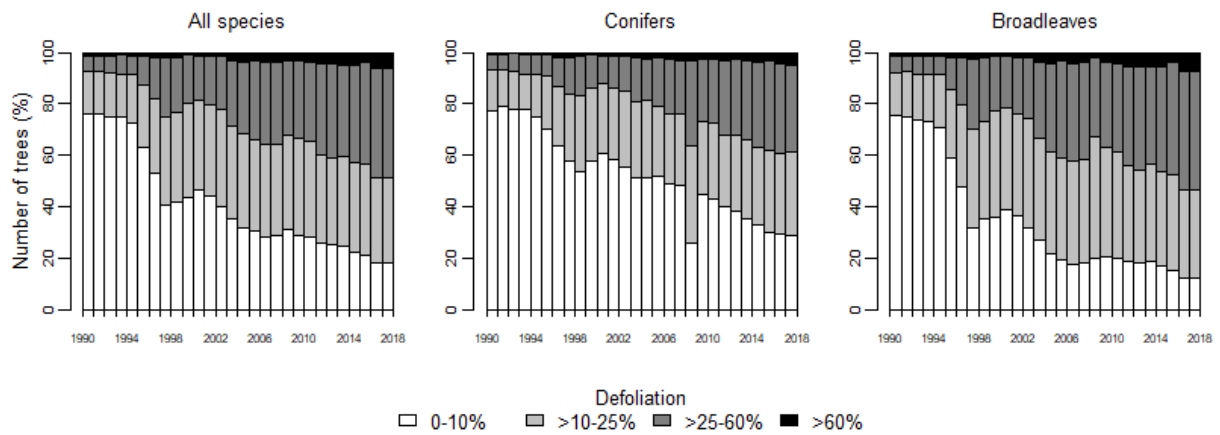
## ESTONIA



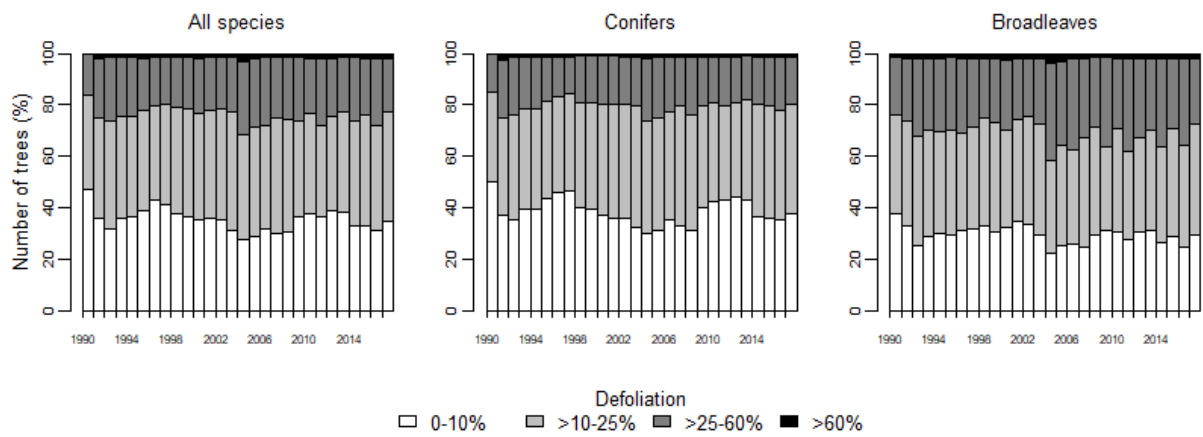
## FINLAND



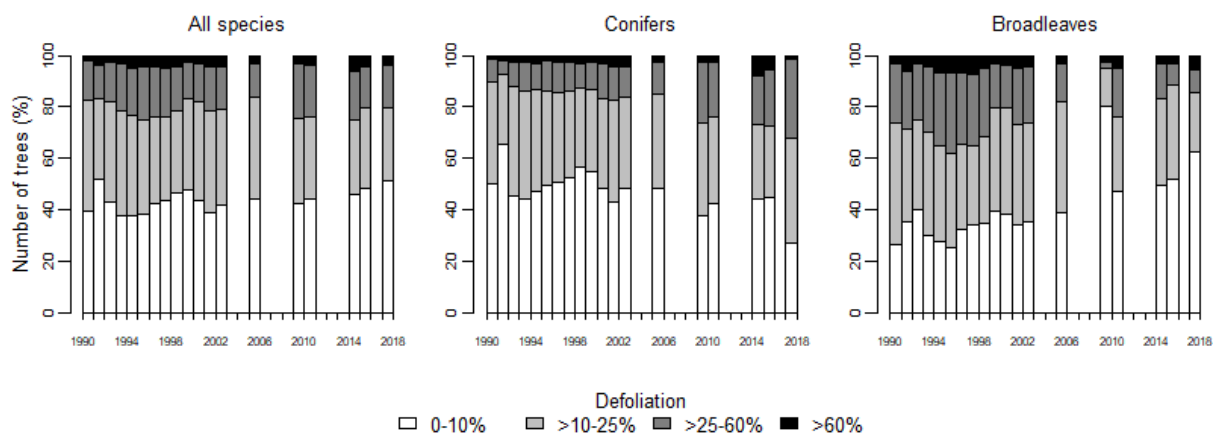
## FRANCE



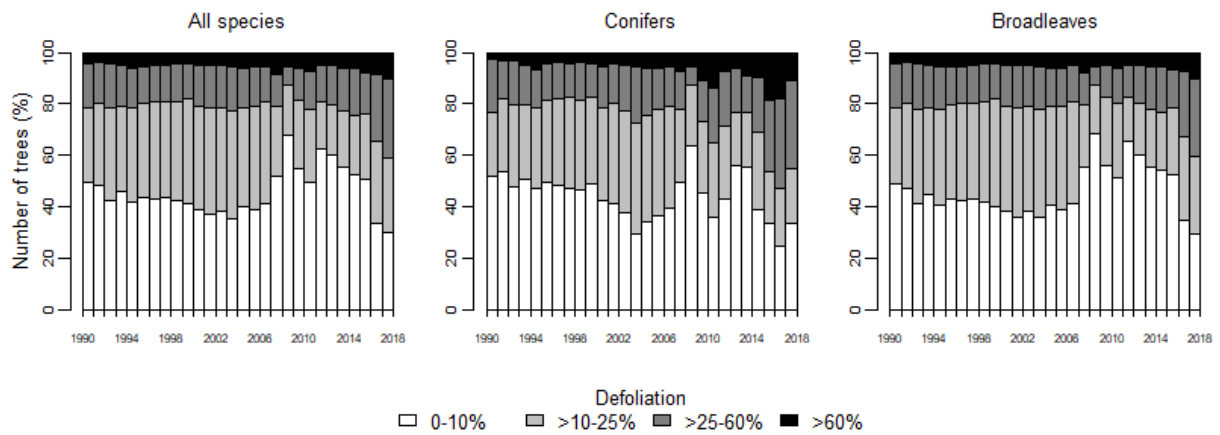
## GERMANY



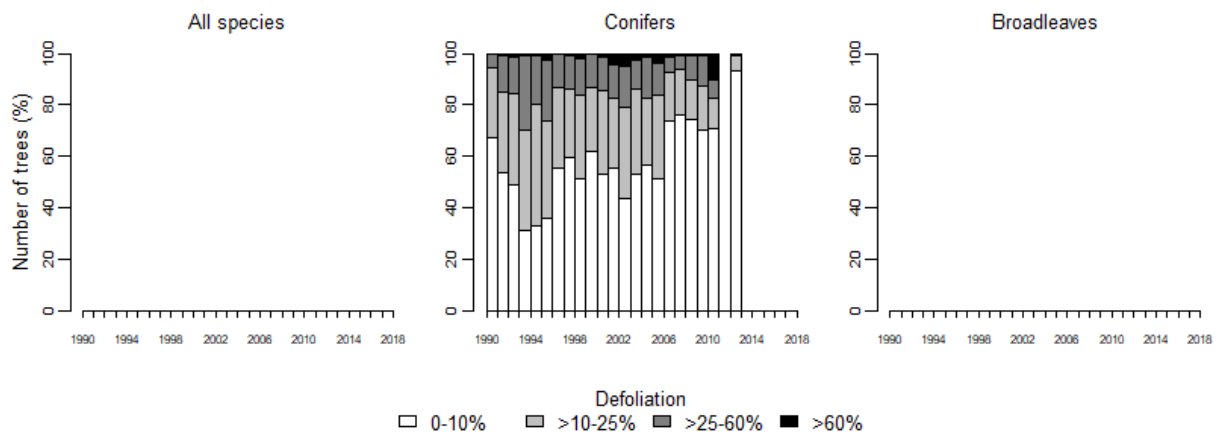
## GREECE



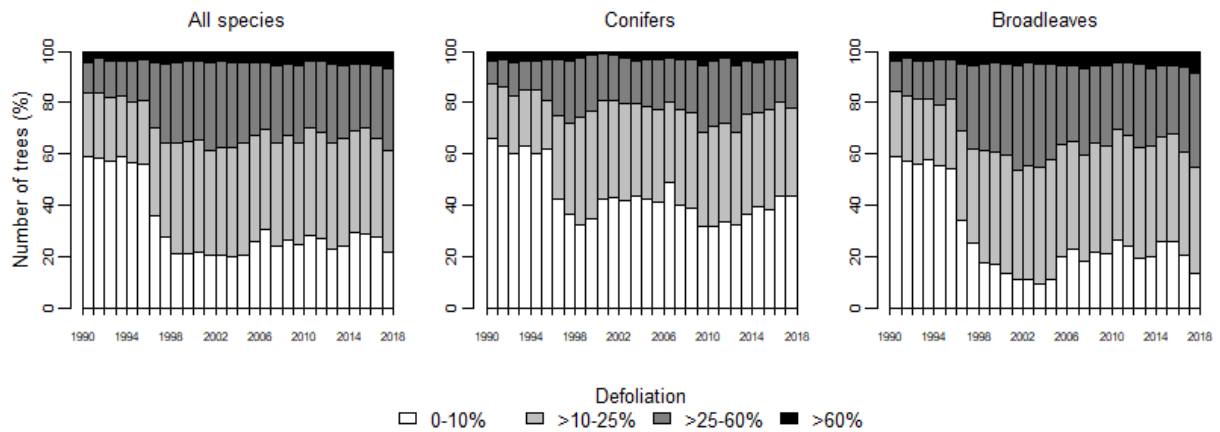
## HUNGARY



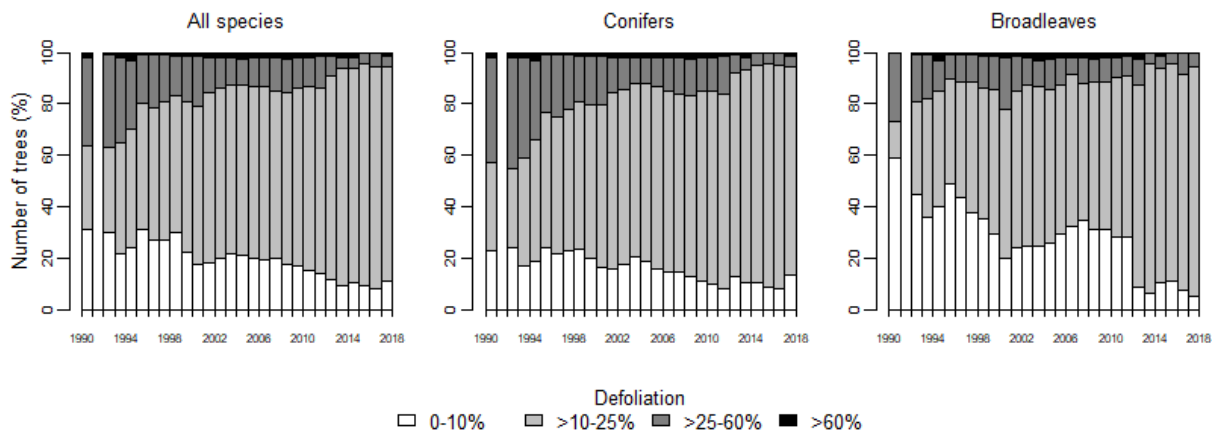
## IRELAND



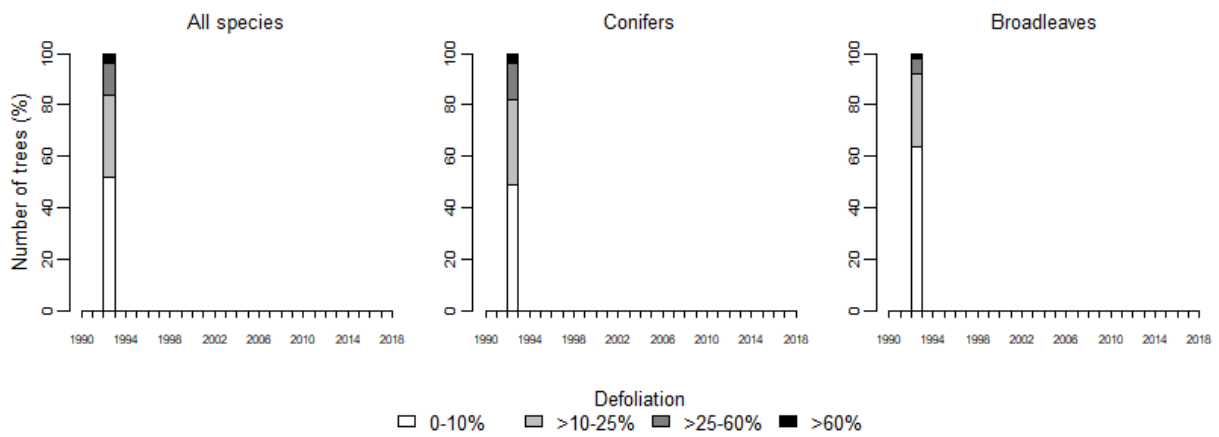
## ITALY



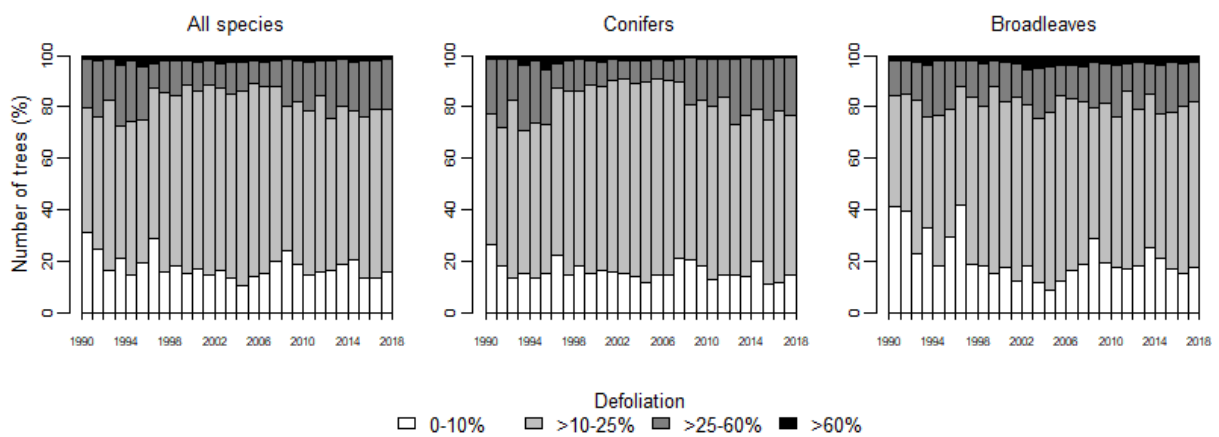
## LATVIA



## LIECHTENSTEIN

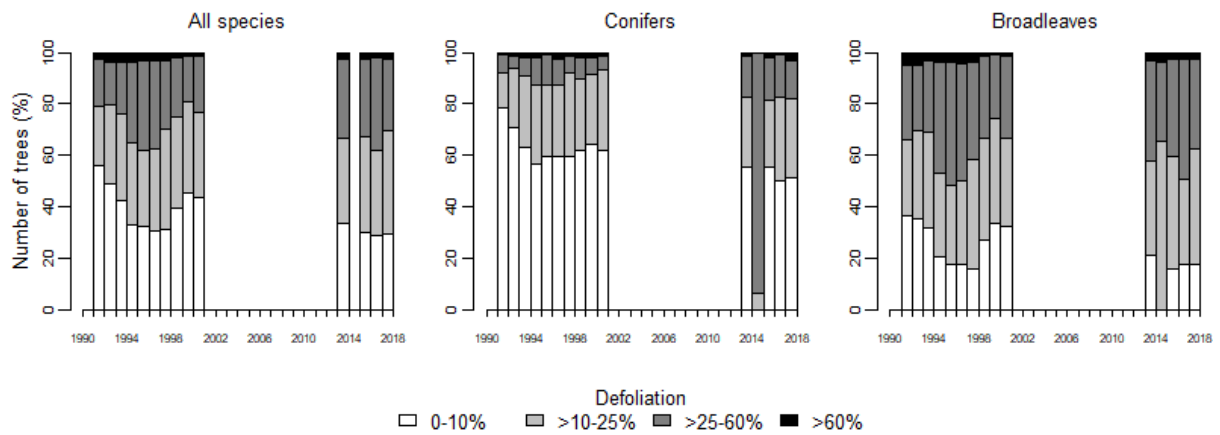


## LITHUANIA

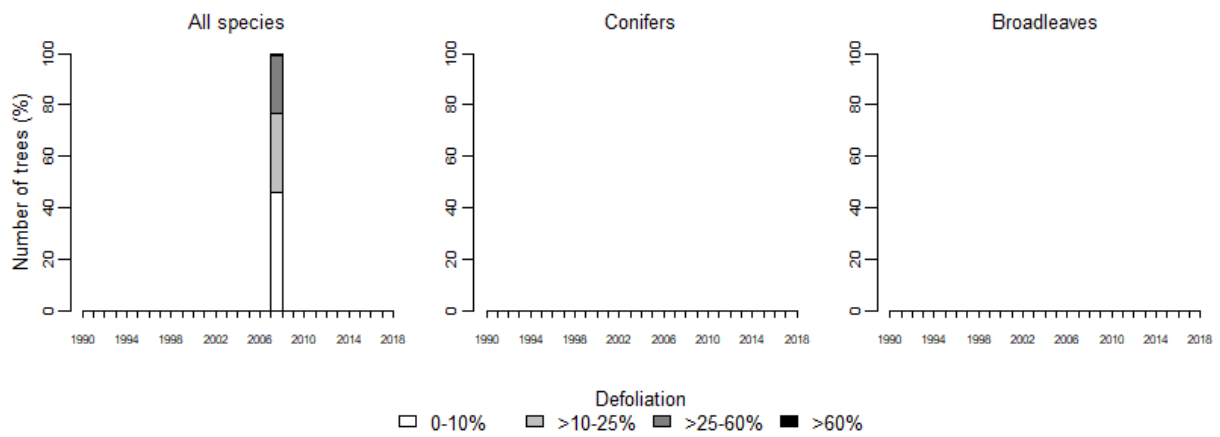




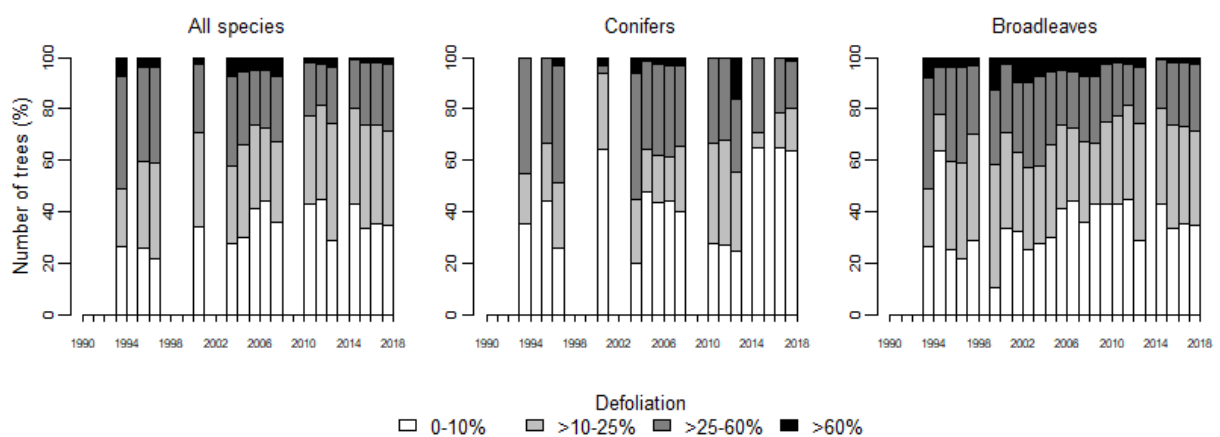
## LUXEMBOURG



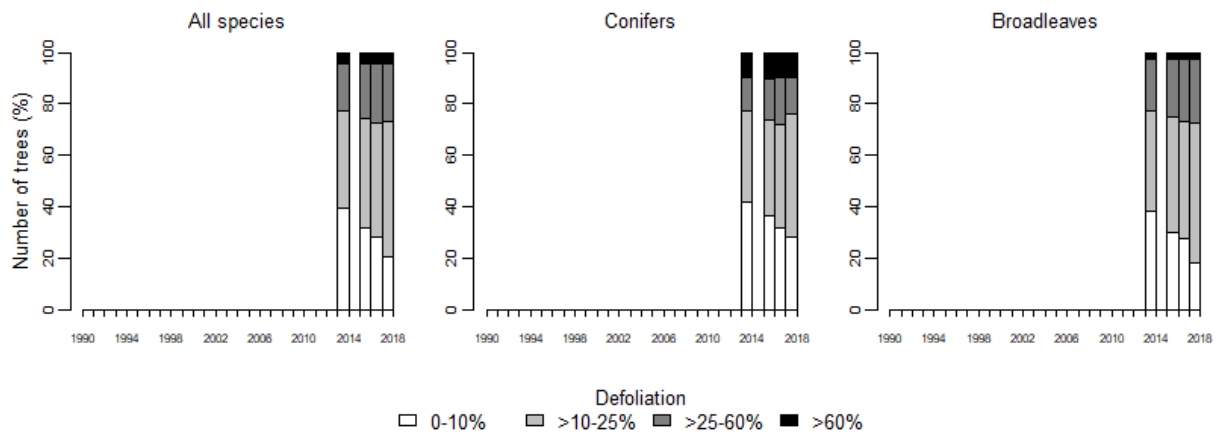
## FYR OF MACEDONIA



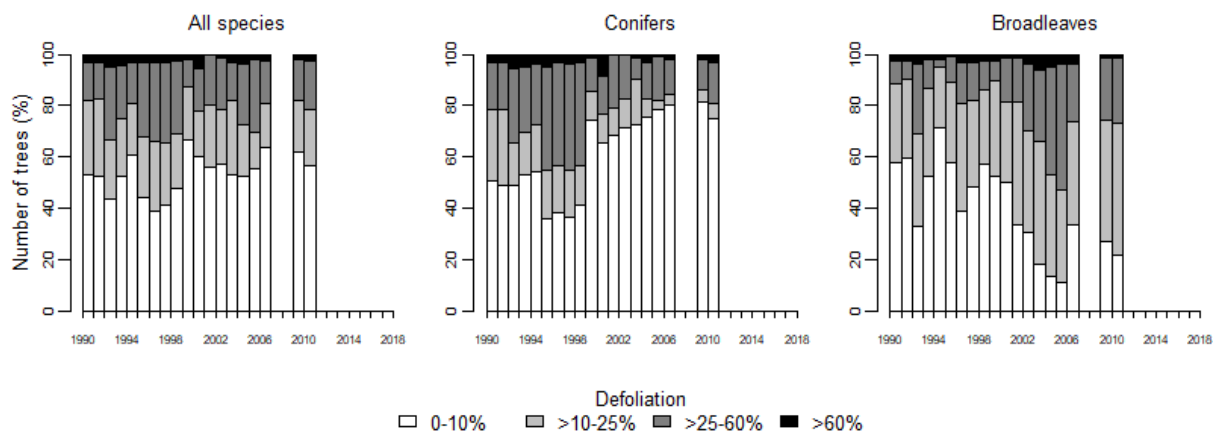
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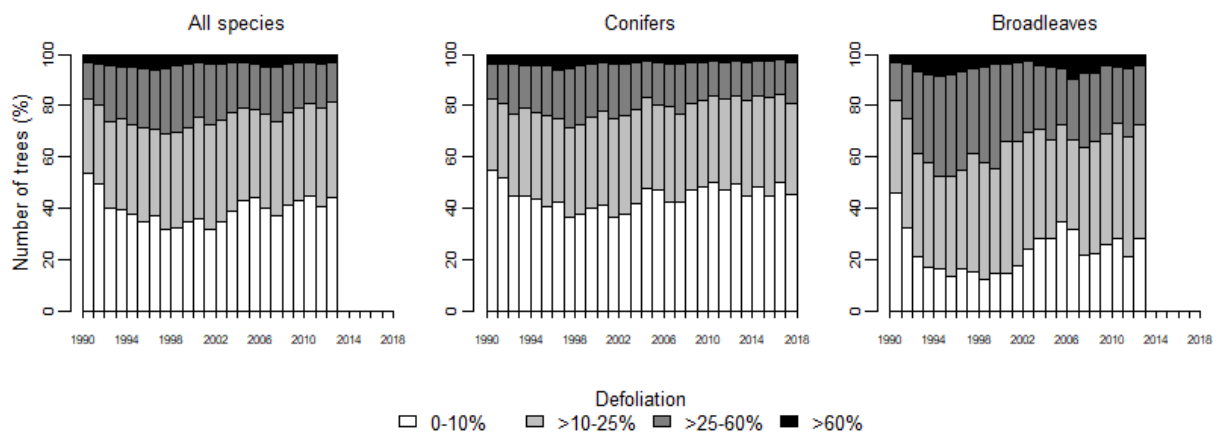
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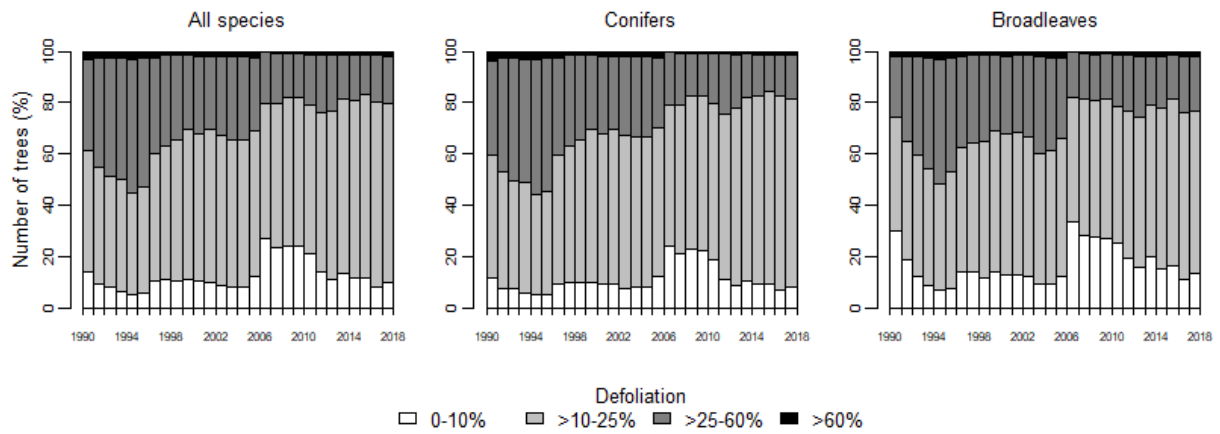
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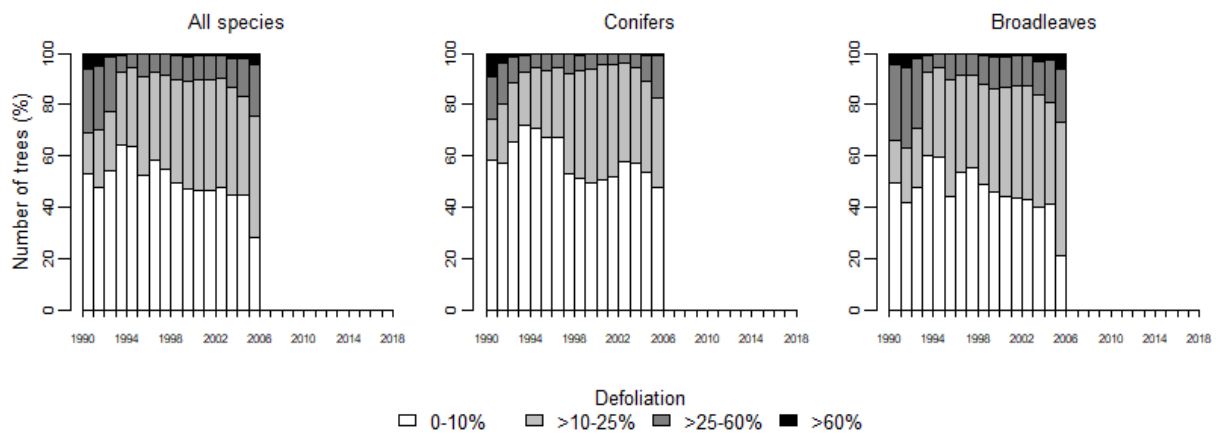
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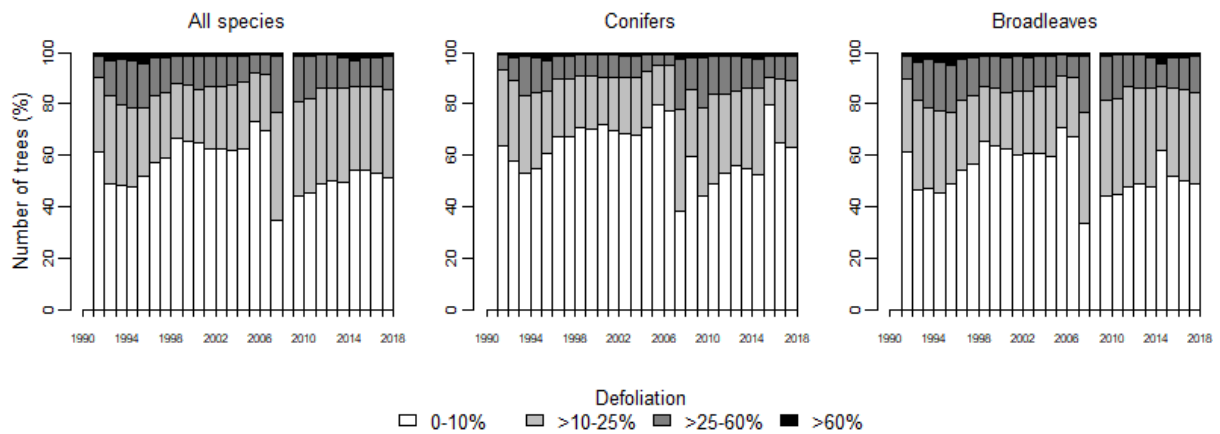
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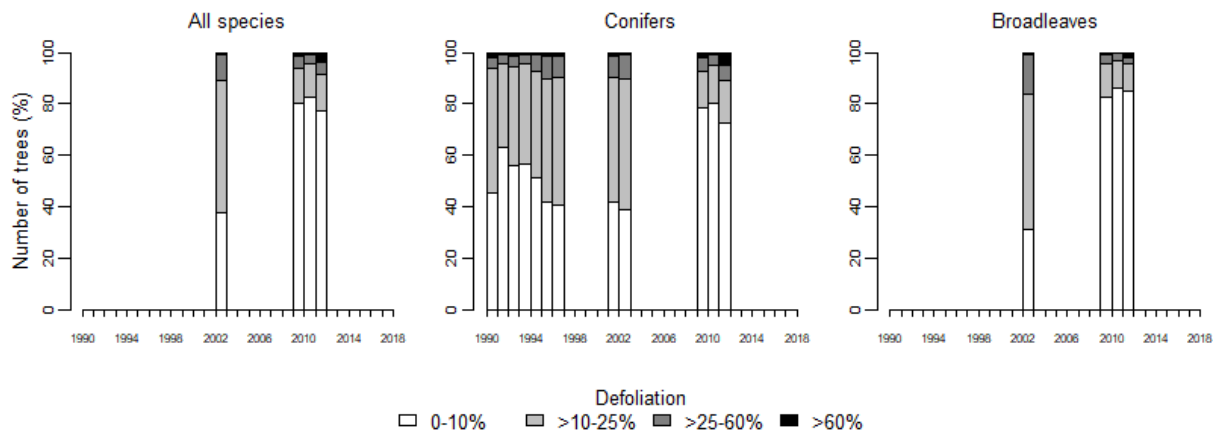
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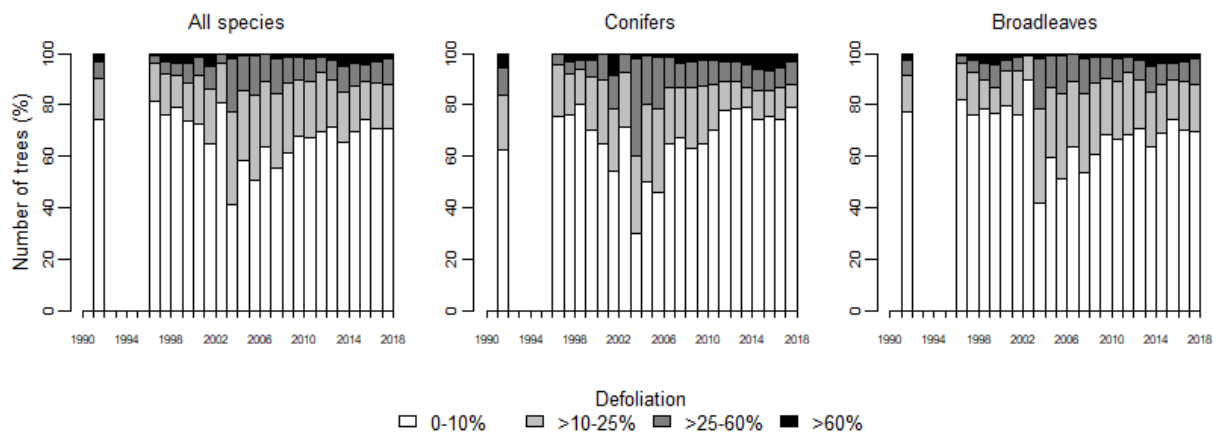
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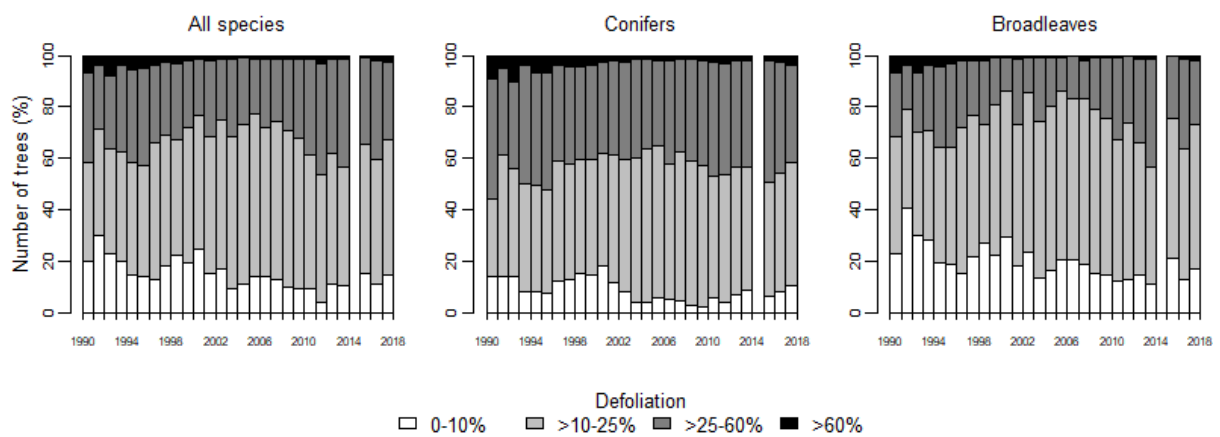
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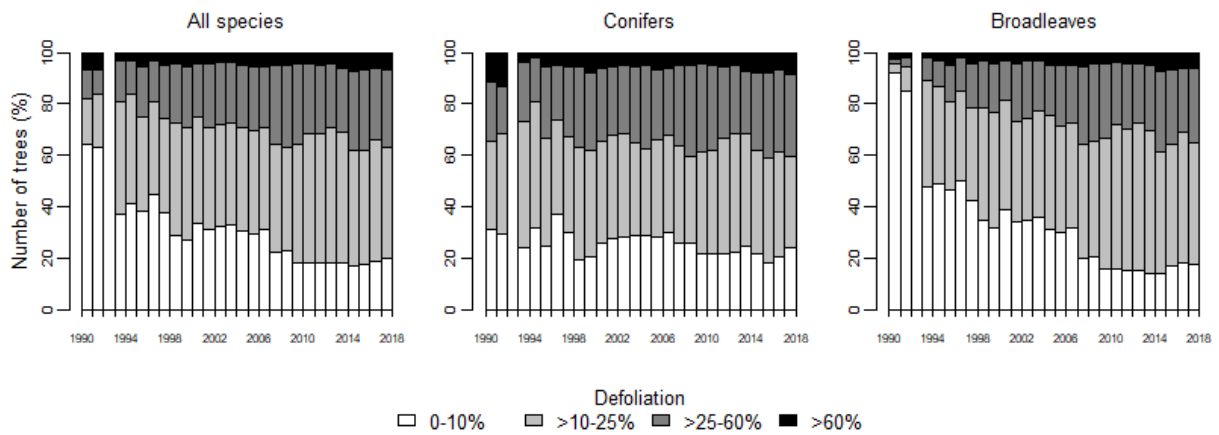
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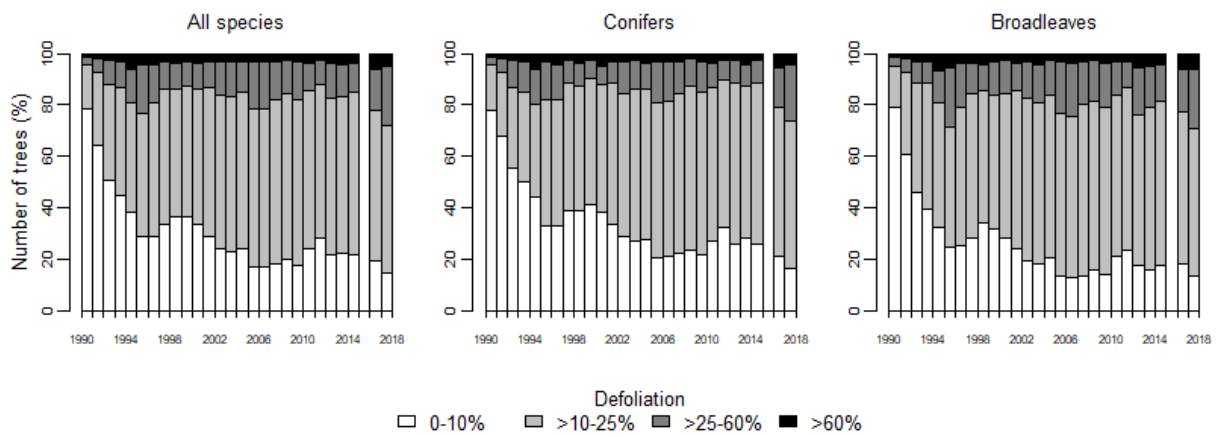
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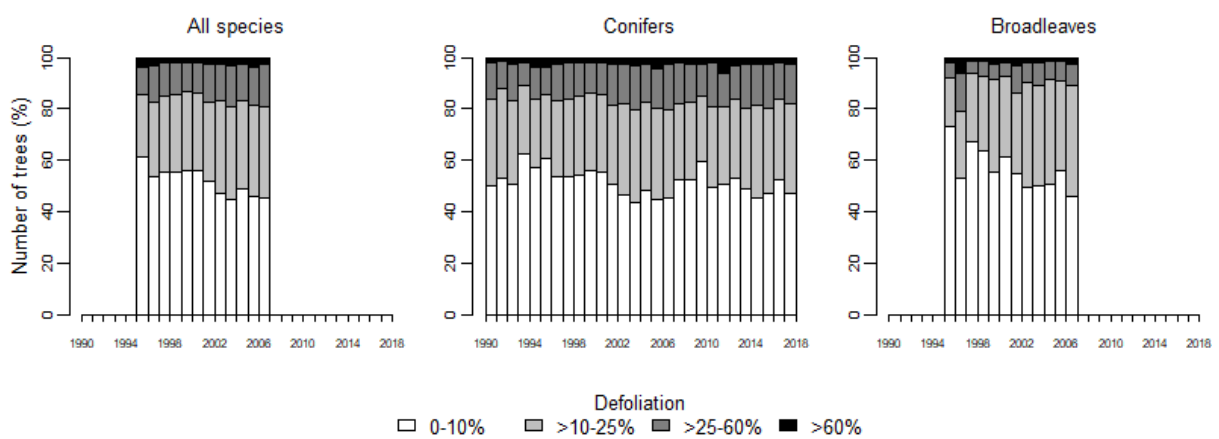
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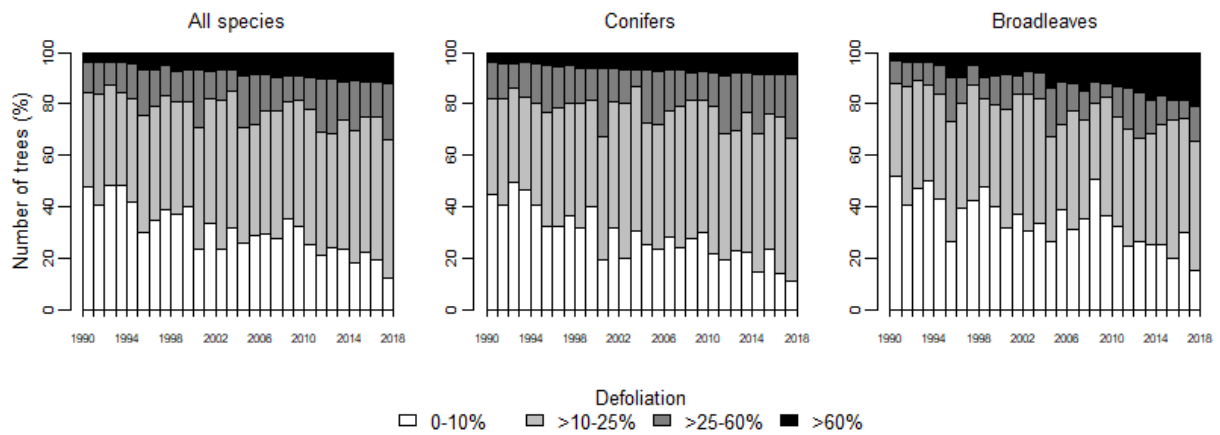
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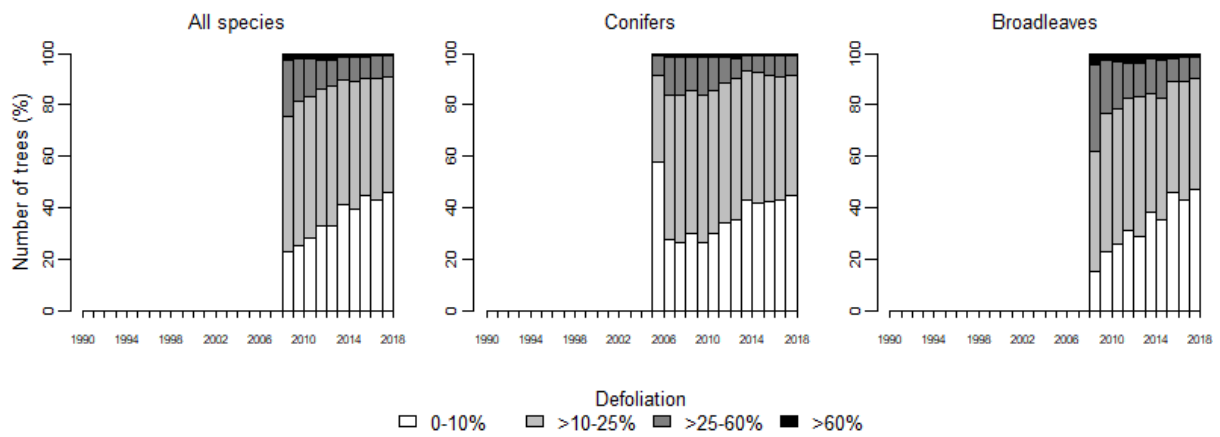
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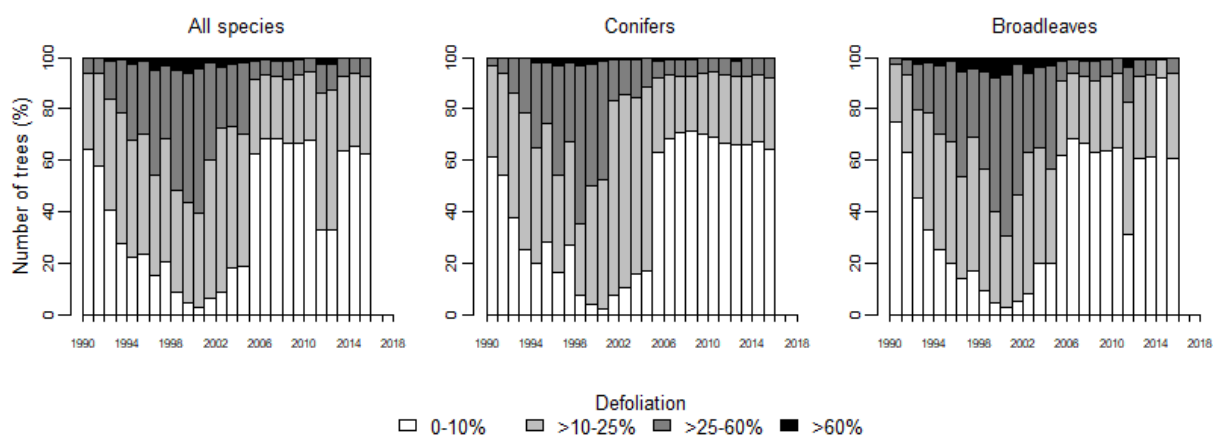
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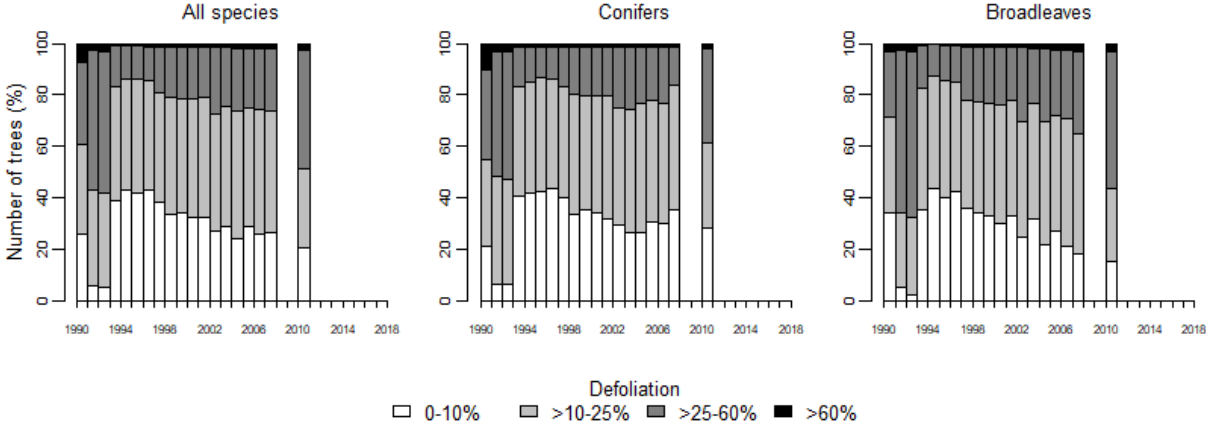
## TURKEY



## UKRAINE



UNITED KINGDOM



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