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COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

ANNEX VIII-b

Accompanying the

proposal for a Regulation of the European Parliament and of the Council

on nature restoration

{COM(2022) 304 final} - {SEC(2022) 256 final} - {SWD(2022) 168 final}

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Annex VIII-b: FORESTS

Introduction

This paper provides information derived from the Member States' reports and assessments under Article 17 of the Habitats Directive. It is a background information to help identify possible restoration targets for the 'legal binding instrument' under the EU Biodiversity Strategy to 2030.

The 'forests' group includes, 69 Annex I habitat types (see Table 1): all forests with codes 9xxx (except wet/alluvial/riparian forests and wooded meadows, which were included in other groups).

The Habitats Directive defines Annex I forest habitats as: *(Sub)natural woodland vegetation comprising native species forming forests of tall trees, with typical undergrowth, and meeting the following criteria: rare or residual, and / or hosting species of Community interest*. The Interpretation Manual of EU Habitats[1] list the following additional criteria:

- *forests of native species;*
- *forests with a high degree of naturalness;*
- *forests of tall trees and high forest;*
- *presence of old and dead trees;*
- *forests with a substantial area;*
- *forests having benefited from continuous sustainable management over a significant period.*

Table 1 – Forest Annex I habitat types selected

Boreal forests (6 types)		**Temperate forests (cont.)**	
9010	Western Taïga	91AA	Eastern white oak woods
9020	Fennoscandian hemiboreal natural old broad-leaved deciduous forests (*Quercus*, *Tilia*, *Acer*, *Fraxinus* or *Ulmus*) rich in epiphytes	91BA	Moesian silver fir forests
9030	Natural forests of primary succession stages of landupheaval coast	91CA	Rhodopide and Balkan Range Scots pine forests
9040	Nordic subalpine/subarctic forests with *Betula pubescens* ssp. *czerepanovii*	**Mediterranean and Macaronesian forests (18 types)**	
9050	Fennoscandian herb-rich forests with *Picea abies*	9210	Apeninne beech forests with *Taxus* and *Ilex*
9060	Coniferous forests on, or connected to, glaciofluvial eskers	9220	Apennine beech forests with *Abies alba* and beech forests with *Abies nebrodensis*
Temperate forests (32 types)		9230	Galicio-Portuguese oak woods with *Quercus robur* and *Quercus pyrenaica*

[1] https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

9110	*Luzulo-Fagetum* beech forests	9240	*Quercus faginea* and *Quercus canariensis* Iberian woods
9120	Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*)	9250	*Quercus trojana* woods
9130	*Asperulo-Fagetum* beech forests	9260	*Castanea sativa* woods
9140	Medio-European subalpine beech woods with *Acer* and *Rumex arifolius*	9270	Hellenic beech forests with *Abies borisii-regis*
9150	Medio-European limestone beech forests of the *Cephalanthero-Fagion*	9280	*Quercus frainetto* woods
9170	*Galio-Carpinetum* oak-hornbeam forests	9290	Cupressus forests (*Acero-Cupression*)
9180	*Tilio-Acerion* forests of slopes, screes and ravines	9310	Aegean *Quercus brachyphylla* woods
9190	Old acidophilous oak woods with *Quercus robur* on sandy plains	9320	*Olea* and *Ceratonia* forests
91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	9330	*Quercus suber* forests
91B0	Thermophilous *Fraxinus angustifolia* woods	9340	*Quercus ilex* and *Quercus rotundifolia* forests
91C0	Caledonian forest	9350	*Quercus macrolepis* forests
91G0	Pannonic woods with *Quercus petraea* and *Carpinus betulus*	9360	Macaronesian laurel forests (*Laurus*, *Ocotea*)
91H0	Pannonian woods with *Quercus pubescens*	9380	Forests of *Ilex aquifolium*
91I0	Euro-Siberian steppic woods with *Quercus* spp.	9390	Scrub and low forest vegetation with *Quercus alnifolia*
91J0	*Taxus baccata* woods of the British Isles	93A0	Woodlands with *Quercus infectoria* (*Anagyro foetidae-Quercetum infectoriae*)
91K0	Illyrian *Fagus sylvatica* forests (*Aremonio-Fagion*)	**Mountainous coniferous forests (13 types)**	
91L0	Illyrian oak-hornbeam forests (*Erythronio-Carpinion*)	9410	Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*)
91M0	Pannonian-Balkanic turkey oak –sessile oak forests	9420	Alpine *Larix decidua* and/or *Pinus cembra* forests
91P0	Holy Cross fir forest (*Abietetum polonicum*)	9430	Subalpine and montane *Pinus uncinata* forests (* if on gypsum or limestone)
91Q0	Western Carpathian calcicolous Pinus sylvestris forests	9510	Southern Apennine Abies alba forests
91R0	Dinaric dolomite Scots pine forests (*Genisto januensis-Pinetum*)	9520	*Abies pinsapo* forests
91S0	Western Pontic beech forests	9530	(Sub-) Mediterranean pine forests with endemic black pines
91T0	Central European lichen Scots pine forests	9540	Mediterranean pine forests with endemic Mesogean pines
91U0	Sarmatic steppe pine forest	9550	Canarian endemic pine forests
91V0	Dacian Beech forests (*Symphyto-Fagion*)	9560	Endemic forests with *Juniperus* spp.
91W0	Moesian beech forests	9570	*Tetraclinis articulata* forests

Source: European Environment Agency – April 2021

91X0	Dobrogean beech forests	9580	Mediterranean *Taxus baccata* woods
91Y0	Dacian oak & hornbeam forests	9590	Cedrus brevifolia forests (*Cedrosetum brevifoliae*)
91Z0	Moesian silver lime woods	95A0	High oro-Mediterranean pine forests

Forest habitats coverage in the EU

The 69 habitat types selected cover close to **357 952 km²** (**9.2 %** of the EU terrestrial area[2]); this excludes areas reported by Romania, which are known to be largely overestimated[3].

The data available from Corine Land Cover[4] and from the Ecosystems Map of Europe[5] do not allow a straightforward comparison between the total area of forests in the EU and the area covered by Annex I forests. This is mainly due to the nomenclatures used and the spatial resolution of the datasets. A comparison between these data sources – excluding alluvial and riparian forests – is given in Table 2 below.

Table 2 – Forest areas (km²) from different sources (EU27)

Corine Land Cover 2018 (level 3)

Forests	**1 356 423**
311 – Broad-leaved forest	435 974
312 – Coniferous forest	660 642
313 – Mixed forest	259 807

Ecosystems map (level 3)

G – Woodland, forest and other wooded land	**1 770 997**
G1 – Broad-leaved deciduous woodland	682 357
G2 – Broad-leaved evergreen woodland	52 200
G3 – Coniferous woodland	707 302
G4 – Mixed deciduous and coniferous woodland	236 096
G5 – Lines of trees, small anthropogenic woodlands, recently felled woodland, early-stage woodland and coppice	93 042

The areas of Annex I forests, have a good representation in most EU countries (except Ireland, Malta and the Netherlands) (see Map 1). The Member States with the highest proportion of those habitats are Slovenia (33 %), Croatia (24 %), Bulgaria (23 %), Greece (22 %), Cyprus (16 %), Austria (15 %), Italy (14 %), Slovakia (14 %), Spain (11 %), France (11 %) and Luxembourg (10 %); seven Member States have less than 2 % of their territory covered by forest Annex I habitats.

[2] Area of habitats calculated from the area reported by Member States as 'best estimate' or 'average of minimum/maximum'

[3] The average total area of forest habitats reported by Romania is 59 126 km²

[4] https://www.eea.europa.eu/data-and-maps/dashboards/land-cover-and-change-statistics

[5] https://www.eea.europa.eu/themes/biodiversity/mapping-europes-ecosystems

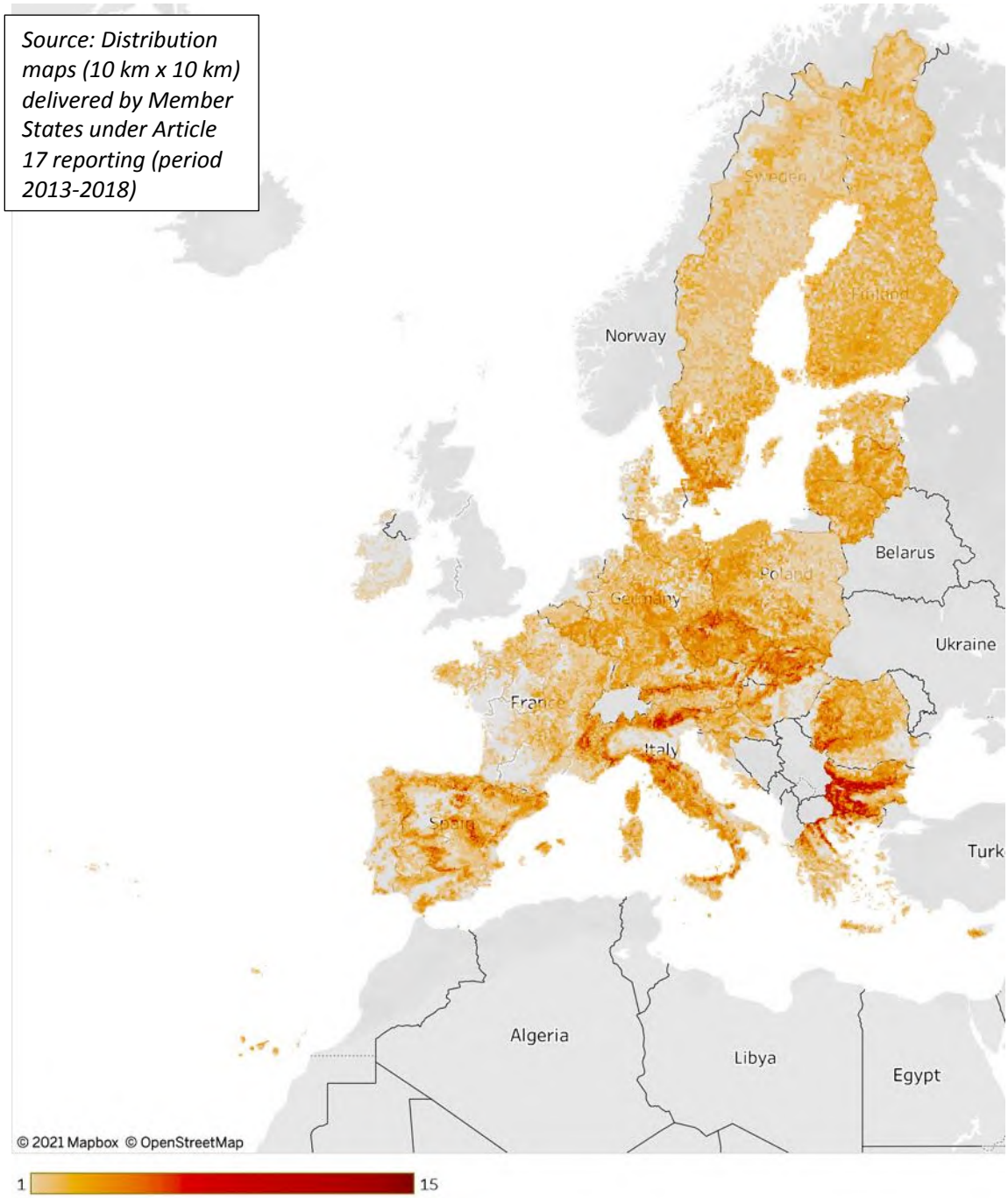
Table 3 gives the areas and proportion of Annex I forests for each Member State, including coverage by Natura 2000. Maps illustrating the distribution of different forest habitats in the EU are available in Annex A.

From the 357 952 km^2 of forest habitats (excluding Romania), **38 %** is estimated to be inside the Natura 2000 network (about **135 596 km^2**); this may be an underestimation since reports from Member States were not comprehensive on this regard. The coverage by Natura 2000 varies according to the sub-group, **from 52 %** for 'boreal forests' **to 31 %** for 'mountainous forests'. The proportion of habitats per sub-group of forest and their coverage is detailed in Table 4.

Coverage by Natura 2000 also greatly varies according to the Member State: **from near 85 %** (Estonia) **to about 9 %** (France) (Table 3).

However, several Member States reported over 75 % of Annex I forest habitats area inside Natura 2000 (Croatia, Estonia, Malta and Poland).

Map 1 – Distribution of the 69 Annex I forest habitats in the EU



Note: the shades of brown indicate the number of habitat types per 10 km x 10 km grid cell.

Source: European Environment Agency – April 2021

Table 3 – Area and proportion of forest habitats per Member State

	Member State area (km²)	In the Member State		Proportion of the forest habitats area (%)	Inside Natura 2000	
		Forest habitats area (km²)	Forest habitats area (%)		Forest habitats area	% Forest habitats area
Austria	83 944	12 838.2	15.3	3.6	2 170.6	16.9
Belgium	30 683	1 409.1	4.6	0.4	757.6	53.8
Bulgaria	110 995	25 039.4	22.6	7.0	13 795.4	55.1
Croatia	55 590	13 278.9	23.9	3.7	10 025.1	75.5
Cyprus	9 249	1 501.3	16.2	0.4	545.2	36.3
Czechia	78 874	4 570.5	5.8	1.3	2 016.0	44.1
Denmark	44 162	643.5	1.5	0.2	117.2	18.2
Estonia	45 382	897.0	2.0	0.3	758.5	84.6
Finland	338 004	27 337.9	8.1	7.6	13 762.7	50.3
France	551 881	58 711.1	10.6	16.4	5 383.2	9.2
Germany	362 177	16 175.8	4.5	4.5	6 305.5	39.0
Greece	132 014	28 791.0	21.8	8.0	7 650.0	26.6
Hungary	93 012	4 003.0	4.3	1.1	2 679.0	66.9
Ireland	70 699	60.9	0.1	0.0	40.2	66.0
Italy	301 321	42 405.3	14.1	11.8	13 408.2	31.6
Latvia	64 590	968.6	1.5	0.3	309.2	31.9
Lithuania	65 289	1 204.1	1.8	0.3	399.0	33.1
Luxembourg	2 595	260.9	10.1	0.1	129.5	49.6
Malta	316	0.7	0.2	0.0	0.5	80.8
Netherlands	39 898	156.9	0.4	0.0	99.2	63.2
Poland	312 683	8 070.0	2.6	2.3	6 378.3	79.0
Portugal	92 378	715.5	0.8	0.2	515.0	72.0
Romania (*)	*238 404*	59 126.3	24.8		20 017.6	33.9
Slovakia	49 026	6 726.6	13.7	1.9	2 210.3	32.9
Slovenia	20 274	6 701.5	33.1	1.9	3 396.4	50.7
Spain	506 222	57 153.3	11.3	16.0	22 610.0	39.6
Sweden	450 110	38 331.4	8.5	10.7	20 134.2	52.5
Total	4 149 772	417 078.7	10.1		155 613.8	37.3
Total (without Romania)	**3 911 772**	**357 952.4**	**9.2**		**135 596.2**	**37.9**

Notes: Member States with more than 9.2 % (the EU average) of their terrestrial area covered by wetlands are highlighted; (*) areas reported by Romania are overestimated.

Source: European Environment Agency – April 2021

Table 4 – Area and proportion of forest habitats per sub-group

		Inside Natura 2000	
EU27 excluding Romania	Area (km²)	Forest area (km²)	% forest area
Boreal forests	**68 286**	**35 184**	**52**
9010	36 315	22 199	61
9020	440	196	45
9030	350	139	40
9040	19 600	11 622	59
9050	4 464	560	13
9060	7 116	468	7
Temperate forests	**172 384**	**59 752**	**35**
9110	21 009	6 113	29
9120	15 384	2 530	16
9130	56 043	13 692	24
9140	612	161	26
9150	5 845	2 613	45
9170	8 347	4 320	52
9180	2 472	1 095	44
9190	1 785	879	49
91A0	61	40	65
91AA	6 007	1 193	20
91B0	333	191	57
91BA	245	188	77
91CA	2 440	1 432	59
91G0	3 239	1 760	54
91H0	938	550	59
91I0	1 515	1 200	79
91J0	1	1	100
91K0	16 338	11 475	70
91L0	3 427	1 251	37
91M0	22 986	7 185	31
91P0	185	157	85
91Q0	20	13	63
91R0	85	48	57
91S0	268	222	83
91T0	277	99	36
91U0	9	4	49
91W0	2 124	1 143	54
91Z0	389	197	51
Mediterranean & Macaronesian forests	**66 335**	**24 911**	**38**
9210	3 271	1 916	59
9220	347	280	81
9230	13 154	3 170	24
9240	3 445	1 544	45
9250	457	452	99
9260	8 528	2 034	24
9270	570	570	100
9280	996	221	22

Source: European Environment Agency – April 2021

		Inside Natura 2000	
EU27 excluding Romania	**Area (km²)**	**Forest area (km²)**	**% forest area**
9290	438	175	40
9310	3	3	100
9320	1 966	1 228	62
9330	4 284	2 143	50
9340	27 784	10 545	38
9350	297	79	27
9360	603	398	66
9380	123	121	99
9390	61	31	50
93A0	6	2	34
Mountainous forests	**50 947**	**15 748**	**31**
9410	12 376	3 828	31
9420	4 007	981	24
9430	1 516	901	59
9510	83	75	91
9520	13	13	100
9530	7 896	1 918	24
9540	21 677	5 506	25
9550	737	626	85
9560	2 153	1 571	73
9570	1	1	83
9580	16	17	110
9590	3	3	90
95A0	470	309	**31**
TOTAL	**357 952**	**135 596**	**38**

Source: European Environment Agency – April 2021

Conservation status and trends

The vast majority (**84 %**) of the assessments of the 69 forest habitats at the EU level have an **unfavourable** conservation status (58 % poor and 26 % bad). Only **16 %** have a **good** conservation status. There are some differences between the different habitat groups (Figure 1): 'Mediterranean forests' has the highest proportion of good status (26 %) and the 'Boreal forests' the worst status (100 % unfavourable).

Among the habitat assessments that do not have a good status, under one-fifth have a **deteriorating** trend (**17 %**) while **18 %** have an improving trend. Near half have a stable trend – not improving nor deteriorating – (**47 %)**; the conservation status trend is unknow for **17 %** of the assessments. The group with the worst conservation status trends is **'Boreal forests'** (**45 % deteriorating**); however, '**Mountainous forests**' have the higher proportion of **improving** trends (**28** %) (Figure 2).

Details on conservation status and conservation status trends for each Member State are given in Table 5.

Figure 1 – Conservation status of forests at the EU level (in percentage)

Note: Number of assessments per group shown in brackets.

Figure 2 – Conservation status trends of forests at the EU level (in percentage)

Note: Number of assessments per group shown in brackets.

Table 5 – Conservation status and trends of forest habitats in the Member States (in percentage)

Member States	FV	U1-	U1+	U1=	U1x	U2-	U2+	U2=	U2x	XX
AT (25)	16	8	16	20	20			8	8	4
BE (11)			18	9	9		18	27	18	
BG (51)	31		55	8	4				2	
CY (8)	63			13				25		
CZ (18)		6		44		33		6	6	6
DE (26)	46	12	8	8		19		4		4
DK (10)						70			30	
EE (5)	20	60							20	
ES (44)	7	2	7	34	27	7		5	7	5
FI (11)	9	18		45		18			9	
FR (47)	23	4	4	32	9	6		6	9	6
GR (22)	73		18	5			5			
HR (23)	78			13		9				
HU (10)	10			50		10		30		
IE (2)						50		50		
IT (58)	10	19	2	33	9	16		7	2	3
LT (7)	14				29	29			29	

Source: European Environment Agency – April 2021

LU (4)	75			25						
LV (6)					33			17	50	
MT (4)	25			25				50		
NL (3)			33	33		33				
PL (19)	32	5		42		11		11		
PT (16)	6	19		25		50				
RO (35)	63			23				6	3	6
SE (18)	6	6		6	17	11		28	28	
SI (13)	31	15		54						
SK (23)	43			35	9	9			4	

Notes: FV = good, U1 = poor, U2 = bad, XX = unknown conservation status
'-' = deteriorating, '+' = improving, '=' = stable, 'x' = unknown conservation status trend;
number of assessments per Member State shown in brackets.

Source: European Environment Agency – April 2021

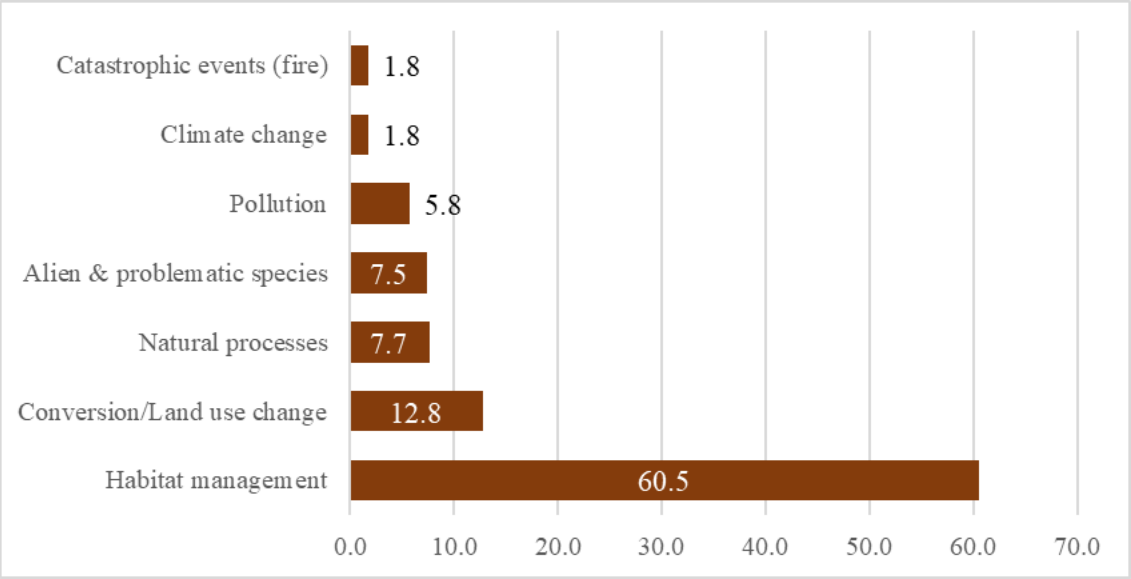
Pressures

Forest habitats are subject to a wide diversity of pressures resulting in their degradation and extirpation. According to Member States reports under Article 17 of the Habitats Directive, the top three groups of pressures (in percentage of the total) are (Figure 3):

- **Habitat management** with close to **61 %** of all pressures; these include inadequate forestry practices like removal of dead and old trees (30 %), clear-cutting (10 %), reduction of old growth forest (8 %)
- **Conversion and land use change** amounts to **13 %**; from these, 45 % correspond to conversion to other forest types (including monocultures), 22 % to construction of urban, commercial, industrial and leisure areas, and 12 % to transport infrastructure
- **Natural processes**, with about **8 %**; this is mainly due to interspecific relations (competition, parasitism and pathogens) (43 %) and changes in species composition (34 %)

Equally important is **alien and problematic species** with over **7 %**, mainly invasive alien species (58 %), and plant diseases, pathogens, and pests (26 %).

Figure 3 – Pressures reported for forest habitats (in percentage)



Note: based on pressures reported as 'high-ranking'.

Source: European Environment Agency – April 2021

Condition of habitats

Member States reported on the condition of habitat types under Article 17 of the Habitats Directive. This data can be used to estimate the area of forest habitats assessed as degraded (condition not-good) therefore, requiring restoration.

The area of Annex I forest habitats that would need to be restored, i.e., improved condition, is **at least 79 210 km^2**, representing **22 %** of the total area reported for this group of habitats (the values exclude Romania). However, the condition of habitats reported as 'unknown' (or not reported) is over 116 444 km^2 (33 % of the total area). This means that the area requiring restoration is bigger than 79 210 km^2; for example, assuming that half of the 'unknown' area is in a not-good condition, the area to be restored would be over 137 000 km^2 or 195 000 km^2 if all the 'unknown' is assumed to be in a 'not-good' condition (22 % of the total area). Table 6 gives information for each of the 69 forest habitats (excluding Romania) and Table 7 the condition areas and percentage for each of the Member States.

In addition to the habitat condition, Member States also reported on the 'favourable reference areas'[6]. Comparing these areas with the actual habitat areas allows to estimate how much area of the habitat would need to be re-created to achieve a good distribution and area of the habitat. Based on this data, it is estimated that a **strict minimum** of **3 500 km^2** would need to be **re-created** to achieve a 'favourable area'.

- 830 km^2 of Boreal forest habitats
- 1 050 km^2 of Temperate forest habitats
- 1 270 km^2 of Mediterranean forest habitats
- 350 km^2 of Mountainous forest habitats

However, these values are much higher since several Member States did not provide enough information in their reports to allow a more realistic estimation.

[6] The surface area in a given biogeographical region considered the minimum necessary to ensure the long-term viability of the habitat type; this should include necessary areas for restoration or development for those habitat types for which the present coverage is not sufficient to ensure long-term viability

Table 6 – Condition of forest habitats per Annex I habitat type

		Condition (area in km2)			Condition (in percentage)		
	Habitat area	Good	Not-good	Unknown	Good	Not-good	Unknown
Total	**357 952**	**162 296**	**79 211**	**116 444**	**45**	**22**	**33**
Boreal forests	**68 286**	**16 160**	**6 728**	**45 398**	**24**	**10**	**66**
9010	36 315	13 774	3 568	18 973	38	10	52
9020	440	118	120	202	27	27	46
9030	350	121	147	82	35	42	23
9040	19 600	1 452	2 590	15 558	7	13	79
9050	4 464	646	249	3 569	14	6	80
9060	7 116	49	54	7 013	1	1	99
Temperate forests	**172 384**	**92 798**	**51 610**	**27 976**	**54**	**30**	**16**
9110	21 009	12 567	4 585	3 857	60	22	18
9120	15 384	2 294	11 883	1 207	15	77	8
9130	56 043	22 018	26 574	7 451	39	47	13
9140	612	148	51	414	24	8	68
9150	5 845	2 108	2 007	1 730	36	34	30
9170	8 347	5 662	2 044	641	68	24	8
9180	2 472	1 346	206	919	54	8	37
9190	1 785	727	1 042	16	41	58	1
91A0	61	43	18		70	30	
91AA	6 007	1 359	98	4 550	23	2	76
91B0	333	39	49	245	12	15	74
91BA	245	246			100		
91CA	2 440	2 421		18	99		1
91G0	3 239	2 541	482	215	78	15	7
91H0	938	640	81	217	68	9	23
91I0	1 515	1 385	85	46	91	6	3
91J0	1		1		35	65	
91K0	16 338	13 553	1 282	1 503	83	8	9
91L0	3 427	2 577	285	565	75	8	16
91M0	22 986	18 035	664	4 288	78	3	19
91P0	185	123	62		66	34	
91Q0	20	5	1	14	25	6	69
91R0	85	82	4		96	4	
91S0	268	268			100		
91T0	277	93	104	80	34	37	29
91U0	9	5	3	1	50	37	13
91W0	2 124	2 124			100		
91Z0	389	389			100		

Source: European Environment Agency – April 2021

		Condition (area in km2)			Condition (in percentage)		
	Habitat area	Good	Not-good	Unknown	Good	Not-good	Unknown
Mediterranean & Macaronesian forests	**66 335**	**28 921**	**14 727**	**22 687**	**44**	**22**	**34**
9210	3 271	1 858	40	1 373	57	1	42
9220	347	275	4	68	79	1	20
9230 (*)	13 154	8 945	7 378	-3 170	68	56	-24
9240	3 445	388	508	2 549	11	15	74
9250 (#)	457	572	1	-115	125		-25
9260	8 528	1 956	511	6 060	23	6	71
9270	570	514		56	90		10
9280	996	896		100	90		10
9290	438	394	1	43	90		10
9310	3		1	3		20	80
9320	1 966	1 280	230	456	65	12	23
9330	4 284	1 540	1 470	1 273	36	34	30
9340	27 784	9 600	4 395	13 789	35	16	50
9350	297	267		30	90		10
9360	603	312	156	135	52	26	22
9380	123	65	23	35	53	18	28
9390	61	55	6		90	10	
93A0	6	3	3		46	54	
Mountainous coniferous forests	**50 947**	**24 418**	**6 146**	**20 383**	**48**	**12**	**40**
9410	12 376	8 383	324	3 670	68	3	30
9420	4 007	1 118	102	2 786	28	3	70
9430	1 516	228	1 087	201	15	72	13
9510	83	74	2	8	89	2	9
9520	13	8	3	2	59	24	16
9530	7 896	3 315	739	3 842	42	9	49
9540	21 677	9 806	3 524	8 346	45	16	39
9550	737	626		111	85		15
9560	2 153	661	278	1 214	31	13	56
9570	1	1			68	19	13
9580	16	11	1	4	71	4	25
9590	3	3			100		
95A0	470	185	86	199	39	18	42

Notes: Areas reported by Romania excluded from the table; (*) issue with data for habitat 9230 in the Atlantic region of France (areas repeated in 'good' and +not-good' condition); (#) (*) issue with data for habitat 9250 in the Mediterranean region of Italy (area in 'good' condition bigger than total area of the habitat).

Source: European Environment Agency – April 2021

Table 7 – Condition of Annex I forest habitats per Member State

	Habitats' area (km^2)				Percentage		
Member State	**Total**	**Good**	**Not-good**	**Unknown**	**Good**	**Not-good**	**Unknown**
AT	12 838	11 612	590	636	90	5	5
BE	1 409	53	192	1 164	4	14	83
BG	25 039	25 038	1		100		
CY	1 501	1 285	216		86	14	
CZ	4 570	3 235	461	874	71	10	19
DE	16 176	14 517	1 129	530	90	7	3
DK	644	2	642			100	
EE	897	586	290	21	65	32	2
ES	57 153	13 314	13 608	30 231	23	24	53
FI	27 338	11 804	4 901	10 633	43	18	39
FR (#)	58 711	15 968	46 922	-4 178	27	80	-7
GR	28 791	25 122	204	3 465	87	1	12
HR	13 279	13 265	14		100		
HU	4 003	1 894	1 520	590	47	38	15
IE	61	42	19		69	31	
IT	42 405	10 783	845	30 778	25	2	73
LT	1 204			1 204			100
LU	261	241	1	19	92		7
LV	969	613	355		63	37	
MT	1				70	30	
NL	157	76	81		49	51	
PL	8 070	3 936	4 133	1	49	51	
PT	716	297	261	158	41	36	22
RO (*)	59 126	55 410	3 401	315	94	6	1
SE	38 331	3 321	1 250	33 760	9	3	88
SI	6 702	5 181	1 508	13	77	22	
SK	6 726	113	69	6 544	2	1	97

Notes: (*) areas reported by Romania largely overestimated; (#) issue with data for several habitats (repeated areas for 'good' and 'not-good condition' – 9230, 9330)

Source: European Environment Agency – April 2021

Carbon stock and sequestration

Forests are the dominant ecosystem in terms of area, sequestration and carbon storage potential. Annual sequestration of forest habitats reaches 100 Mio tons C per year equivalent to 367 Mio tons of CO_2. The storage capacity is estimated to range between 2,8 and 8,8 Gt of carbon equivalent to 10,3 Gt and 32,3 Gt of CO_2. Despite area covered by forest is more than twice as much as wetland area and sequestration rate is five times higher, the storage capacity for forests per km^2 is slightly lower compared to wetlands. Forests acumulate carbon over decades to centuries before reaching saturation point. If harvested, the climate change mitigation effect is determinated by the use of wood and timber (e.g. short-term storage if used for fuel or papel versus long-term storage in furniture and construction). Harvesting also leads to loss of soil organic carbon by erosion and mineralization.

Source: European Environment Agency – April 2021

Table 8 – Carbon stock and sequestration of Annex I forest habitats

EU27 excluding Romania	Forest area (km^2)	Total Carbon Stock (Mt)		Potential carbon sequestration rate (Mt y^{-1})
	EU-27	min	max	mean
Boreal forests	**68 285.55**	**512.14**	**1536.42**	**20.52**
9010	36 315.02	272.36	817.09	10.89
9020	440.22	3.30	9.90	0.17
9030	350.00	2.63	7.88	0.11
9040	19 600.00	147.00	441.00	5.88
9050	4 464.06	33.48	100.44	1.34
9060	7 116.26	53.37	160.12	2.13
Temperate forests	**172 384.14**	**1293.96**	**4756.65**	**56.88**
9110	21 009.04	157.57	630.27	7.88
9120	15 383.62	115.38	461.51	5.77
9130	56 042.97	420.32	1681.29	21.02
9140	612.33	4.59	18.37	0.23
9150	5 844.65	43.83	175.34	2.19
9170	8 347.21	62.60	187.81	3.13
9180	2 471.91	18.54	55.62	0.93
9190	1 785.03	13.39	53.55	0.54
91A0	61.08	0.46	1.83	0.02
91AA	6 006.88	45.05	135.15	0.90
91B0	333.10	2.50	7.49	0.05
91BA	245.29	3.68	7.36	0.11
91CA	2 439.55	18.30	36.59	0.55
91G0	3 238.73	24.29	72.87	1.21
91H0	938.37	7.04	21.11	0.14
91I0	1 515.00	11.36	34.09	0.23
91J0	0.83	0.00	0.01	0.00
91K0	16 338.05	122.54	490.14	6.13
91L0	3 427.09	25.70	77.11	1.29
91M0	22 985.73	172.39	517.18	3.45
91P0	185.00	2.78	5.55	0.08
91Q0	20.18	0.15	0.30	0.00
91R0	85.49	0.64	1.28	0.02
91S0	268.02	2.01	8.04	0.10
91T0	276.78	0.00	4.15	0.06
91U0	9.16	0.00	0.14	0.00
91W0	2 123.92	15.93	63.72	0.80

Source: European Environment Agency – April 2021

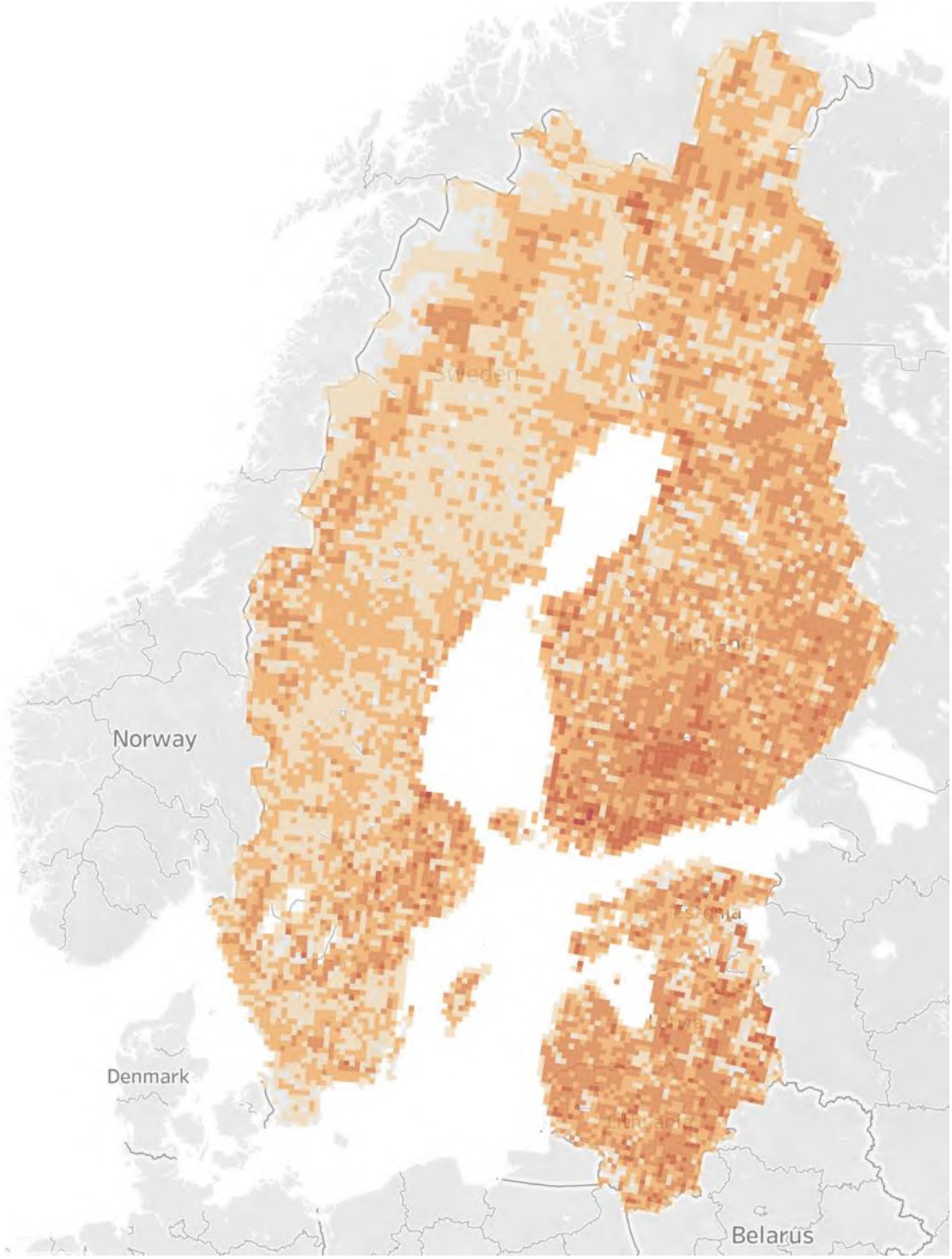
EU27 excluding Romania	Forest area (km^2)	Total Carbon Stock (Mt)		Potential carbon sequestration rate (Mt y^{-1})
	EU-27	min	max	mean
91Z0	389.14	2.92	8.76	0.06
Mediterranean forests	**66 334.91**	**735.25**	**1572.82**	**13.99**
9210	3271.37	24.54	98.14	1.23
9220	346.69	2.60	10.40	0.13
9230	13153.76	98.65	295.96	1.97
9240	3444.99	25.84	77.51	0.52
9250	457.31	3.43	10.29	0.07
9260	8527.79	63.96	255.83	1.92
9270	570.15	4.28	17.10	0.21
9280	996.00	7.47	29.88	0.37
9290	438.06	0.00	6.57	0.03
9310	3.47	0.03	0.08	0.00
9320	1966.46	14.75	29.50	0.15
9330	4283.86	64.26	96.39	0.96
9340	27784.22	416.76	625.15	6.25
9350	297.12	2.23	6.69	0.09
9360	602.94	4.52	9.04	0.05
9380	122.89	0.92	2.77	0.03
9390	61.40	0.92	1.38	0.01
93A0	6.44	0.10	0.14	0.00
Mountainous forests	**50 947.05**	**255.36**	**950.57**	**9.56**
9410	12 376.21	185.64	371.29	4.64
9420	4 006.57	0.00	60.10	0.90
9430	1 515.95	0.00	22.74	0.34
9510	82.78	1.24	1.86	0.02
9520	13.25	0.20	0.30	0.00
9530	7 896.00	59.22	118.44	1.78
9540	21 676.59	0.00	325.15	1.63
9550	736.98	5.53	11.05	0.06
9560	2 152.77	0.00	32.29	0.16
9570	0.95	0.00	0.01	0.00
9580	15.80	0.00	0.24	0.00
9590	2.91	0.00	0.04	0.00
95A0	470.29	3.53	7.05	0.04
TOTAL	**357 951.65**	**2796.70**	**8816.44**	**100.97**

Note: areas reported by Romania note included

Source: European Environment Agency – April 2021

Annex A

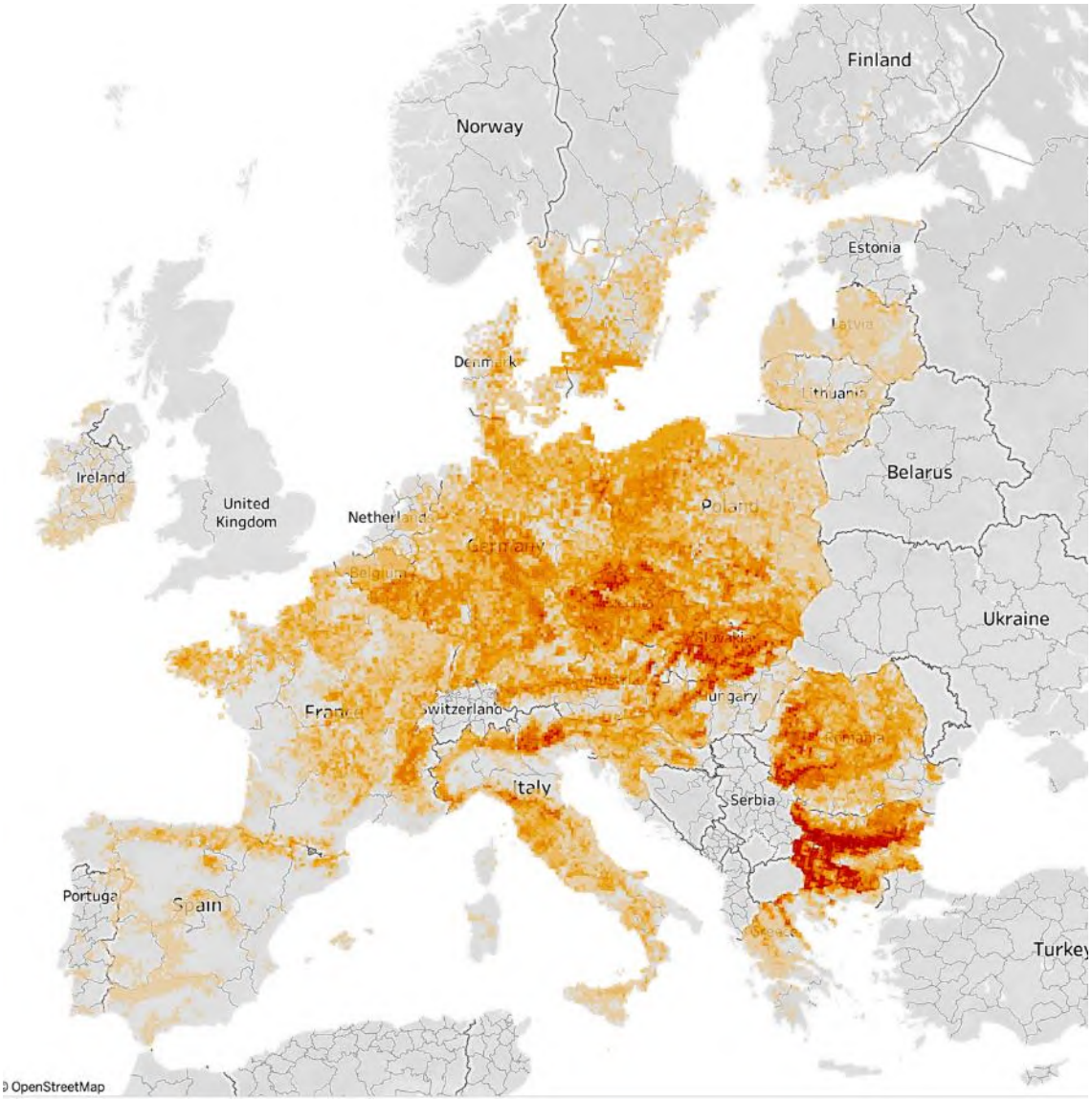
Map 2 – Distribution of Annex I Boreal forest habitats (9010, 9020, 9030, 9040, 9050, 9060)



Note: the shades of brown indicate the number of habitat types per 10 km x 10 km grid cell.

Source: European Environment Agency – April 2021

Map 3 – Distribution of Annex I Temperate forest habitats (9110-9150, 9170-91C0, 91G0-91M0, 91P0-91CA)



Note: the shades of brown indicate the number of habitat types per 10 km x 10 km grid cell. Macaronesian islands not shown in the map.

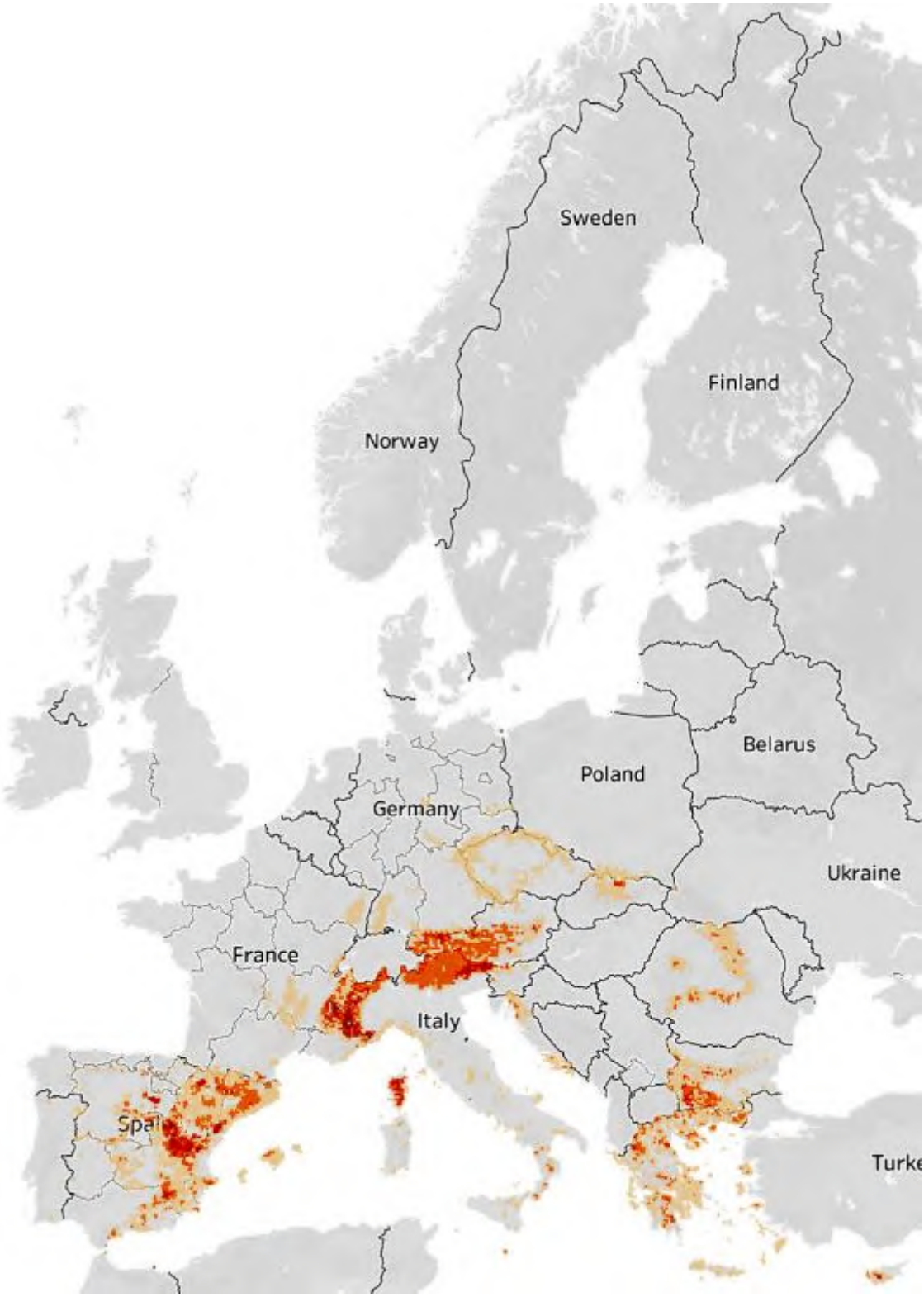
Source: European Environment Agency – April 2021

Map 4 – Distribution of Annex I Mediterranean forest habitats (9210-9290, 9310-9360, 9380-93A0)

Note: the shades of brown indicate the number of habitat types per 10 km x 10 km grid cell. Macaronesian islands not shown in the map.

Source: European Environment Agency – April 2021

Map 5 – Distribution of Annex I Mountainous forest habitats (9410-9430, 9510-95A0)



Note: the shades of brown indicate the number of habitat types per 10 km x 10 km grid cell. Macaronesian islands not shown in the map.

Source: European Environment Agency – April 2021