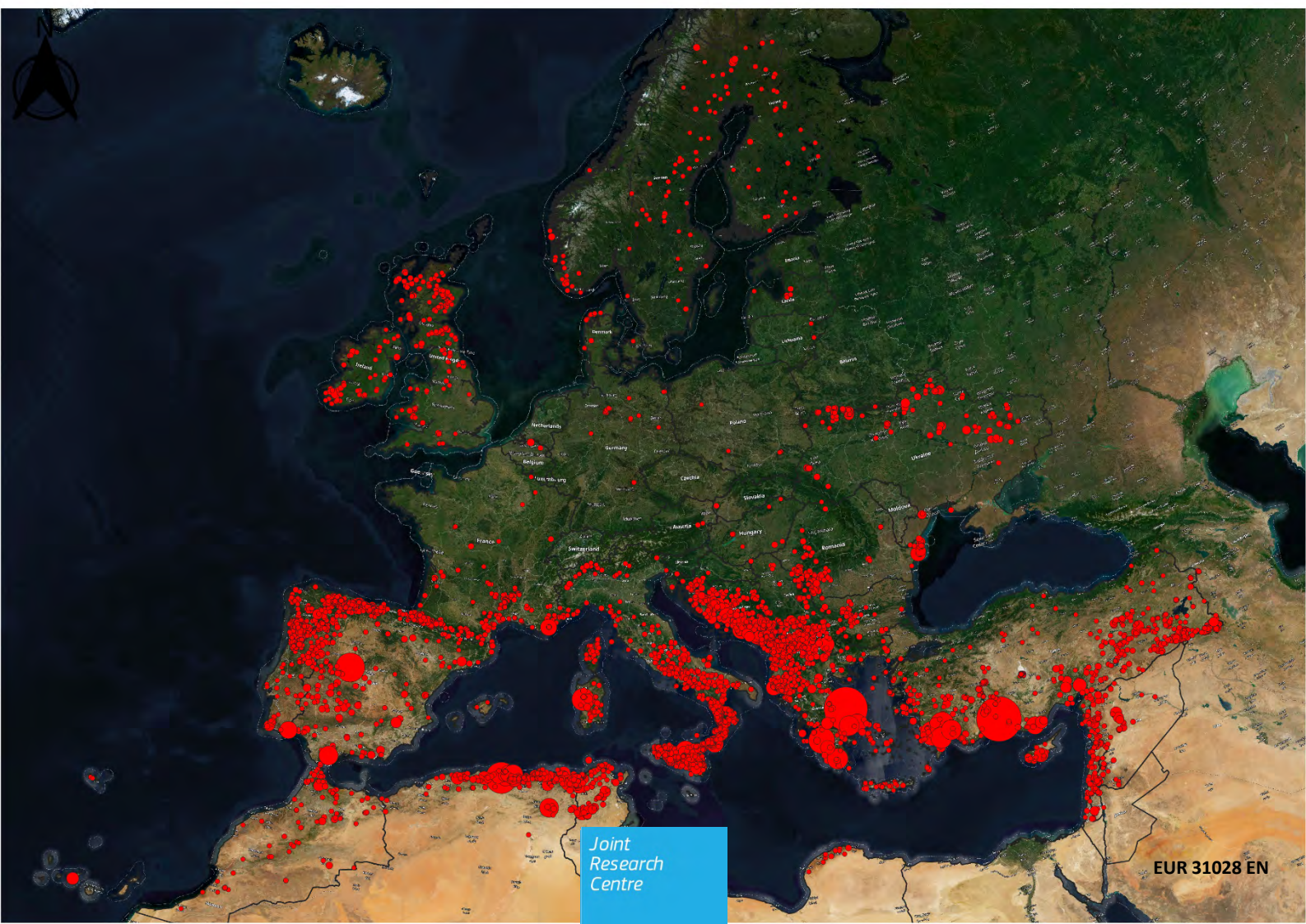




JRC TECHNICAL REPORT

Advance Report on Forest Fires in Europe, Middle East and North Africa 2021



This publication is a Technical report by the Joint Research Centre (JRC), the European Commission's science and knowledge service. It aims to provide evidence-based scientific support to the European policymaking process. The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use that might be made of this publication. For information on the methodology and quality underlying the data used in this publication for which the source is neither Eurostat nor other Commission services, users should contact the referenced source. The designations employed and the presentation of material on the maps do not imply the expression of any opinion whatsoever on the part of the European Union concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Contact information

Address: Joint Research Centre, Via Enrico Fermi 2749, TP 261, 21027 Ispra (VA), Italy
Email: JRC-EFFIS@ec.europa.eu
Tel.: +39 0332 78 6138

EU Science Hub

<https://ec.europa.eu/jrc>

JRC128678

EUR 31028 EN

PDF

ISBN 978-92-76-49633-5

ISSN 1831-9424

doi:10.2760/039729

Luxembourg: Publications Office of the European Union, 2022

© European Union, 2022



The reuse policy of the European Commission is implemented by the Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39). Except otherwise noted, the reuse of this document is authorised under the Creative Commons Attribution 4.0 International (CC BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed provided appropriate credit is given and any changes are indicated. For any use or reproduction of photos or other material that is not owned by the EU, permission must be sought directly from the copyright holders.

All content © European Union, 2022

How to cite this report: San-Miguel-Ayanz, J., Durrant, T., Boca, R., Maianti, P., Libertá, G., Artés-Vivancos, T., Oom, D., Branco, A., de Rigo, D., Ferrari, D., Pfeiffer, H., Grecchi, R., Nuijten, D. 2022. Advance Report on Forest Fires in Europe, Middle East and North Africa 2021, EUR 31028 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-49633-5, doi:10.2760/039729, JRC128678.

Cover image: EFFIS – Distribution of burnt areas mapped in 2021

Contents

- 1 The European Forest Fire Information System (EFFIS)..... 4
 - 1.1 EFFIS Danger Forecast: 2021 results..... 5
 - 1.2 EFFIS Rapid Damage Assessment: 2021 results..... 12
 - 1.2.1 Damage to Natura2000 and other protected sites..... 14
 - 1.2.2 Affected land cover types..... 15
 - 1.2.3 European countries..... 16
 - 1.3 Mapped burnt area by country 17
 - 1.3.1 Albania 17
 - 1.3.2 Austria..... 18
 - 1.3.3 Belgium 18
 - 1.3.4 Bosnia and Herzegovina..... 18
 - 1.3.5 Bulgaria 18
 - 1.3.6 Croatia..... 18
 - 1.3.7 Cyprus 19
 - 1.3.8 Denmark..... 19
 - 1.3.9 Finland 19
 - 1.3.10 France 20
 - 1.3.11 Germany..... 21
 - 1.3.12 Greece..... 21
 - 1.3.13 Hungary..... 22
 - 1.3.14 Ireland..... 22
 - 1.3.15 Italy 22
 - 1.3.16 Kosovo under UNSCR 1244 23
 - 1.3.17 Latvia..... 23
 - 1.3.18 Lithuania..... 23
 - 1.3.19 Montenegro 23
 - 1.3.20 North Macedonia..... 23
 - 1.3.21 Norway..... 24
 - 1.3.22 Poland..... 24
 - 1.3.23 Portugal..... 24
 - 1.3.24 Romania 25
 - 1.3.25 Serbia 25
 - 1.3.26 Slovakia 26
 - 1.3.27 Slovenia..... 26
 - 1.3.28 Spain 26
 - 1.3.29 Sweden..... 27

1.3.30	Switzerland.....	27
1.3.31	Turkey	27
1.3.32	Ukraine.....	28
1.3.33	United Kingdom.....	29
1.4	Middle East and North Africa	30
1.4.1	Algeria.....	30
1.4.2	Iraq.....	30
1.4.3	Israel	30
1.4.4	Lebanon	31
1.4.5	Libya.....	31
1.4.6	Morocco	31
1.4.7	Palestinian Territory.....	31
1.4.8	Syria	32
1.4.9	Tunisia.....	32
1.5	Conclusions	33
1.6	List of acronyms	33

Authors

Jesús San-Miguel-Ayanz¹

Tracy Durrant²

Roberto Boca³

Pieralberto Maianti³

Giorgio Libertà¹

Tomàs Artés Vivancos¹

Duarte Oom¹

Alfredo Branco³

Daniele de Rigo³

Davide Ferrari²

Hans Pfeiffer²

Rosana Grecchi³

Daniel Nuijten⁴

1 European Commission, Joint Research Centre (JRC),
Directorate for Space, Security and Migration, Disaster Risk Management Unit,
Ispra (VA), Italy

2 External consultant for the European Commission
(Engineering Ingegneria Informatica S.p.A.) Piazzale dell'Agricoltura (RM), Italy

3 External consultant for the European Commission
(ARCADIA SIT s.r.l) Vigevano (PV), Italy

4 European Commission, Directorate General Environment,
Directorate D: Natural Capital, Land–Use and Management
Brussels, Belgium

1 The European Forest Fire Information System (EFFIS)

The European Forest Fire Information System (EFFIS) has been established jointly by the European Commission services (DG ENV and JRC) and the relevant fire services in the EU Member States and European countries (Forest Services and Civil Protection services). Research activities for the development of the system initiated at JRC in 1998 and the first EFFIS operations were in the year 2000.

In 2003, EFFIS was embedded in the new Regulation (EC) No 2152/2003 (Forest Focus) of the European Council and Parliament on monitoring of forests and environmental interactions until it expired in 2006. Since then, EFFIS operated as a voluntary system of information on wildfires until 2015, when it became part of the EU Copernicus program, under the Emergency Management Services.

Acting as the focal point of information on forest fires, EFFIS supports the national services in charge wildfire management. Currently, the EFFIS network is made of 43 countries in Europe, Middle East and North Africa. EFFIS provides specific support to the Emergency Response Centre (ERCC) of the European Civil Protection and Humanitarian Aid Operations (ECHO) as regards near-real time information on wildfires during the fire campaigns and assists other European Commission Directorate Generals through the provision both pre-fire and post-fire information on wildfire regimes and impacts. It provides information that supports the needs of the European Parliament with regards to wildfire management, impact in natural protected areas and harmonized information on forest fires in the EU.

EFFIS also centralises the national fire data that the countries collect through their national forest fire programmes in the so-called EFFIS Fire Database. The EFFIS web services¹ allow users to access near-real time and historical information on wildfires in Europe, Middle East and North Africa.

EFFIS provides a continuous monitoring of the fire situation in Europe and the Mediterranean area. The information about the on-going fire season is continuously updated on the EFFIS web site (up to 6 times, daily), which can be interactively queried². EFFIS provides daily meteorological fire danger maps and forecasts of fire danger up to 9 days in advance, updated maps of the latest active fires, wildfire perimeters and post-fire evaluation of damage.

The EFFIS module for the assessment of meteorological forest fire danger is the EFFIS Danger Forecast. This module forecasts forest fire danger in Europe, part of North Africa and the Middle East, on the basis of the Canadian Fire Weather Index (FWI), allowing a harmonized evaluation to be made of the forest fire danger situation throughout Europe and neighbouring countries. Currently, EFFIS forecast is produced using numerical weather predictions from the European Centre for Medium Range Forecast (ECMWF) and from the French meteorological service MeteoFrance.

The damage caused by forest fires in Europe and neighbouring countries is estimated using the EFFIS Rapid Damage Assessment (RDA) module. Since 2000, cartography of the burnt areas is produced every year through the processing of satellite imagery. In the year 2003, due to the availability of daily satellite imagery from the MODIS sensor on board the TERRA and AQUA satellites, the RDA provided frequent updates of the total burnt area in Europe. In 2007, the RDA was updated twice a day and currently, since 2016, it is updated 3 times a day. Further to the mapping of burnt areas, the analysis of which types of land cover classes are affected by fires is performed. This module uses MODIS satellite imagery with a ground spatial resolution of about 250 metres, which permits the mapping of fires of around 30 ha or larger. The burnt area mapped by EFFIS corresponds, on average, to around 75% to 80% of the total area burned in Europe each year. Since 2019, EFFIS has incorporated the use of Sentinel 2 imagery, at 20 meters spatial resolution, which permits the mapping of fires smaller than 30 ha, up to the size of approximately or below 5 ha.

In addition to the two EFFIS applications related to near-real time information on fire danger, active for fires and burnt areas, the system holds the following applications: (1) [Long-term fire weather forecasts](#) for the next weeks and months, (2) [Firenews](#), which provides the geolocation and access to all fire related news published in Internet, (3) [Data request form](#), which allows for the automatic request of data that are not directly available in EFFIS and (4) [Data and services](#), which provides access to the data published in the current situation viewer as well as summary data of the number of fires and burnt areas of past years.

¹ <https://effis.jrc.ec.europa.eu>

² see <https://effis.jrc.ec.europa.eu/current-situation>

1.1 EFFIS Danger Forecast: 2021 results

The EFFIS Danger Forecast was developed to support the Commission's Directorate-General for the Environment and the forest fire-fighting services in the EU Member States. From 2002, at the request of the Member States, operation of the EFFIS Danger Forecast was extended to six months starting on 1 May and ending on 31 October, and in 2006 to nine months, from 1 February to 31 October. From 2008 the EFFIS Danger Forecast system has run continuously throughout the year without interruption.

The geographic extent has been enlarged over the years from the initial extent that covered only the Mediterranean region. Now the system covers the whole of Europe and MENA (Middle East & North Africa) countries.

The meteorological data used to run the model has also changed during the years. At the beginning the system started using forecasted data provided by MeteoFrance with a spatial resolution of around 50 km. Then over time other providers were included, such as DWD (Deutscher Wetterdienst) and ECMWF (European Centre for Medium-Range Weather Forecast) and the resolution has improved. Now the system runs with two different data sets from two providers: ECMWF (the primary) and MeteoFrance, with a spatial resolution in a range from around 8 km to 10 km.

In this chapter the fire danger trends assessed by EFFIS in the different countries during the 2021 fire season are presented, comparing them with long term trends.

Through the Danger Forecast module of EFFIS the situation has been continuously monitored and the risk level analysed and mapped.

The following figures show fire danger throughout 2021 as determined by the average FWI values assessed in the individual countries.

In the following charts we present fire weather index data for the current year, showing how it compares against the long-term minimum and maximum, the 10-90 percentiles, and the long term average (measured from 1980-2021). This makes it possible to see whether and when extreme conditions occur in the current year.

The countries analysed are those participating in the EFFIS network for which data are available, and are presented in alphabetic order within the two groups (European countries and MENA countries) in the graphs that follow.

How to read the charts

The red area encloses the most extreme values seen in the 41 year period from 1980-2021.

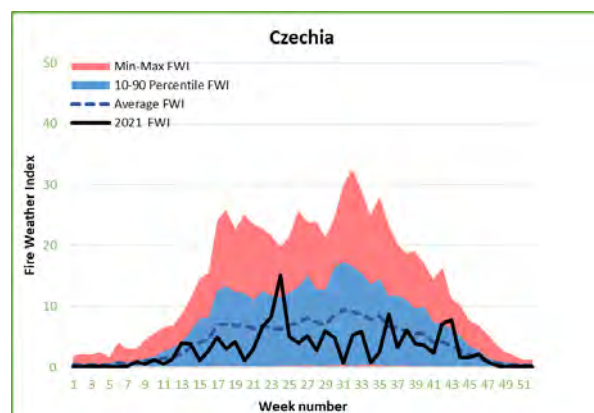
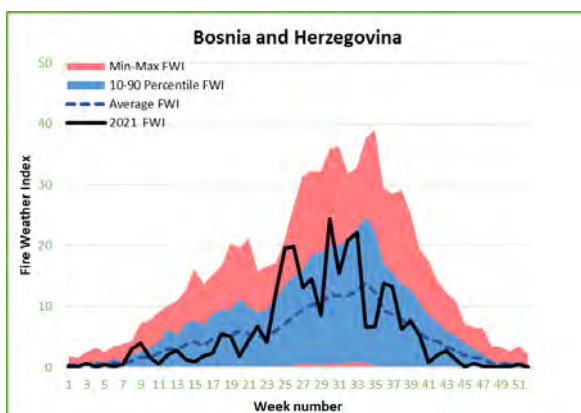
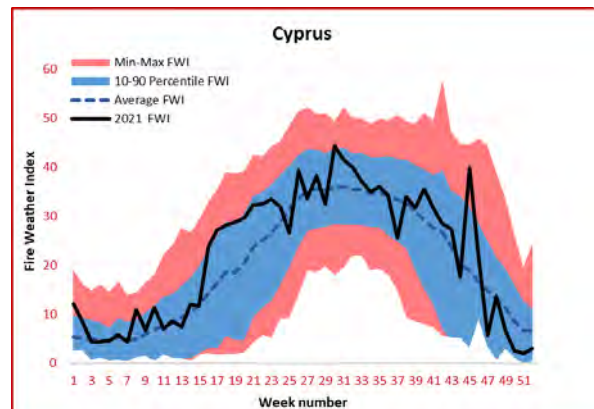
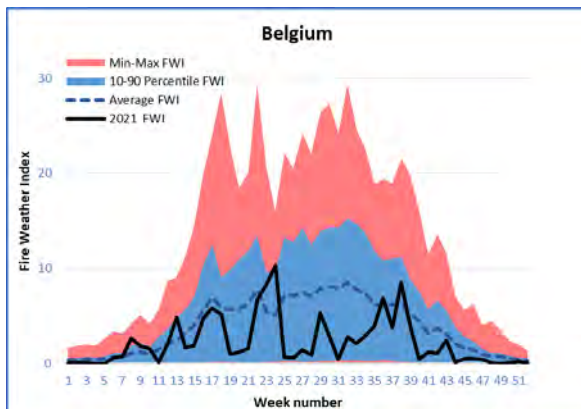
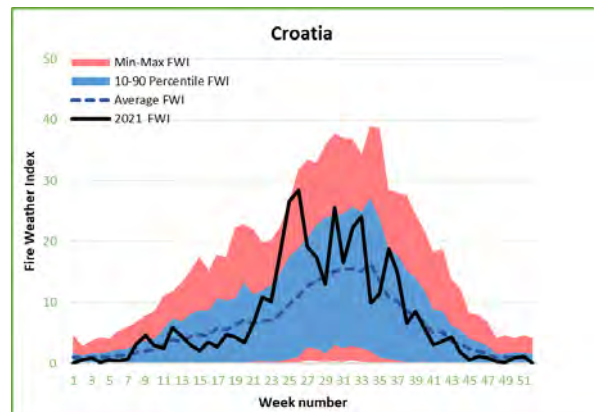
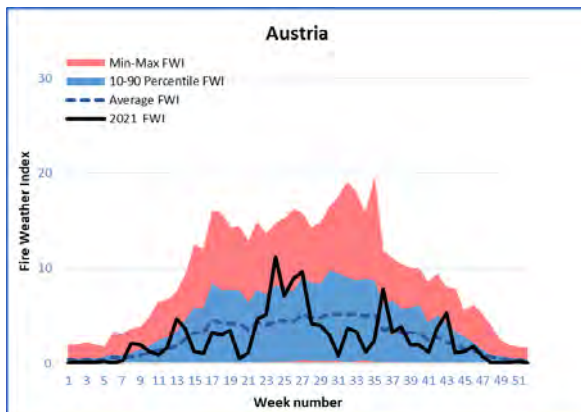
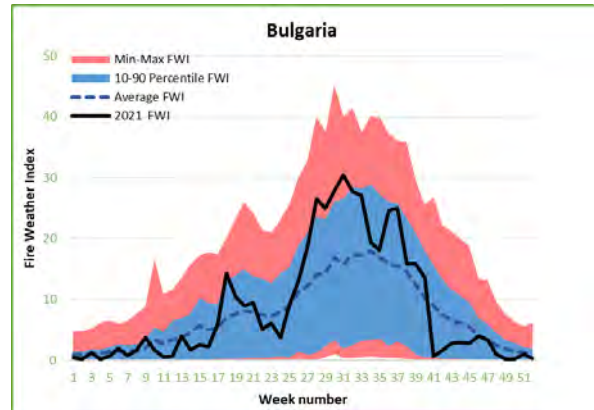
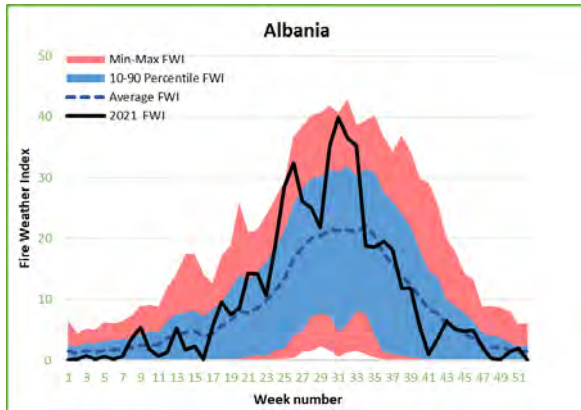
The blue area encloses the 10-90th percentiles: i.e. 80% of observations fall within this band.

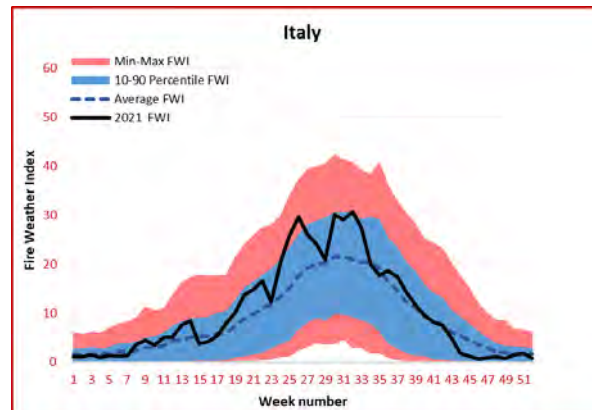
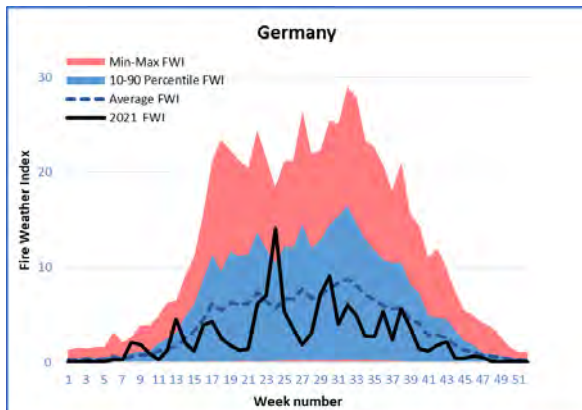
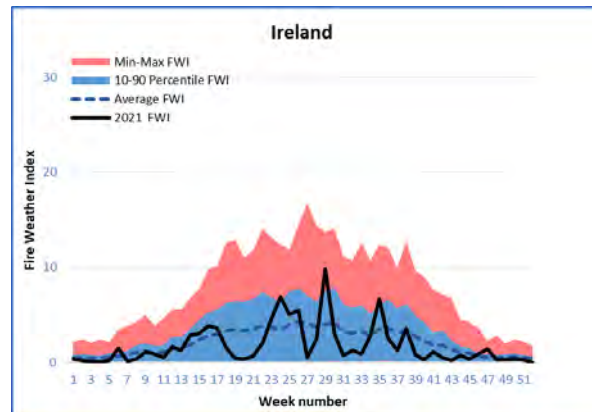
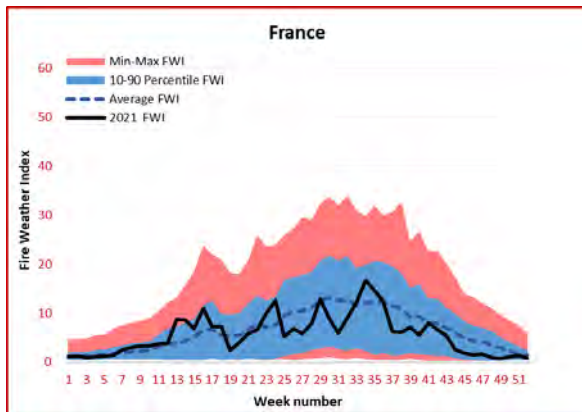
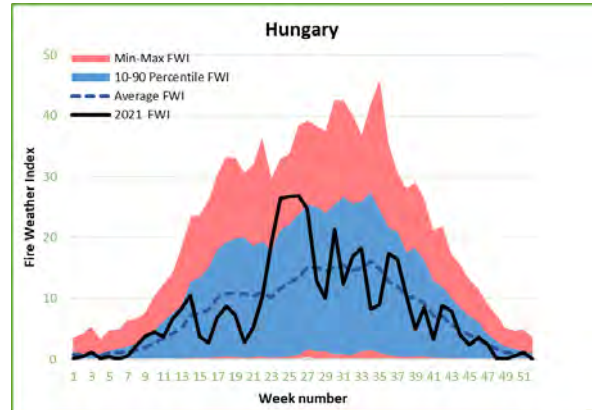
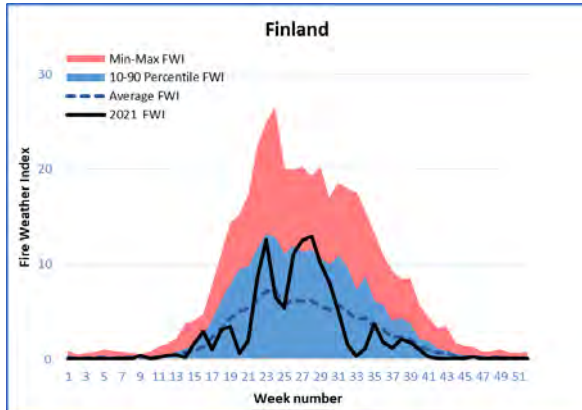
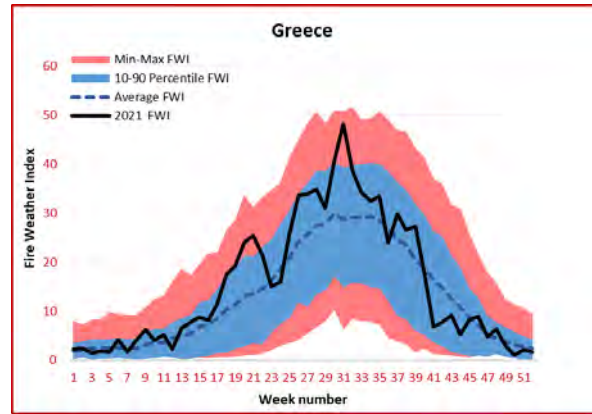
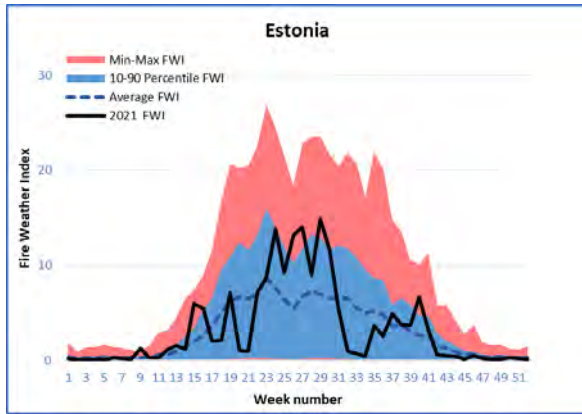
The dotted line signifies the 41-year average.

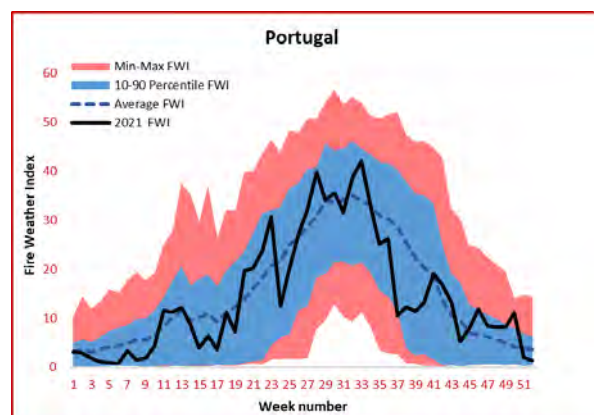
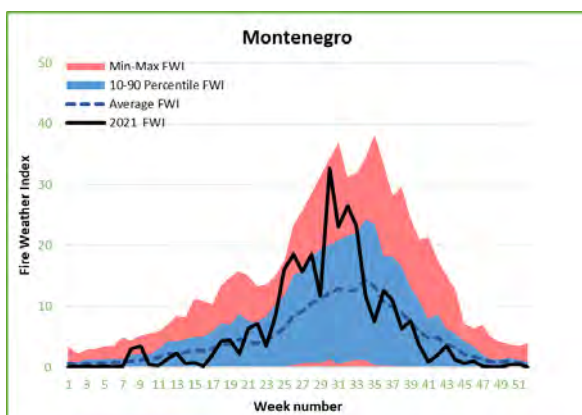
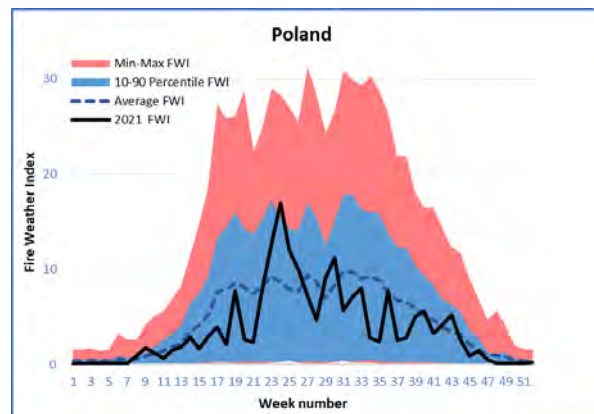
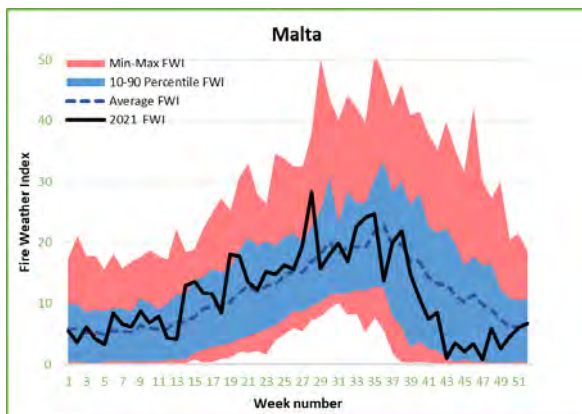
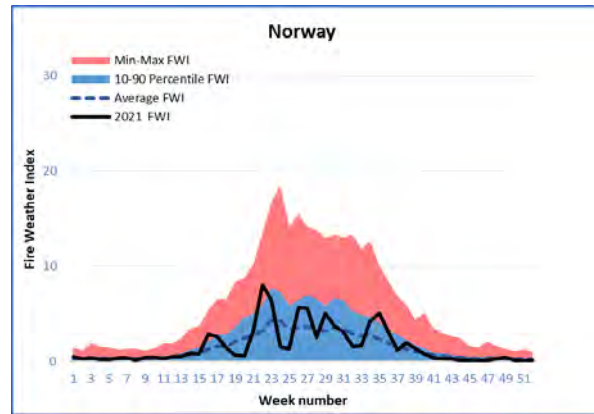
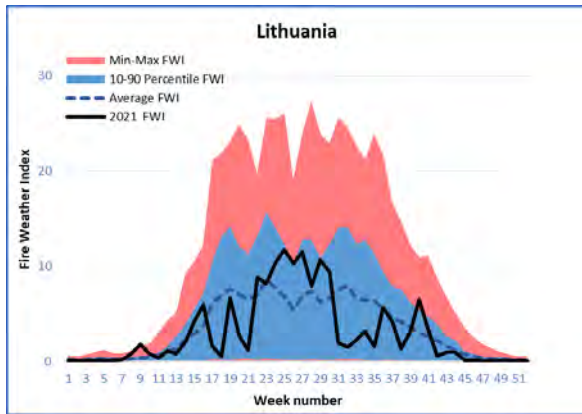
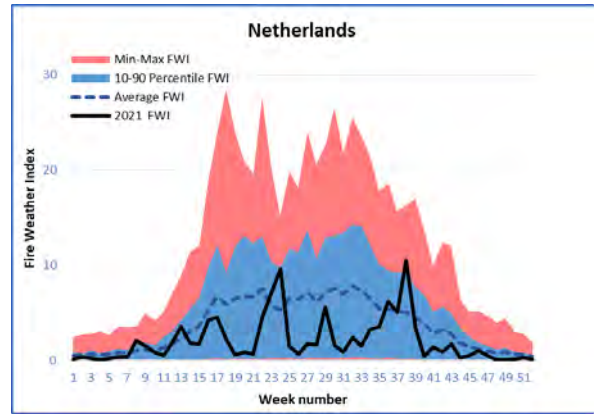
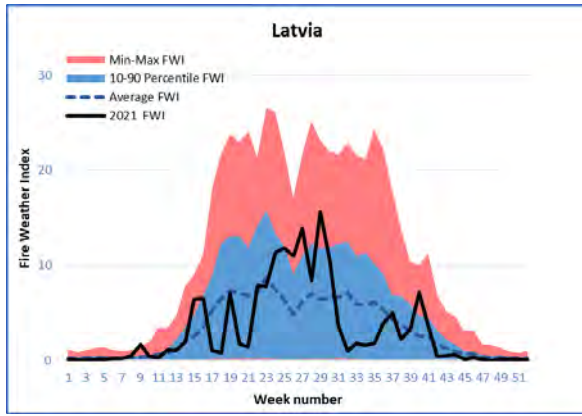
The solid black line shows the current year (2021).

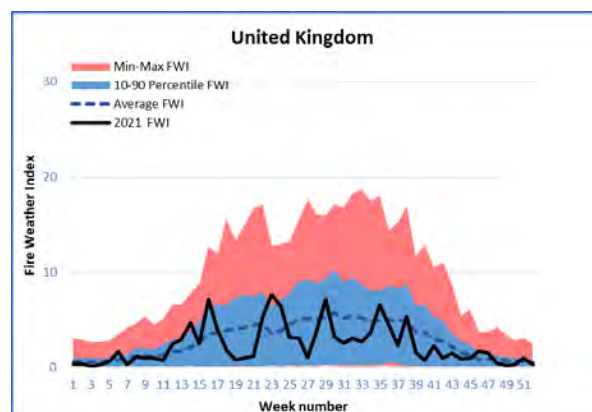
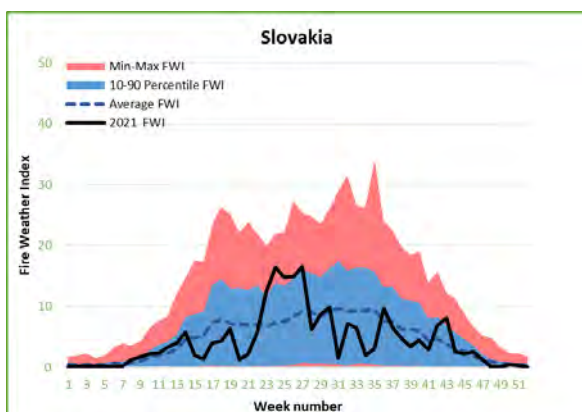
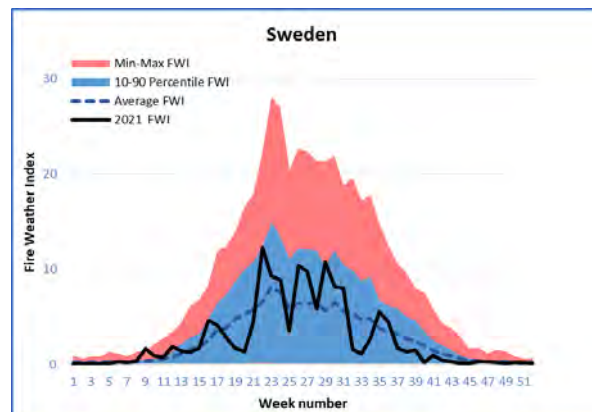
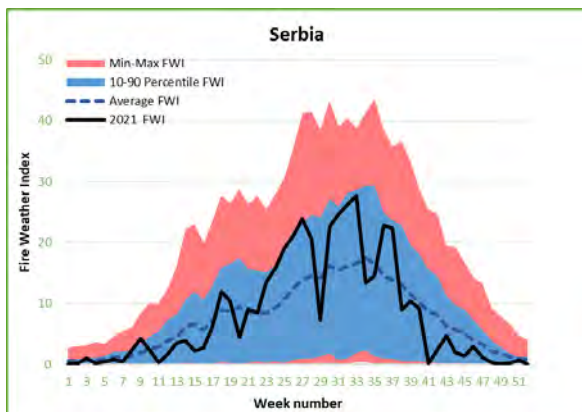
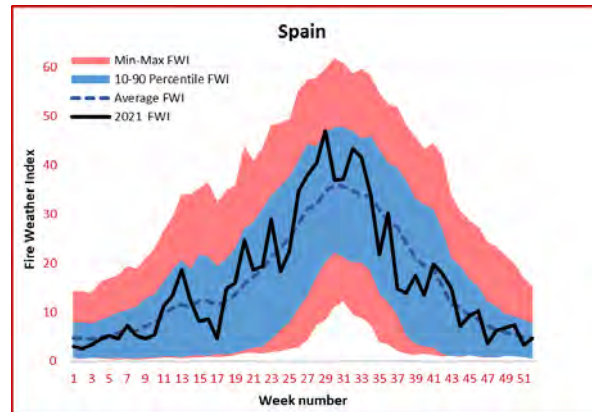
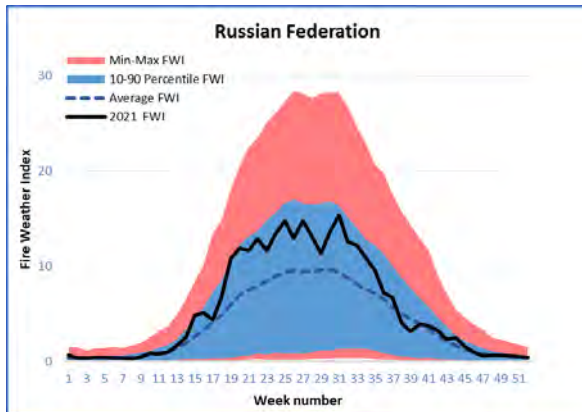
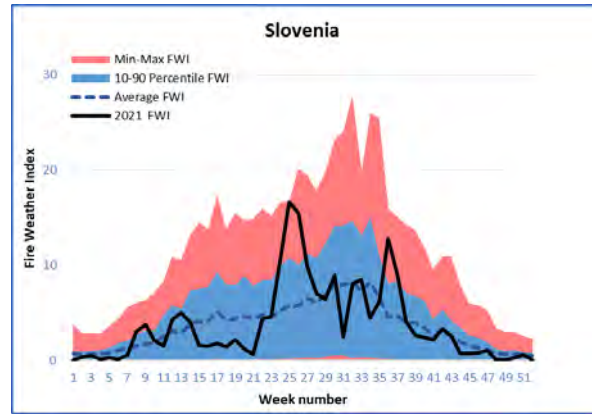
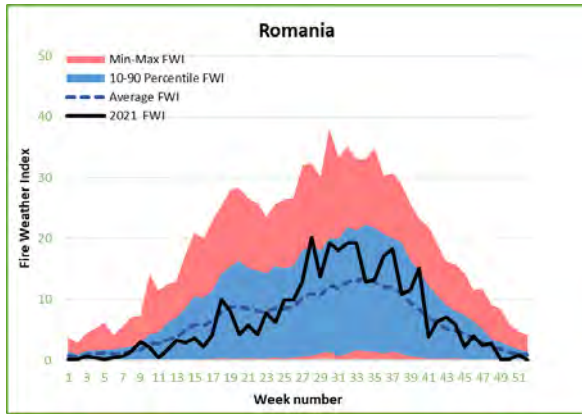
NOTE: Four colour-coded scales have been used to present the FWI: **0-30** for the most northern countries where fire danger rarely reaches high levels; **0-50** for central countries, **0-60** for the Mediterranean and Turkey, and **0-130** for the MENA countries.

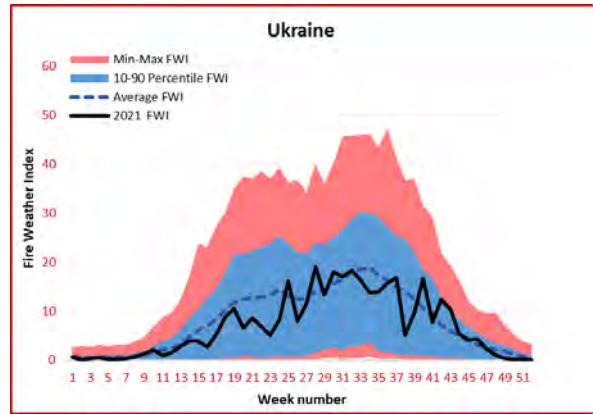
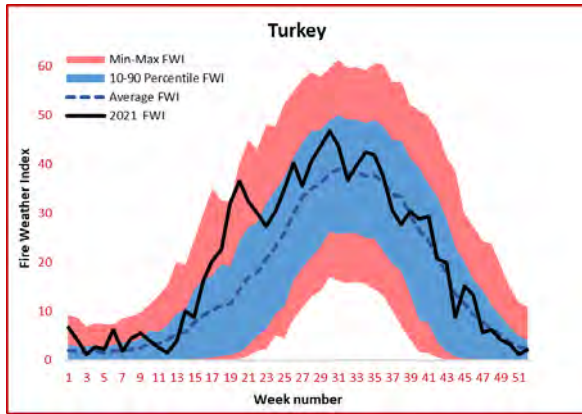
European countries



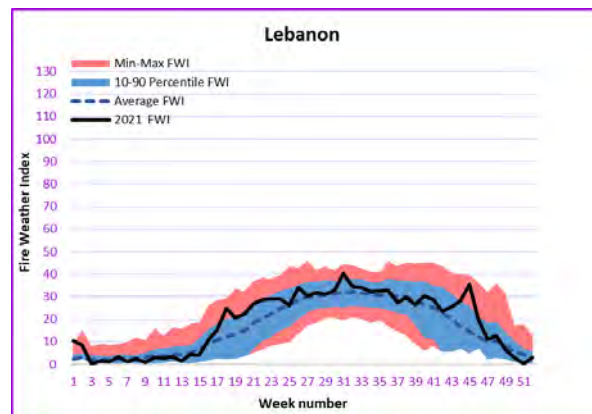
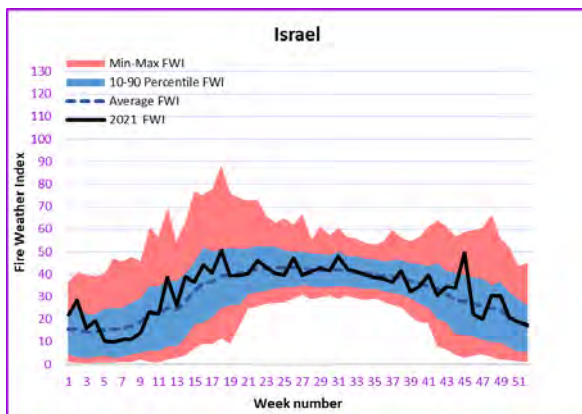
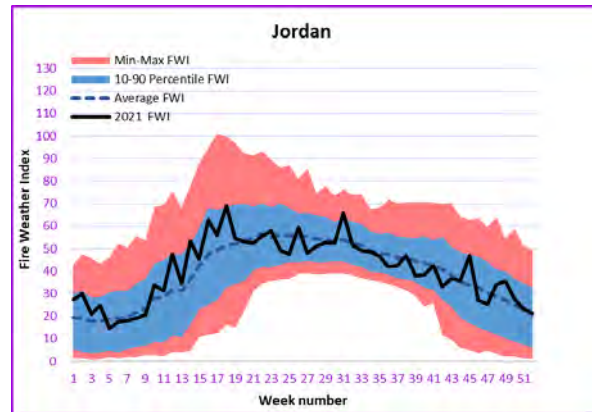
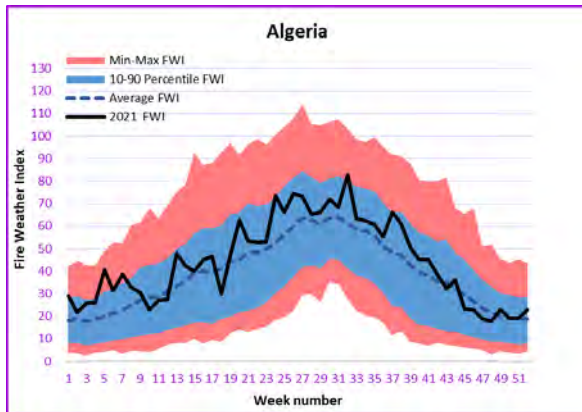


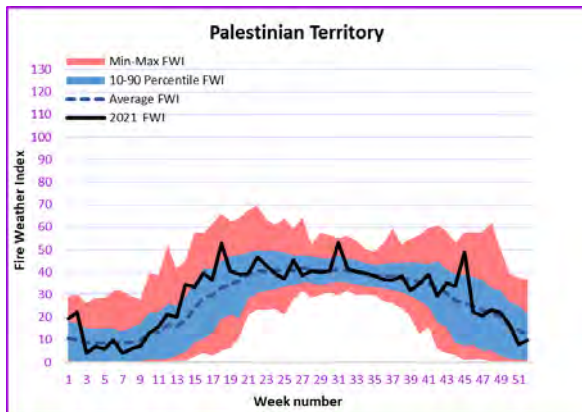
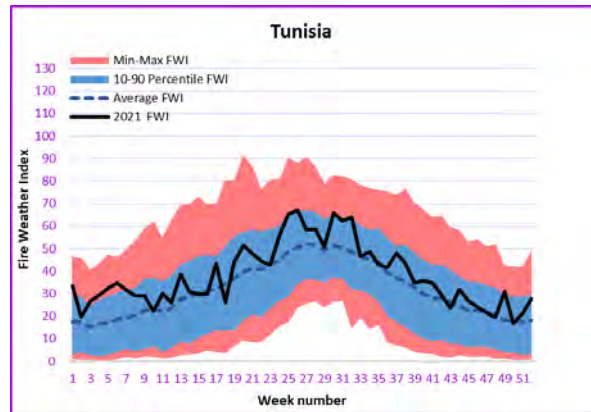
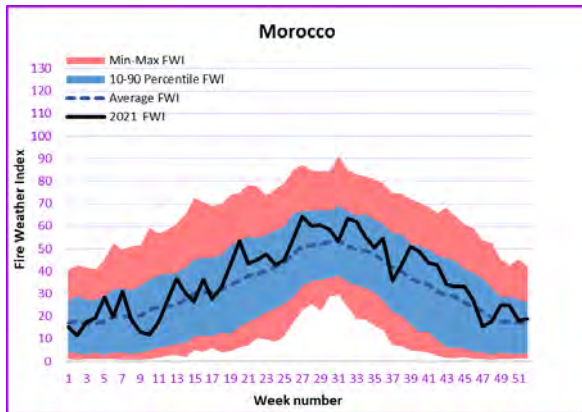
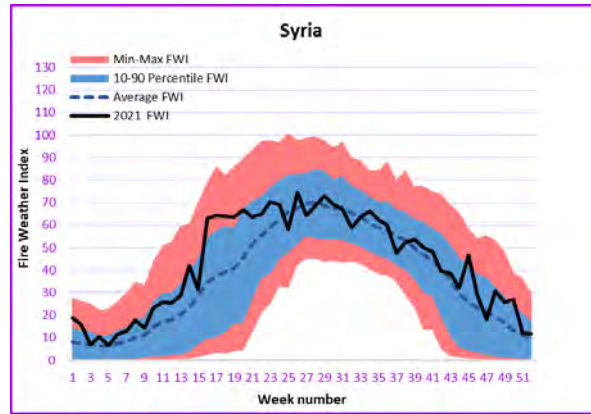
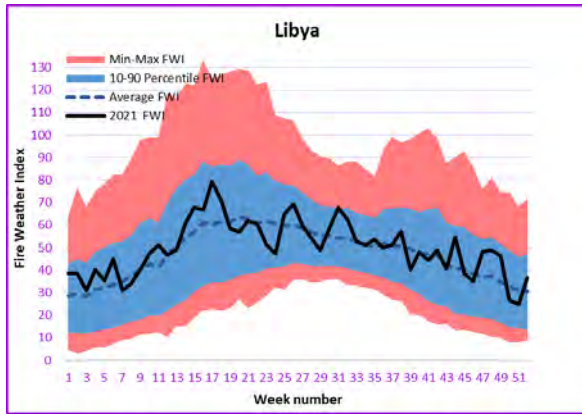






MENA countries





1.2 EFFIS Rapid Damage Assessment: 2021 results

The Rapid Damage Assessment module of EFFIS was set up to provide reliable and harmonized estimates of the areas affected by forest fires during the fire season. The methodology and the spatial resolution of the satellite sensor data used for this purpose, from the MODIS sensor, at 250 metre spatial resolution, allowed fires of about 30 ha or larger to be mapped. This methodology was enhanced in 2018 through the use of Sentinel 2 imagery, at 20 metre spatial resolution, which allowed the mapping of fires of about 5 ha or larger. In order to obtain the statistics of the burnt area by land cover type, the data from the European CORINE Land Cover database were used. Therefore, the mapped burnt areas were overlaid with the CLC data, making it possible to derive damage assessment results comparable for all the EU countries.

EFFIS Rapid Damage Assessment is based on the analysis of MODIS satellite imagery. The MODIS instrument is on board both the TERRA (morning pass) and AQUA (afternoon pass) satellites. MODIS data has 2 bands with spatial resolution of 250 metres (red and near-infrared bands) and 5 bands with spatial resolution of 500 metres (blue, green, and three short-wave infrared bands). Mapping of burnt areas is based mainly on the 250 metre bands, although the MODIS bands at 500 metres resolution are also used, as they provide complementary information that is used for improved burnt area discrimination. This type of satellite imagery allows detailed mapping of fires of around 30 ha or larger. Although only a fraction of the total number of fires is mapped (fires smaller than 30 ha are not mapped), the analysis of historical fire data has determined that the area burned by wildfires of this size represents in most cases the large majority of the total area burned. On average, the area burned by fires of at least 30 ha accounts for about 85% of the total area burnt every year in the Southern EU. As mentioned above, since 2018, through the use of Sentinel 2 imagery nearly about 95% of the total burnt area is mapped in EFFIS. The results for each of the countries affected by forest fires are given in the following paragraphs in alphabetical order, followed by a section on the MENA countries.

The total area burned in 2021, as shown by the analysis of satellite imagery, is shown in Table 1. These figures may also include agricultural and urban areas that were burned during the forest fires. Figure 1 below shows the scars caused by forest fires during the 2021 season.

In 2021, fires were mapped in 43 countries and a total burnt area of 1 113 464 ha was mapped, a similar total to that mapped in 2020, despite fires of less than 30 ha being included for the first time.

Table 1. Areas mapped in 2021 estimated from satellite imagery.

Country	Area (Ha)	Number of Fires
Albania	31275	329
Algeria	134273	295
Austria	82	2
Belgium	659	2
Bosnia and Herzegovina	63284	294
Bulgaria	4261	80
Croatia	10074	113
Cyprus	6339	24
Denmark	369	19
Finland	2793	42
France	34986	587
Germany	285	27
Greece	131254	222
Hungary	573	8
Iraq	25	1
Ireland	3609	50
Israel	4021	32
Italy	159537	1422
Jordan	2	1
Kosovo under UNSCR 1244	7580	92
Latvia	312	6
Lebanon	2360	50
Libya	377	11
Lithuania	65	5
Montenegro	43469	198
Morocco	6083	81
North Macedonia	21511	136
Norway	991	22
Palestinian Territory	143	2
Poland	51	12
Portugal	31582	749
Romania	20957	121
Serbia	7708	139
Slovakia	115	1
Slovenia	81	2
Spain	91295	901
Sweden	1287	48
Switzerland	12	2
Syria	18798	118
Tunisia	29009	98
Turkey	206013	612
Ukraine	27866	128
United Kingdom	8098	234
Total	1113464	7318

Summary	Total Area (Ha)
EU27	500566
Other European countries	417807
Middle East and North Africa	195091
Natura2000 and other protected sites	102598

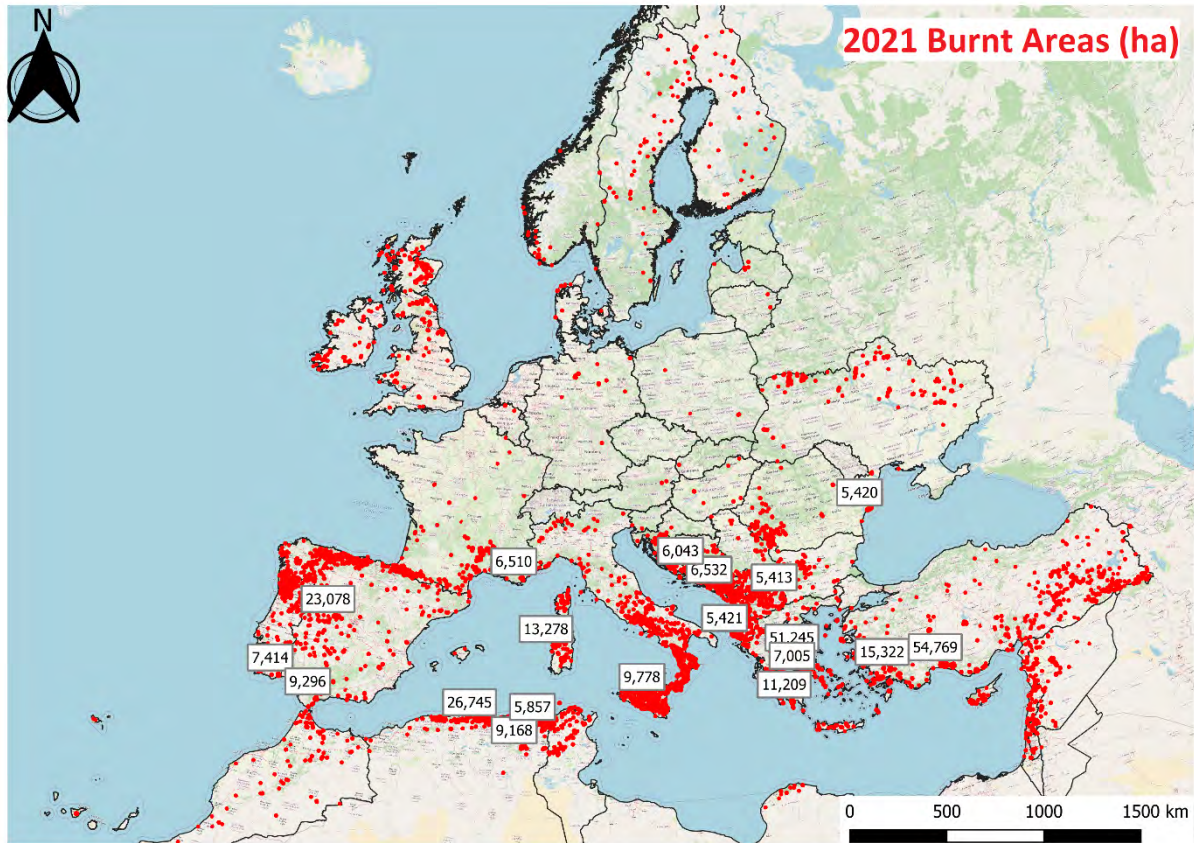


Figure 1. Burnt areas mapped during the 2021 fire season. Largest fires are indicated in ha.

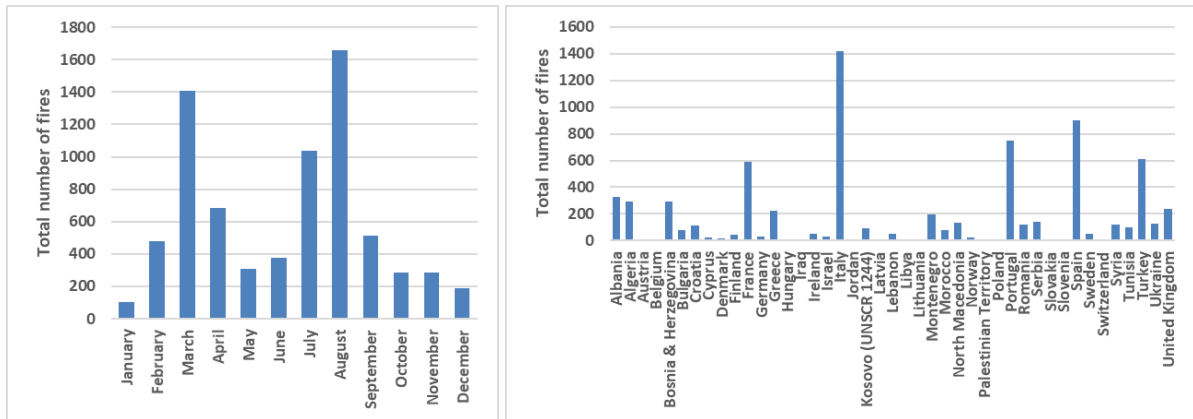


Figure 2. Total number of fires mapped by month and country in 2021.

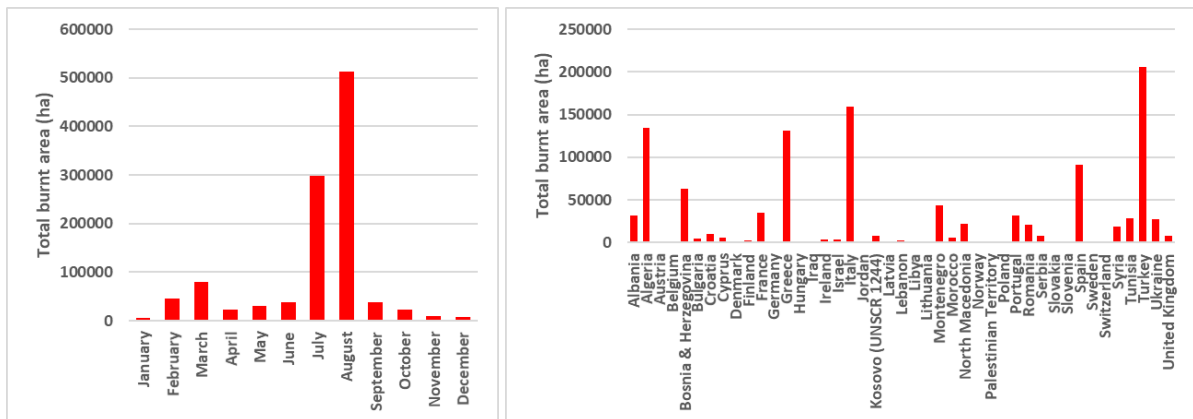


Figure 3. Total burnt area of fires mapped by month and country in 2021.

1.2.1 Damage to Natura2000 and other protected sites

Of particular interest is the analysis of the damage caused by fires to the areas protected within the Natura2000 network, as they include habitats of especial interest which are home for endangered plant and animal species.

The category of Natura2000 areas only exists in the countries of the European Union. Information on other protected areas outside the EU is presented for those countries for which the information is available. The area burnt within the Natura2000 and other protected sites is presented below.

Country	Area (Ha)	% of Natura2000 Area	Number of Fires
Austria	72.0	0.005846	1
Belgium	643.1	0.167338	2
Bulgaria	1937.1	0.051546	20
Cyprus	196.3	0.120738	3
Denmark	230.0	0.059806	4
France	9277.2	0.135198	164
Germany	118.8	0.002167	3
Greece	10453.5	0.292012	35
Finland	1605.1	0.03295	5
Hungary	563.9	0.028311	5
Ireland	2209.4	0.242724	9
Italy	25222.6	0.437154	206
Latvia	218.9	0.029986	2
Poland	40.0	0.000658	1
Portugal	7902.0	0.41354	91
Romania	15289.3	0.359062	36
Slovenia	76.0	0.01065	1
Spain	21668.0	0.157953	142
Sweden	447.2	0.007855	2
EU27 total	98170.4		732
Albania	6.9	0.70516444	1
Algeria	2737.7	1.64471275	15
Morocco	544.0	0.07587772	3
United Kingdom	1139.1	0.06466358	15
Non-EU total	4427.7		34
TOTAL	102598.1		766

Fires were mapped in 18 of the 27 EU member states and four non-EU countries that have information on protected areas.

The total burnt area in protected areas in 2021 was 102 598 ha, less than in the last two years and slightly below the average of the previous 10 years.

The most affected country in 2021 was Italy, followed closely by Spain. These two countries accounted for 45% of the total burnt in protected areas.

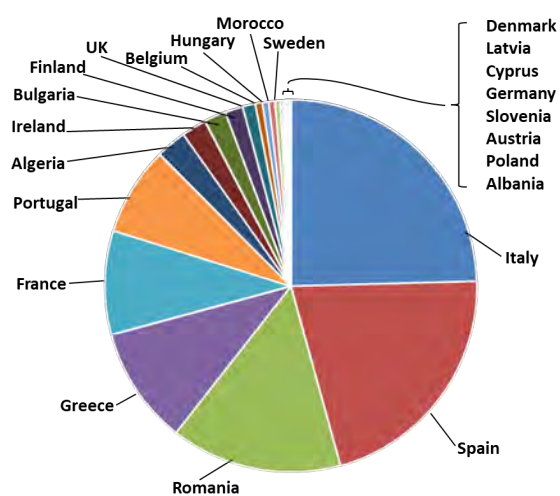


Figure 4. relative proportions of burnt area mapped in protected areas in 2021, ordered by size.

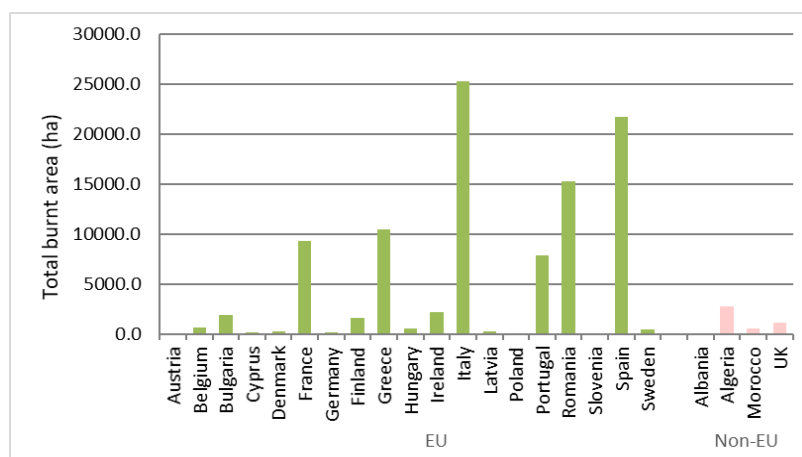


Figure 5. Burnt area in Natura2000 sites and other protected areas in 2021.

1.2.2 Affected land cover types

In 2021, the vegetation types were classified into more detailed categories than used in previous years, as follows:

Category	Description
Broadleaved forest	Vegetation formation composed principally of trees, including shrub and bush understoreys, where broad-leaved species predominate.
Coniferous forest	Vegetation formation composed principally of trees, including shrub and bush understoreys, where coniferous species predominate.
Mixed forest	Vegetation formation composed principally of trees, including shrub and bush understoreys, where neither broad-leaved nor coniferous species predominate.
Other Natural	Other natural land not included in the other categories
Sclerophyllous	Bushy sclerophyllous vegetation, includes maquis and garrigue.
Transitional	Bushy or herbaceous vegetation with scattered trees. Can represent either woodland degradation or forest regeneration/recolonization.
Agriculture	Cultivated crops
Artificial	Includes urban and industrial areas, mine, dump and construction areas.
Other	Other land types not included in the above categories

A detailed description of all the land cover types used can be found in:

Bossard, M., Feranec, J., Otahel, J., Steenmans, C., 2000. **CORINE land cover technical guide - Addendum 2000**. Report No. 40. *European Environment Agency*.

https://www.eea.europa.eu/ds_resolveuid/032TFUPGV

In 2021, around a quarter of the total burnt area was in the Agriculture land type. Forest (comprising Broadleaved Forest, Coniferous forest and Mixed Forest) together accounted for 28%, and other natural land types (Sclerophyllous, Transitional and Other Natural Land) accounted for most of the remainder (nearly one half) of the total.

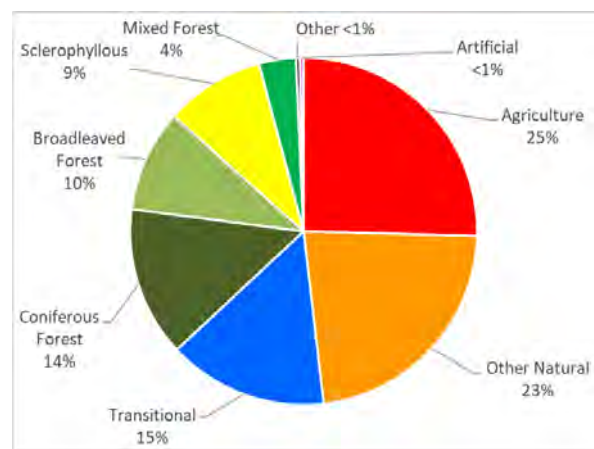


Figure 6. Proportions of land cover types affected in 2021 (all countries, ordered by total burnt area).

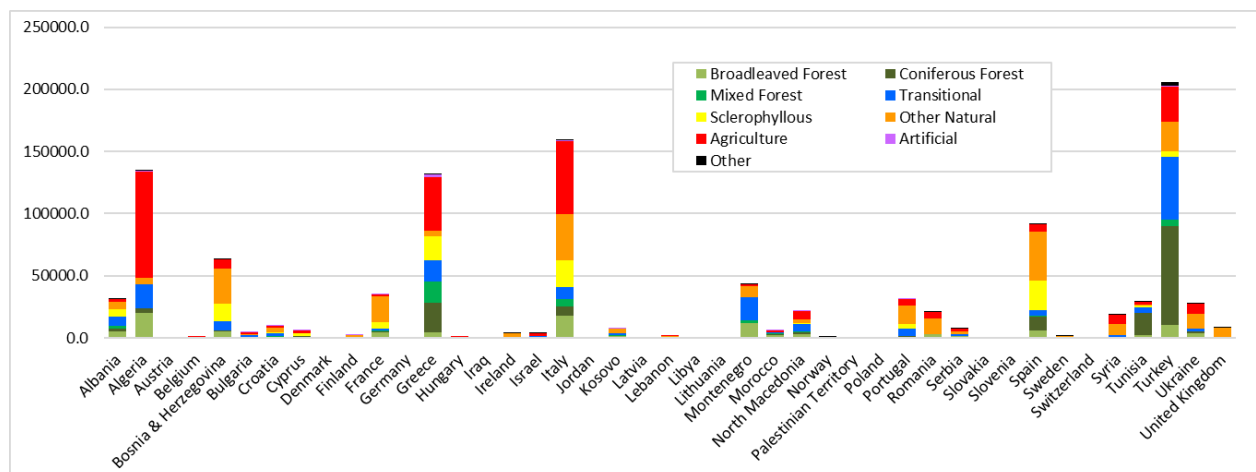


Figure 7. Burnt area in each country in 2021 by CORINE land class.

1.2.3 European countries

In 2021, fires were mapped in 22 of the EU27 countries in 2021: (Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden), burning 500 566 ha in total. This is above the amount recorded in 2020, but figures are not completely comparable as fires below 30 ha were included in the totals for the first time this year. August was the month when a significant proportion of the damage occurred, particularly in Greece.

Of this total, 102 598 ha occurred on Natura2000 sites. This amounts to 20% of the total, a smaller proportion than in 2020.

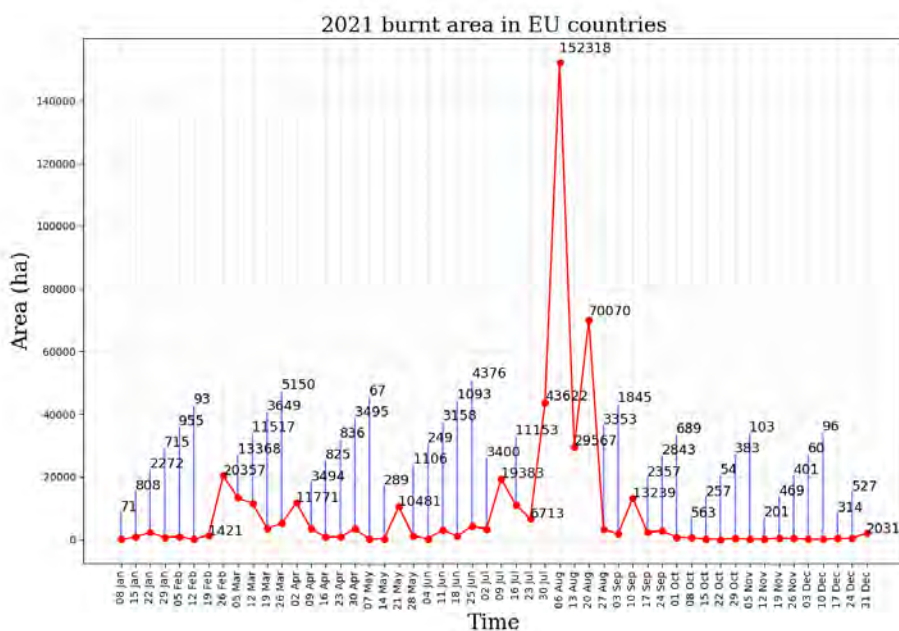


Figure 8. Burnt area weekly evolution in 2021 (European Union countries).

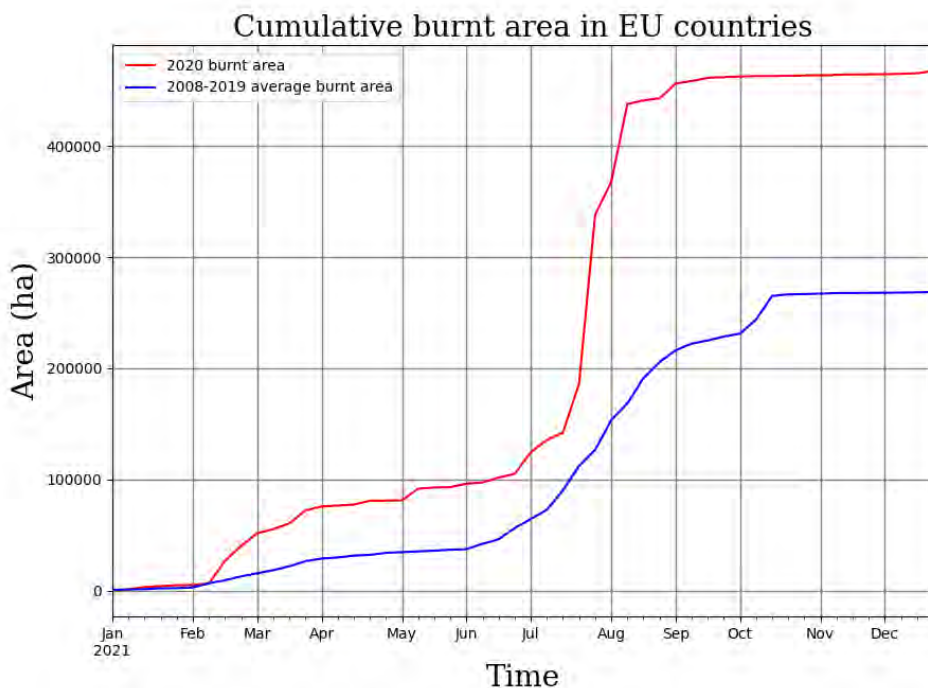


Figure 9. Cumulative burnt area in 2021 (European Union countries).

1.3 Mapped burnt area by country

The following section details the burnt areas mapped in each country in 2021. European countries (EU and non-EU) are listed alphabetically, followed by the MENA countries.

Burnt areas are split into different land cover types using the CLC 2018 database unless otherwise specified.

In 2021, for the first time, fires smaller than 30 ha were also included in the mapped totals. Therefore, precise comparisons with previous years are not possible. However, almost all damage comes from fires of over 30 ha (Table 2), and general observations about the season with respect to previous years can still be made.

Table 2. Analysis of the portion of mapped burnt areas over 30 ha in 2021.

Region	% of mapped burnt area from fires >30ha
EU	94%
Other European countries	97%
MENA countries	98%

1.3.1 Albania

The mapped burnt area in Albania was significantly higher than recent years (apart from 2017). 329 fires were mapped between February and November, burning a total of 31 275 ha. The peak of the season was in July and August, when 90% of the damage occurred. 8 fires over 500 ha were mapped, the biggest of which occurred in Korçë province at the end of July and covered over 5 000 ha. Around one third of all the burnt area was mapped in forest lands (Table 3). Burnt area scars from the fires in 2021 can be seen in Figure 10.

Table 3. Distribution of burnt area (ha) in Albania by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	5610	17.9
Coniferous forest	2018	6.5
Mixed forest	2372	7.6
Transitional	6883	22.0
Sclerophyllous vegetation	6275	20.1
Other Natural Land	6118	19.6
Agriculture	1972	6.3
Artificial Surfaces	9	0.0
Other Land Cover	18	0.1
TOTAL	31275	100

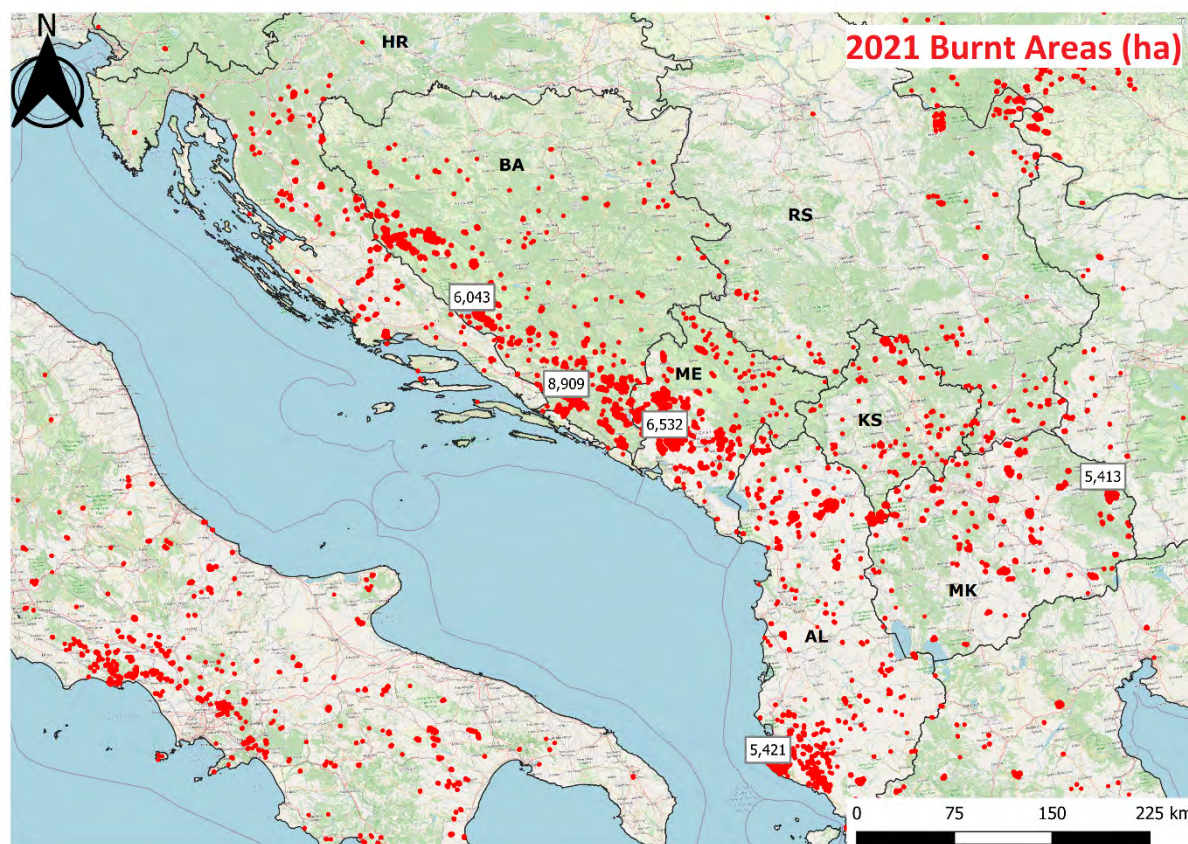


Figure 10. Burnt area scars in the Balkans in 2021. Largest fires are indicated in ha.

AL=Albania; BA=Bosnia & Herzegovina; HR=Croatia; KS=Kosovo under UNSCR 1244; ME=Montenegro; MK=North Macedonia; RS=Serbia

1.3.2 Austria

Two fires were mapped in Austria, in July and October. The larger of the two (72 ha) occurred in a Natura2000 site. Coniferous forest was the most affected land type.

Table 4. Distribution of burnt area (ha) in Austria by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Coniferous forest	44	53.5
Mixed forest	22	27.2
Transitional	4	4.4
Other Natural Land	12	14.8
TOTAL	82	100

1.3.3 Belgium

Two fires were mapped in Belgium early in the season, in March and April, totalling 659 ha. The largest fire burnt over 500 ha in Brecht. Almost all of the total (98%, 643 ha) was on Natura2000 land, amounting to 0.167% of the protected area of the country.

Table 5. Distribution of burnt area (ha) in Belgium by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Coniferous forest	3	0.5
Mixed forest	37	5.6
Transitional	21	3.2
Other Natural Land	593	90.0
Agriculture	5	0.8
TOTAL	659	100

1.3.4 Bosnia and Herzegovina

The fire season in Bosnia was somewhat lighter than the previous year. 294 fires were mapped between January and October, burning a total of 63 284 ha. There were two peaks of fire activity in the season: one in February/March and the second in July/August. 45% of the total burnt area was mapped in Other Natural Land. There were a number of large fires: 23 were over 500 ha, and the largest covered almost 9 000 ha in Ljubinje in August. Figure 10 above shows the locations of the large fires in 2021.

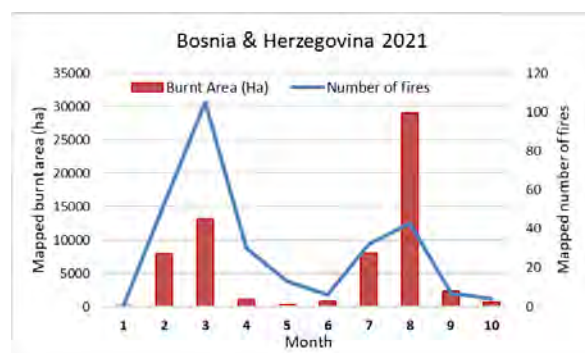


Figure 11. Monthly mapped burnt area and number of fires in Bosnia & Herzegovina in 2021.

Table 6. Distribution of burnt area (ha) in Bosnia & Herzegovina by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	5352	8.5
Coniferous forest	407	0.6
Mixed forest	357	0.6
Transitional	7178	11.3
Sclerophyllous vegetation	14471	22.9
Other Natural Land	28354	44.8
Agriculture	7142	11.3
Artificial Surfaces	21	0.0
Other Land Cover	1	0.0
TOTAL	63284	100

1.3.5 Bulgaria

The 2021 fire season in Bulgaria was light, with a total mapped burnt area less than half of that in 2020, even taking into account that fires smaller than 30 ha were included in 2021. A total of 80 fires were mapped, burning 4 261 ha in two main waves: one in February/March and the other in the summer when two-thirds of the damage occurred. None of the fires exceeded 500 ha.

Of the annual total, nearly half (1 937 ha) occurred on Natura2000 sites, which amounts to 0.167% of the total Natura2000 land in Bulgaria.

Table 7. Distribution of burnt area (ha) in Bulgaria by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	397	9.3
Coniferous forest	358	8.4
Mixed forest	370	8.7
Transitional	976	22.9
Other Natural Land	665	15.6
Agriculture	1491	35.0
Artificial Surfaces	5	0.1
TOTAL	4261	100

1.3.6 Croatia

In Croatia the fire season was significantly lighter than the previous year, with 10 074 ha mapped from 113 fires, compared with 2020, when 27 477 ha was mapped from fires over 30 ha. The season started early, and almost half of the annual burnt area was mapped in February/March. A second peak was observed in August, including a fire of over 1 400 ha in Split-Dalmatia province. Four other fires of over 500 ha were also mapped, these 5 fires accounting for 40% of the annual total between them. None of the fires were mapped in protected areas.

Burnt area scars from these fires can be seen in Figure 10 above.

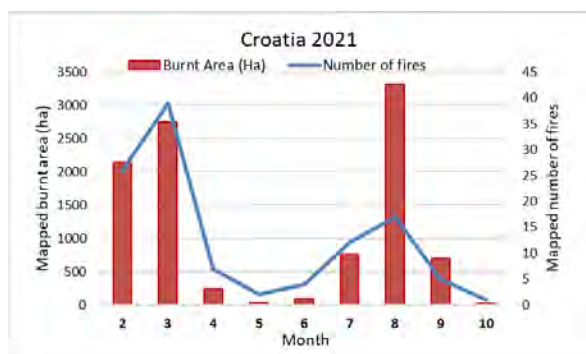


Figure 12. Monthly mapped burnt area and number of fires in Croatia in 2021.

Table 8. Distribution of burnt area (ha) in Croatia by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	1070	10.6
Coniferous forest	77	0.8
Mixed forest	53	0.5
Transitional	2579	25.6
Sclerophyllous vegetation	509	5.1
Other Natural Land	3604	35.8
Agriculture	2129	21.1
Artificial Surfaces	53	0.5
TOTAL	10074	100

1.3.7 Cyprus

It was an extreme season in Cyprus, even allowing for the fact that fires of less than 30 ha were included. 24 fires burned a total of 6 339 ha, the highest figure for over 10 years, although most of the damage was caused by a single fire of 4 627 ha in Larnaca District in July (Figure 13). A second fire of 530 ha was mapped in September in Paphos district.

Natura2000 land was relatively unaffected; accounting for only 196 ha or 3% of the total, and 0.12% of the protected land in the country.

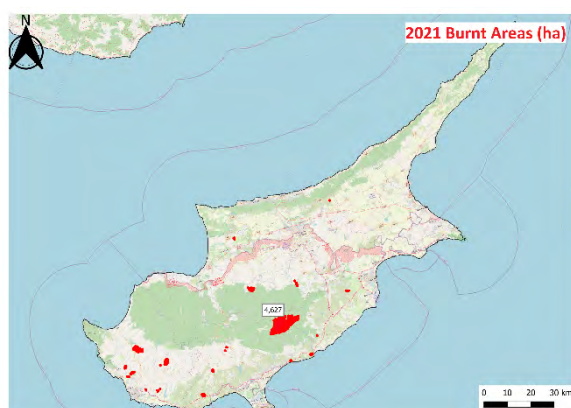


Figure 13. Burnt area scars in Cyprus in 2021, showing the large fire in Larnaca district.

Table 9. Distribution of burnt area (ha) in Cyprus by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	3	0.0
Coniferous forest	1637	25.8
Transitional	18	0.3
Sclerophyllous vegetation	1847	29.1
Other Natural Land	98	1.5
Agriculture	2698	42.6
Artificial Surfaces	38	0.6
TOTAL	6339	100

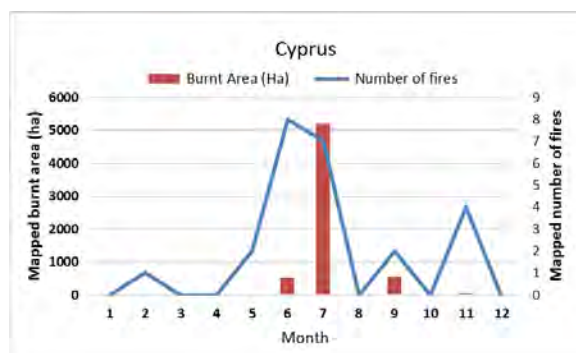


Figure 14. Monthly mapped burnt area and number of fires in Cyprus in 2021.

1.3.8 Denmark

In 2021, 19 fires were mapped in Denmark, mostly early in the season in February/March. A total of 369 ha was mapped, almost all in Other Natural Land.

Table 10. Distribution of burnt area (ha) in Denmark by land cover types in 2021.

Land cover	Area burnt	% of total
Transitional	5	1.3
Other Natural Land	364	98.7
TOTAL	369	100

1.3.9 Finland

The summer in Finland saw two unusually large fires mapped, with one over 1 000 ha and the second over 600 ha, both in Lappi province on the same day in August (Figure 15). In total there were 42 fires mapped in 2021 between May and August, resulting in a burnt area of 2 793 ha. Of this, 1 605 ha occurred on Natura2000 land, corresponding to 57% of the total and 0.033% of the Natura2000 land in the country.

Table 11. Distribution of burnt area (ha) in Finland by land cover types in 2021.

Land cover	Area burnt	% of total
Coniferous forest	706	25.3
Mixed forest	102	3.6
Transitional	36	1.3
Other Natural Land	1761	63.1
Agriculture	1	0.0
Artificial Surfaces	187	6.7
TOTAL	2793	100

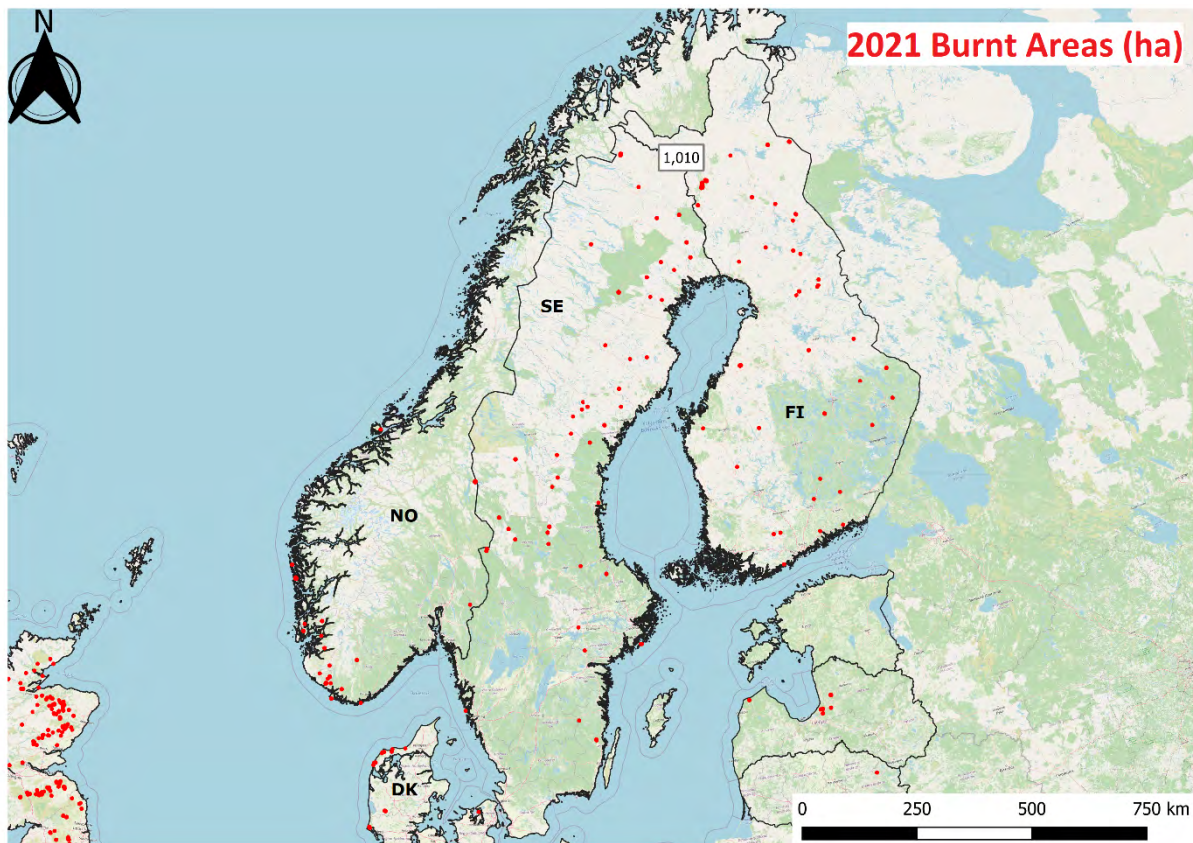


Figure 15. Burnt area scars in Scandinavia in 2021. Largest fire is indicated in ha. NO=Norway; SE=Sweden; FI=Finland; DK=Denmark.

1.3.10 France

The season started early in France, with several very large fires in the Pyrénées-Atlantiques in February. One was over 1 350 ha and three others exceeded 500 ha. A second peak occurred in August, when the largest fire of the year for France occurred in Var, covering 6 500 ha.

The total burnt area in France was 34 986 ha from 587 fires, over twice that mapped in 2020, but still below the extreme year of 2019. Of this total, 9 277 ha occurred on Natura2000 sites which corresponds to 27% of the total area burnt and 0.135% of the total Natura2000 areas in the country.

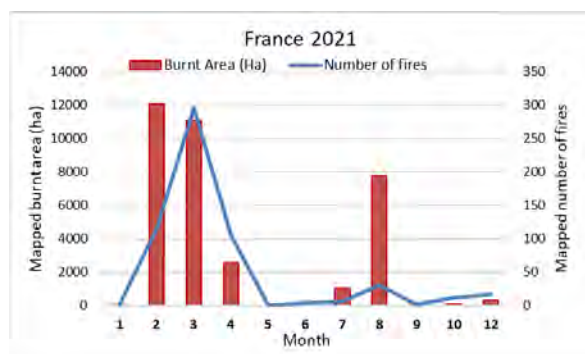
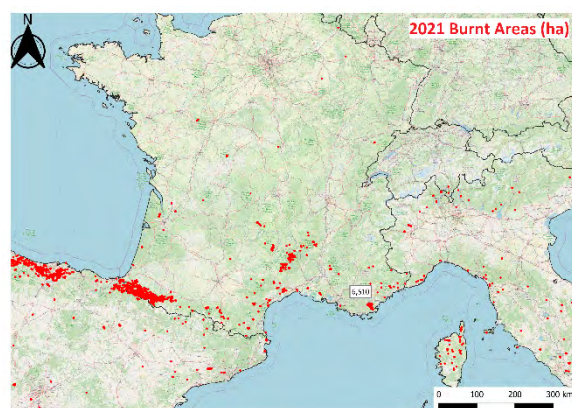


Figure 16. Monthly mapped burnt area and number of fires in France in 2021.

Table 12. Distribution of burnt area (ha) in France by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	4319	12.3
Coniferous forest	653	1.9
Mixed forest	1294	3.7
Transitional	887	2.5
Sclerophyllous vegetation	5617	16.1
Other Natural Land	20389	58.3
Agriculture	1772	5.1
Artificial Surfaces	54	0.2
TOTAL	34986	100



Burnt area scars in southern France and Corsica in 2021. Largest fire is indicated in ha.

1.3.11 Germany

The 2021 fire season on Germany was mild. 27 fires were mapped, resulting in a total burnt area of 285 ha, less than in 2020, even though fires below 30 ha were included in 2021. Fires were mapped between February and September but over 80% of the damage occurred early in the season, between February and April.

Of the annual total, 119 ha occurred in Natura2000 sites, amounting to 42% of the total and 0.002% of the Natura2000 area in the country.

Table 13. Distribution of burnt area (ha) in Germany by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	1	0.4
Coniferous forest	5	1.8
Mixed forest	12	4.3
Transitional	5	1.8
Other Natural Land	259	90.9
Agriculture	3	1.0
TOTAL	285	100

1.3.12 Greece

It was an extreme year for fires in Greece, and resulted in the highest mapped burnt area since the historically bad year of 2007. A total of 131 254 ha was mapped from 222 fires. This total included the second largest fire across the whole of the area covered by EFFIS when a fire of over 51 000 ha burned a large portion of the island of Evia (Figure 17).

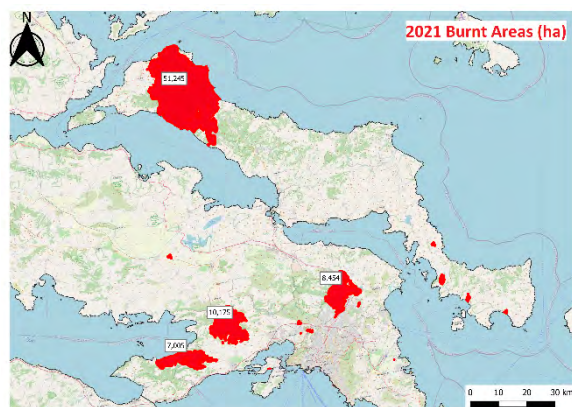


Figure 17. Burnt area scar in Evia, the second largest fire in 2021, and the largest in the EU27.

Although the largest, this was not the only extreme fire in Greece in 2021. Three others over 10 000 ha were also mapped, in addition to 8 over 1 000 ha and a further 5 over 500 ha. Most of these fires occurred in August and together almost 90% of the annual total was mapped in this month (Figure 18).

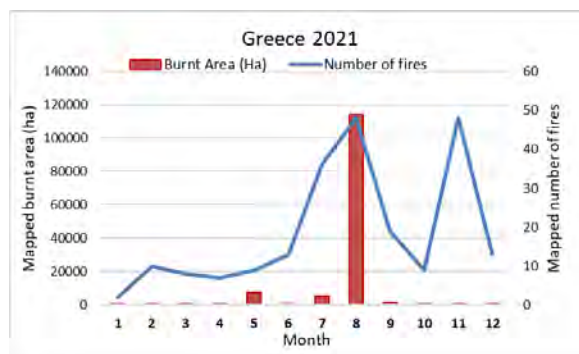


Figure 18. Monthly mapped burnt area and number of fires in Greece in 2021.

Of the total, 10 453 ha occurred on Natura2000 sites, amounting to 8% of the total and 0.29% of the total Natura2000 area of Greece. Table 14 presents the distribution of the mapped burnt area by land cover type. Figure 19 shows the burnt area scars in Greece.

Table 14. Distribution of burnt area (ha) in Greece by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	4803	3.7
Coniferous forest	23611	18.0
Mixed forest	16994	12.9
Transitional	17349	13.2
Sclerophyllous vegetation	18873	14.4
Other Natural Land	4882	3.7
Agriculture	43048	32.8
Artificial Surfaces	1664	1.3
Other Land Cover	31	0.0
TOTAL	131254	100

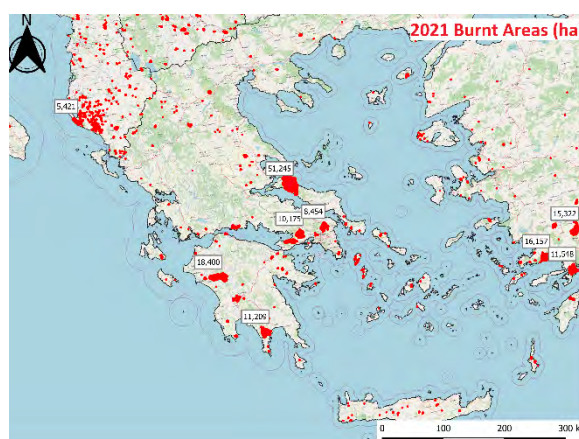


Figure 19. Burnt area scars in Greece in 2021. Largest fires are indicated in ha.

1.3.13 Hungary

Eight fires burned a total of 573 ha in Hungary in 2021. Practically all of the damage occurred in July and September and most of it (564 ha) was on Other Natural Land in Natura2000 sites, amounting to 98% of the total and 0.028% of the Natura2000 area in the country.

Table 15. Distribution of burnt area (ha) in Hungary by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	2	0.4
Coniferous forest	3	0.5
Mixed forest	2	0.3
Transitional	3	0.5
Other Natural Land	558	97.4
Agriculture	5	0.9
TOTAL	573	100

1.3.14 Ireland

The total burnt area of 3 609 ha from 50 fires mapped in Ireland was slightly higher than in the last three years, although this is mostly because of a very large fire of 1 799 ha that occurred in April in Muckross municipality in the South-West province. In total, 85% of the damage occurred early in the season in April. 61% of the burnt area (2 209 ha) was recorded in Natura2000 sites, which corresponds to 0.243% of the total Natura2000 land in the country. The most affected land type in 2021 was Other Natural Land, as shown in Table 16. Mapped burnt area scars in Ireland in 2021 can be seen in Figure 37 below.

Table 16. Distribution of burnt area (ha) in Ireland by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	24	0.7
Coniferous forest	5	0.1
Mixed forest	1	0.0
Transitional	80	2.2
Other Natural Land	3384	93.8
Agriculture	95	2.6
Other Land Cover	19	0.5
TOTAL	3609	100

1.3.15 Italy

In 2021, Italy was the country second most affected by fires in terms of burnt area (after Turkey), and recorded the highest number of fires. The total burnt area of 159 537 ha mapped from 1 422 fires was the highest recorded in over a decade. 90% of the damage occurred in July and August (Figure 21).

There were 49 fires over 500 ha, the highest number of large fires mapped in 2021 across Europe, the Middle East and North Africa.

15 of the 49 fires exceeded 1 000 ha and the largest (in Sardinia) was over 13 000 ha. Sicily was particularly affected, with 32 of these 49 large fires occurring there (Figure 20).

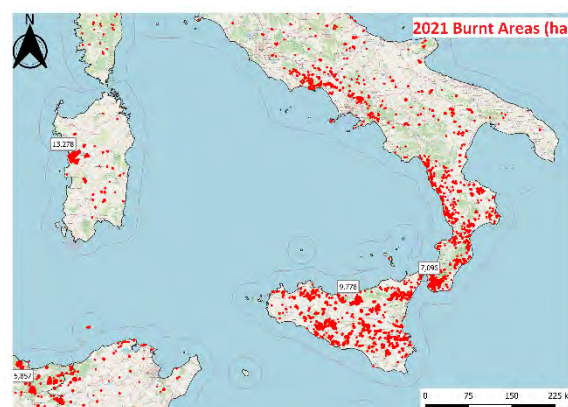


Figure 20. Burnt area scars in southern Italy and Sardinia. Largest fires are indicated in ha.

Of the year's total, 25 223 ha occurred on Natura2000 sites, corresponding to 16% of the total and 0.437% of the Natura2000 land in Italy. Table 17 presents the distribution of the mapped burnt area by land cover type.

Table 17. Distribution of burnt area (ha) in Italy by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	17672	11.1
Coniferous forest	7435	4.7
Mixed forest	6169	3.9
Transitional	9813	6.2
Sclerophyllous vegetation	21530	13.5
Other Natural Land	37239	23.3
Agriculture	58630	36.8
Artificial Surfaces	432	0.3
Other Land Cover	617	0.4
TOTAL	159537	100



Figure 21. Monthly mapped burnt area and number of fires in Italy in 2021.

1.3.16 Kosovo under UNSCR 1244

The total burnt area mapped in Kosovo was comparable with the 2020 season, taking into account the inclusion of smaller fires in 2021. 92 fires were mapped, giving a total burnt area of 7 580 ha. In common with other countries in this region, the worst month was August, when almost half the annual damage occurred, but there was also a late end to the season with three of Kosovo's largest fires recorded in October and November. Mapped burnt area scars can be seen in Figure 10 above.

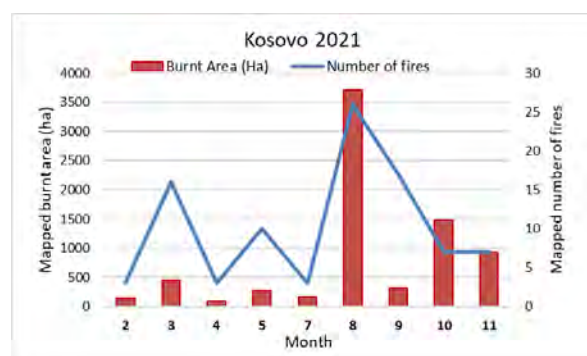


Figure 22. Monthly mapped burnt area and number of fires in Kosovo in 2021.

Table 18. Distribution of burnt area (ha) in Kosovo by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	1792	23.6
Coniferous forest	115	1.5
Mixed forest	40	0.5
Transitional	1614	21.3
Other Natural Land	3600	47.5
Agriculture	413	5.5
Artificial Surfaces	6	0.1
TOTAL	7580	100

1.3.17 Latvia

Six fires were mapped in Latvia, covering a total of 312 ha between April and July. 219 ha of this total occurred in Natura2000 sites, corresponding to 70% of the total burnt area and 0.03% of the total protected area in the country.

Table 19. Distribution of burnt area (ha) in Latvia by land cover types in 2021.

Land cover	Area burnt	% of total
Coniferous forest	21	6.7
Mixed forest	14	4.5
Transitional	59	18.9
Other Natural Land	218	69.8
TOTAL	312	100

1.3.18 Lithuania

Five fires were mapped in Lithuania in May and June, resulting in a total burnt area of 65 ha. No Natura2000 land was affected.

Table 20. Distribution of burnt area (ha) in Lithuania by land cover types in 2021.

Land cover	Area burnt	% of total
Coniferous forest	2	3.5
Transitional	1	1.2
Other Natural Land	62	95.4
TOTAL	65	100

1.3.19 Montenegro

The fire season in Montenegro was comparable to that of 2020 and significantly worse than the long term average. A total of 43 469 ha from 198 fires was mapped between February and November. However, in common with many other countries, August was the month when most of the damage occurred, in this case 75% of the annual total (Figure 23). The largest fire covered over 6 500 ha, and 11 exceeded 1 000 ha, with a further 7 greater than 500 ha. Figure 10 above shows the mapped burnt area scars.

Table 21. Distribution of burnt area (ha) in Montenegro by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	11656	26.8
Coniferous forest	363	0.8
Mixed forest	2263	5.2
Transitional	18390	42.3
Other Natural Land	9179	21.1
Agriculture	1595	3.7
Artificial Surfaces	19	0.0
Other Land Cover	5	0.0
TOTAL	43469	100

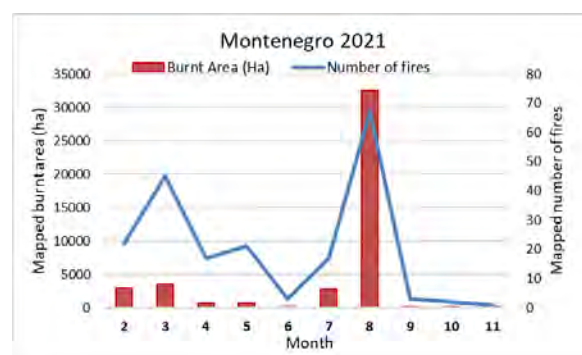


Figure 23. Monthly mapped burnt area and number of fires in Montenegro in 2021.

1.3.20 North Macedonia

136 fires were mapped in North Macedonia giving a total burnt area of 21 511 ha, ten times that mapped in 2020 but still well below the extreme year in 2019. Similar to other countries, August was by far the worst month, when two-thirds of the damage was recorded. The largest fire of the year covered more than 5 000 ha in Pehčevo municipality in the east of the country,

and there were 7 other fires that exceeded 500 ha, all occurring in July and August. The burnt area scars are shown in Figure 10 above.

Table 22. Distribution of burnt area (ha) in North Macedonia by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	2938	13.7
Coniferous forest	1850	8.6
Mixed forest	180	0.8
Transitional	6424	29.9
Sclerophyllous vegetation	432	2.0
Other Natural Land	3345	15.5
Agriculture	6333	29.4
Artificial Surfaces	9	0.0
TOTAL	21511	100

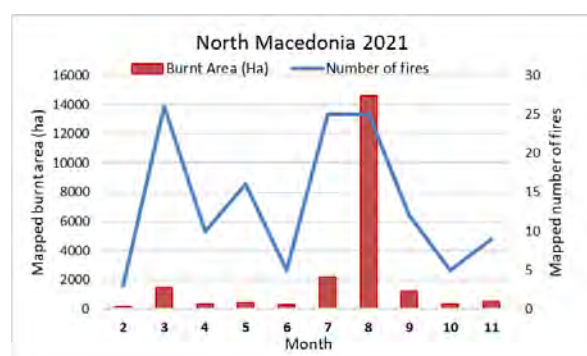


Figure 24. Monthly mapped burnt area and number of fires in North Macedonia in 2021.

1.3.21 Norway

There were fires mapped in Norway from March to August, resulting in a total of 991 ha from 22 fires. Most of the damage occurred early in the season, in April and June. Other Natural Land was the land cover type most affected, as shown in Table 23.

Table 23. Distribution of burnt area (ha) in Norway by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	43	4.4
Coniferous forest	23	2.3
Mixed forest	55	5.6
Other Natural Land	859	86.7
Agriculture	9	0.9
Other Land Cover	2	0.2
TOTAL	991	100

1.3.22 Poland

It was a light year in Poland. Twelve fires were mapped, all in June and in Other Natural Land, giving a total burnt area of 51 ha. 78% (40 ha) of this total was on Natura2000 land, amounting to 0.001% of the Natura2000 area of the country.

Table 24. Distribution of burnt area (ha) in Poland by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Other Natural Land	51	100.0

TOTAL	51	100
--------------	-----------	------------

1.3.23 Portugal

The 2021 fire season in Portugal was relatively light, and resulted in only half the total burnt area mapped compared with 2020. There were two peaks in the season: one early in March when a large number of relatively small fires occurred, and a second one in August which saw the largest fires of the year. The biggest one was in the Algarve in August, and burned over 7 000 ha. There was a second fire over 2 000 ha, also in the Algarve and a third over 500 ha in the Alentejo Litoral province. (This is a significant fall in large fires compared with 2020, when there were 21 fires over 500 ha, with the largest covering over 15 000 ha). The mapped burnt areas in Portugal in 2021 can be seen in Figure 25.

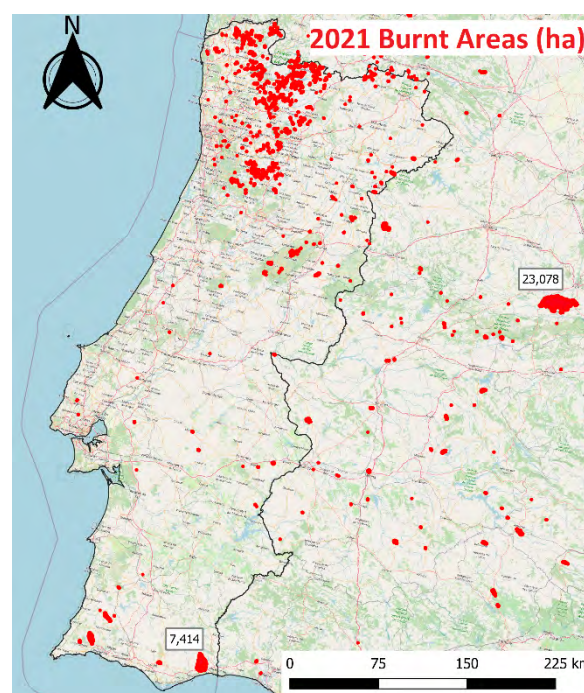


Figure 25. Burnt area scars in Portugal in 2021. Largest fires are indicated in ha.

Of the mapped total, 7 902 ha occurred on Natura2000 sites, corresponding to 25% of the total area burnt, and 0.414 % of the total Natura2000 areas in Portugal. The distribution of the mapped burnt area by land cover type is shown in Table 25.



Figure 26. Monthly mapped burnt area and number of fires in Portugal in 2021.

Table 25. Distribution of burnt area (ha) in Portugal by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	1118	3.5
Coniferous forest	406	1.3
Mixed forest	239	0.8
Transitional	5458	17.3
Sclerophyllous vegetation	4167	13.2
Other Natural Land	14749	46.7
Agriculture	5315	16.8
Artificial Surfaces	130	0.4
TOTAL	31582	100

1.3.24 Romania

The 2021 fire season in Romania was significantly better than the previous two years. The total of 20 957 ha mapped from 121 fires was just over one quarter of the totals recorded in those years. Most of the damage occurred early in the season, with 60% of the annual burnt area occurring in March. There were 6 fires over 1 000 ha and one over 500 ha, five in the Tulcea region early in the year (including the largest, of 5 420 ha), and the other two in Mehedinți province in August.

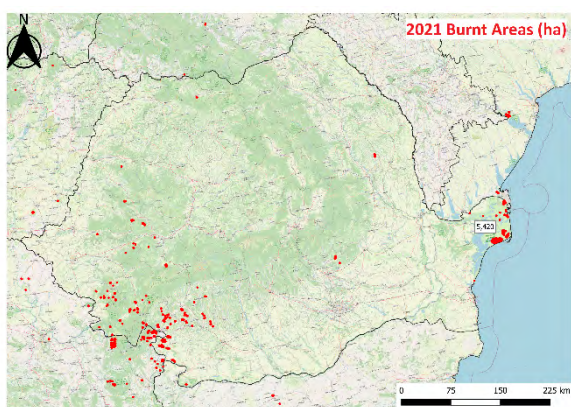


Figure 27. Burnt area scars in Romania in 2021. Largest fires are shown in ha.

In total, 15 289 ha (73%) of the mapped burnt area was on Natura2000 sites, representing 0.359% of the total Natura2000 area of Romania, a significant drop from the previous two years. Table 26 presents the distribution of the mapped burnt area by land cover type.

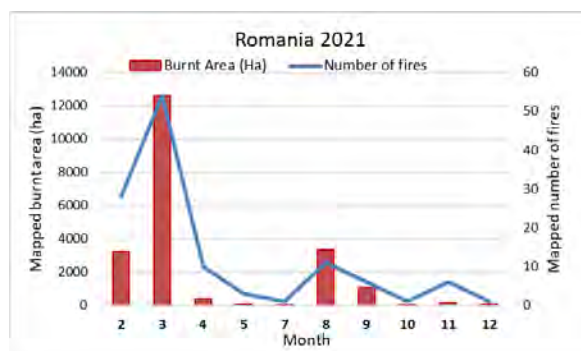


Figure 28 Monthly mapped burnt area and number of fires in Romania in 2021.

Table 26. Distribution of burnt area (ha) in Romania by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	2747	13.1
Mixed forest	6	0.0
Transitional	343	1.6
Other Natural Land	12319	58.8
Agriculture	5277	25.2
Artificial Surfaces	259	1.2
Other Land Cover	6	0.0
TOTAL	20957	100

1.3.25 Serbia

The 2021 fire season in Serbia was somewhat better than that of 2020, with a total annual burnt area of 7 708 ha from 139 mapped fires. There were two peaks to the season (Figure 29), but the largest fire of the year (1 311 ha, in Kladovo municipality in East Serbia) occurred in August. Burnt area scars from these fires can be seen in Figure 10 above.

Table 27. Distribution of burnt area (ha) in Serbia by land cover type in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	1245	16.2
Coniferous forest	479	6.2
Mixed forest	162	2.1
Transitional	1445	18.7
Other Natural Land	1691	21.9
Agriculture	2681	34.8
Artificial Surfaces	4	0.1
Other Land Cover	2	0.0
TOTAL	7708	100



Figure 29, Monthly mapped burnt area and number of fires in Serbia in 2021.

1.3.26 Slovakia

A fire of 115 ha was mapped in July, covering Other Natural Land. No Natura2000 land was impacted.

Table 28. Distribution of burnt area (ha) in Slovakia by land cover type in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Other Natural Land	115	100.0
TOTAL	115	100

1.3.27 Slovenia

Two fires were mapped in Slovenia, resulting in a total burnt area of 81 ha. The larger of the two, 76 ha in February, was on a Natura2000 site and amounted to 0.011% of the Natura2000 area of the country.

Table 29. Distribution of burnt area (ha) in Slovenia by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Transitional	5	6.2
Other Natural Land	76	93.8
TOTAL	81	100

1.3.28 Spain

The 2021 fire season in Spain was the worst since 2017, although the total burnt area of 91 295 ha from 901 fires was still only two-thirds of that measured in the extreme year of 2017. Like Portugal, the season was notable for a large number of relatively small fires in Spring. However, the main damage of the year occurred in August, mostly because of one fire in Ávila province that covered more than 23 000 ha, the second largest fire to be mapped in the EU (after the one in Evia, Greece). There were 8 other fires over

1 000 ha mapped, and a further 14 over 500 ha (Figure 31).

Of the total burnt area mapped in 2021, 21 668 ha occurred on Natura2000 sites, corresponding to 24% of the total area burnt, and 0.157% of the Natura2000 areas in Spain.

Table 30 presents the distribution of the mapped burnt area by land cover type.

Table 30. Distribution of burnt area (ha) in Spain by land cover type in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	5997	6.6
Coniferous forest	11195	12.3
Mixed forest	986	1.1
Transitional	4320	4.7
Sclerophyllous vegetation	23801	26.1
Other Natural Land	39014	42.7
Agriculture	5803	6.4
Artificial Surfaces	123	0.1
Other Land Cover	56	0.1
TOTAL	91295	100



Figure 30. Monthly mapped burnt area and number of fires in Spain in 2021.

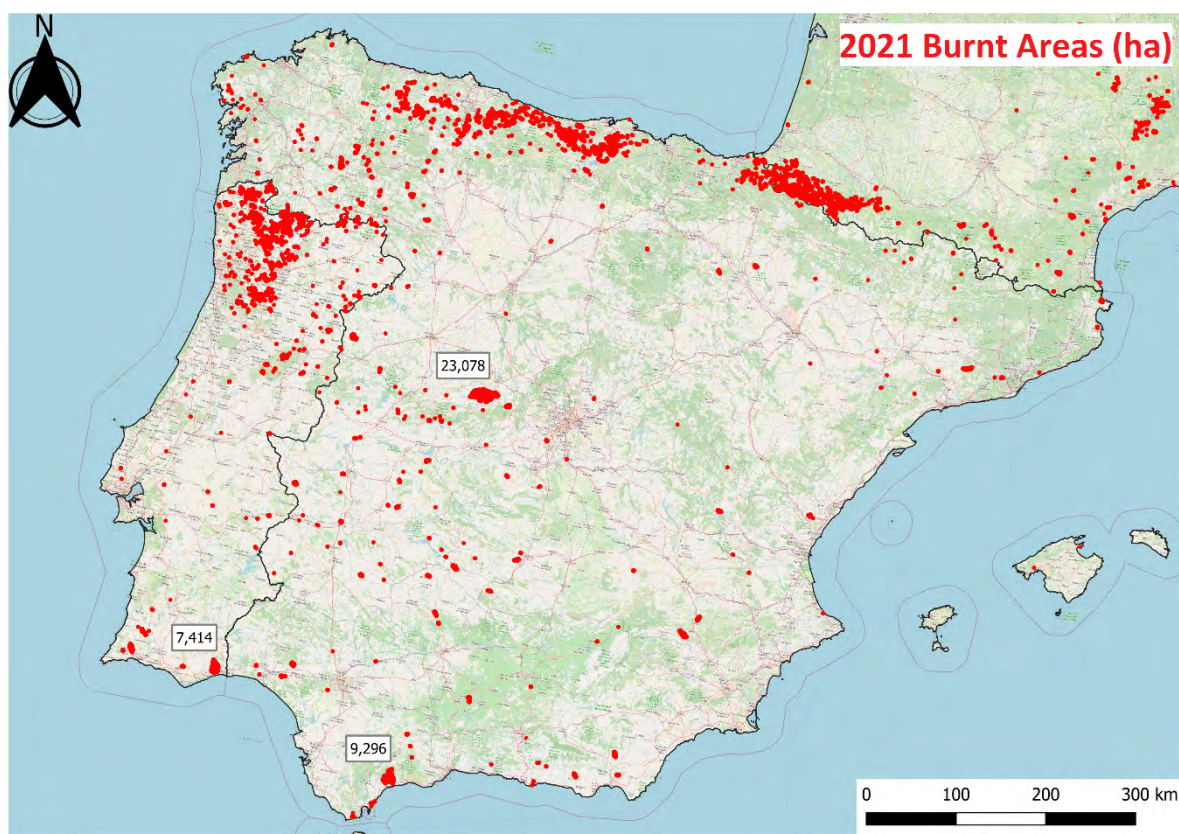


Figure 31. Burnt area scars in Spain in 2021. Largest fires are indicated in ha.

1.3.29 Sweden

48 fires were mapped in Sweden in 2021, resulting in a total burnt area of 1 287 ha. Fires were mapped between March and August but almost all of the damage occurred in June/July. 447 ha of the total was in Natura2000 sites, amounting to 35% of the total and 0.008% of the Natura2000 area of the country. Burnt area scars mapped in 2021 can be seen in Figure 15 above.

Table 31. Distribution of burnt area (ha) in Sweden by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Coniferous forest	514	39.9
Mixed forest	52	4.0
Transitional	140	10.9
Other Natural Land	520	40.4
Other Land Cover	61	4.8
TOTAL	1287	100

1.3.30 Switzerland

Two fires were mapped in Switzerland in April, covering a total of 12 ha.

Table 32. Distribution of burnt area (ha) in Switzerland by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	8	64.3
Mixed forest	4	35.7
TOTAL	12	100

1.3.31 Turkey

It was the worst fire season in Turkey for more than a decade. The total burnt area from 612 fires was 206 013 ha, the highest amount recorded across Europe, Middle East and North Africa in 2021.

Fires were mapped in every month of the year, but the worst period was in July, when two-thirds of the annual total was mapped (Figure 32). This included the largest fire mapped across the whole area covered by EFFIS, which burned more than 54 000 ha in Antalya at the end of the month. There were also 5 other fires over 10 000 ha, 16 fires over 1 000 ha and 17 fires over 500 ha. Coniferous Forest was particularly impacted (Table 33).

Table 33. Distribution of burnt area (ha) in Turkey by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	10814	5.2
Coniferous forest	79432	38.6
Mixed forest	5172	2.5
Transitional	50552	24.5
Sclerophyllous vegetation	4296	2.1
Other Natural Land	23663	11.5
Agriculture	28565	13.9
Artificial Surfaces	546	0.3
Other Land Cover	2973	1.4
TOTAL	206013	100

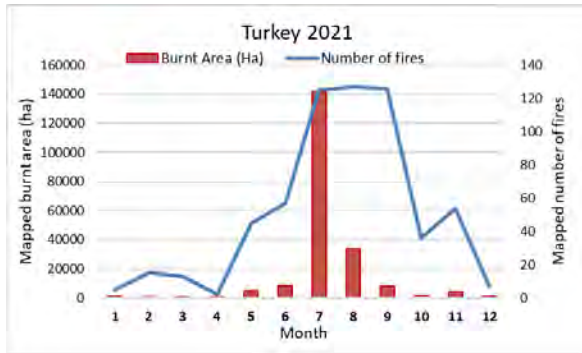


Figure 32. Monthly mapped burnt area and number of fires in Turkey in 2021.

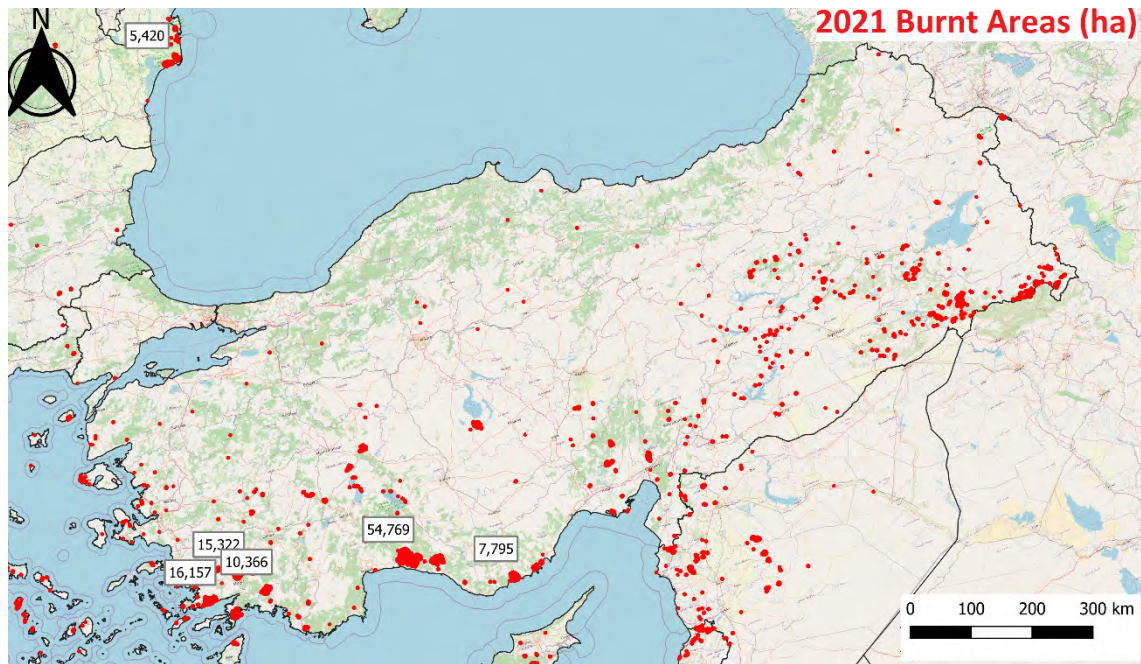


Figure 33. Burnt area scars in Turkey in 2021. Largest fires are indicated in ha.

1.3.32 Ukraine

After an extreme year in 2020, the 2021 season in Ukraine was much quieter. 128 fires were mapped, burning 27 866 ha, around 11% of 2021's total. The season started in March, but the largest fires of the year occurred at the end of the season in October with one fire over 2 000 ha and two over 1 000 ha mapped on the same day. There were also 5 other fires over 1 000 ha and four over 500 ha during the year. Other Natural Land made up over 40% of the total burnt area (Table 34).

Table 34. Distribution of burnt area (ha) in Ukraine by land cover types in 2021.

Land cover	Area burnt	% of total
Broadleaf forest	3681	13.2
Coniferous forest	1516	5.4
Mixed forest	216	0.8
Transitional	2142	7.7
Other Natural Land	11956	42.9
Agriculture	8211	29.5
Artificial Surfaces	52	0.2
Other Land Cover	92	0.3
TOTAL	27866	100



Figure 34. Monthly mapped burnt area and number of fires in Ukraine in 2021.

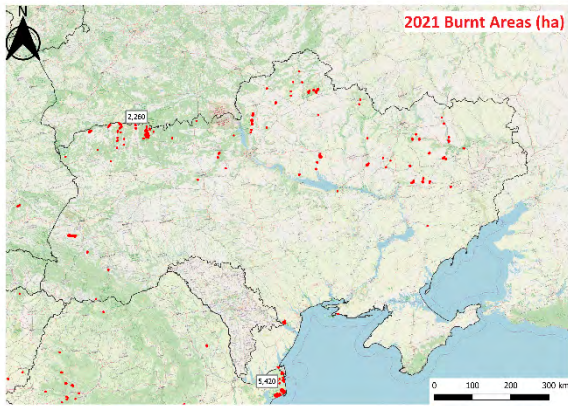


Figure 35. Burnt area scars in Ukraine in 2021. Largest fires are indicated in ha.

Figure 36. Monthly mapped burnt area and number of fires in the United Kingdom in 2021.

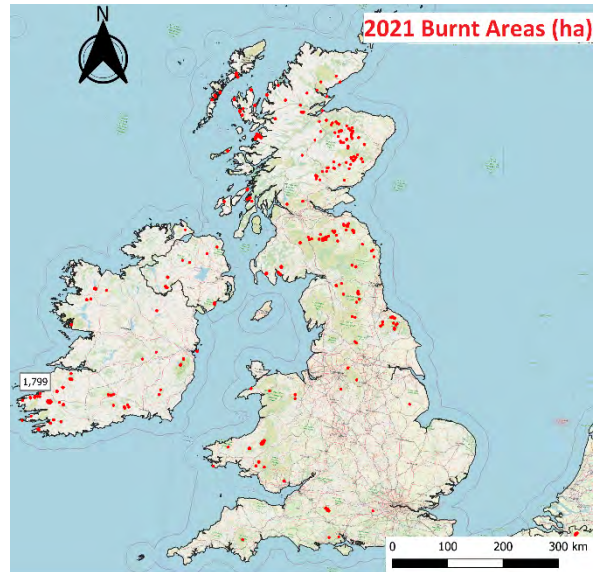


Figure 37. Burnt area scars in the United Kingdom and Ireland in 2021.

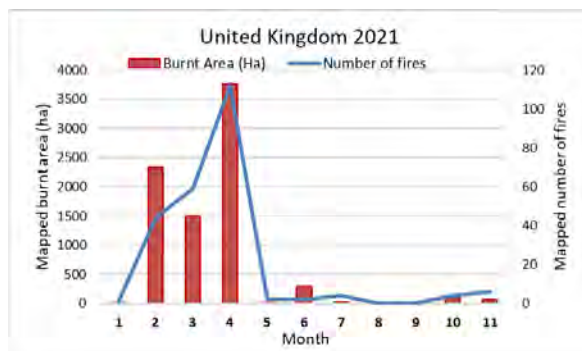
1.3.33 United Kingdom

The 2021 fire season in the United Kingdom was lighter than the previous three years, with a total of 8 098 ha mapped from 234 fires. 94% of the damage was recorded between February and April, although a small number of fires were mapped from January to November. No large fires (>500 ha) were mapped (Figure 37).

Of the total, 1 139 ha occurred on Natura2000 land, amounting to 14% of the total burnt area and 0.064% of the Natura2000 land in the UK. Other Natural Land was by far the most affected land type (Table 35).

Table 35. Distribution of burnt area (ha) in the UK by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Coniferous forest	87	1.1
Mixed forest	10	0.1
Transitional	68	0.8
Other Natural Land	7887	97.4
Agriculture	20	0.3
Artificial Surfaces	12	0.1
Other Land Cover	14	0.2
TOTAL	8098	100



1.4 Middle East and North Africa

The total burnt area mapped across North Africa and the Middle East was very similar to that of 2020 and somewhat worse than the long-term average, but with large differences within individual nations. Israel and Tunisia had a worse year than in 2020, while Libya's season was better. The most affected country in the region was Algeria, accounting for 69% of the total burnt area

1.4.1 Algeria

The total mapped burnt area in Algeria was the highest since 2012. 295 fires were mapped, giving a total burnt area of 31 275 ha, two-thirds of which was on Agricultural Land. The first fire of the season was mapped in February and the last in November, but 85% of the damage was in August.

The largest fire of the season was over 25 000 ha, and there were 20 other fires over 1 000 ha and 15 that exceeded 500 ha (Figure 38).

Of the total, 2738 ha of protected areas were burnt, amounting to 1.64% of the protected land of Algeria. The Globcover land cover map from ESA was used to split the burnt area into different land type categories, harmonised with CLC terminology, and the distribution of burnt area by these land cover types is given in Table 36.

Table 36. Distribution of burnt area (ha) in Algeria by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	20466	15.2
Coniferous forest	3171	2.4
Mixed forest	105	0.1
Transitional	19711	14.7
Other Natural Land	4720	3.5
Agriculture	85934	64.0
Artificial Surfaces	161	0.1
Other Land Cover	6	0.0
TOTAL	134273	100

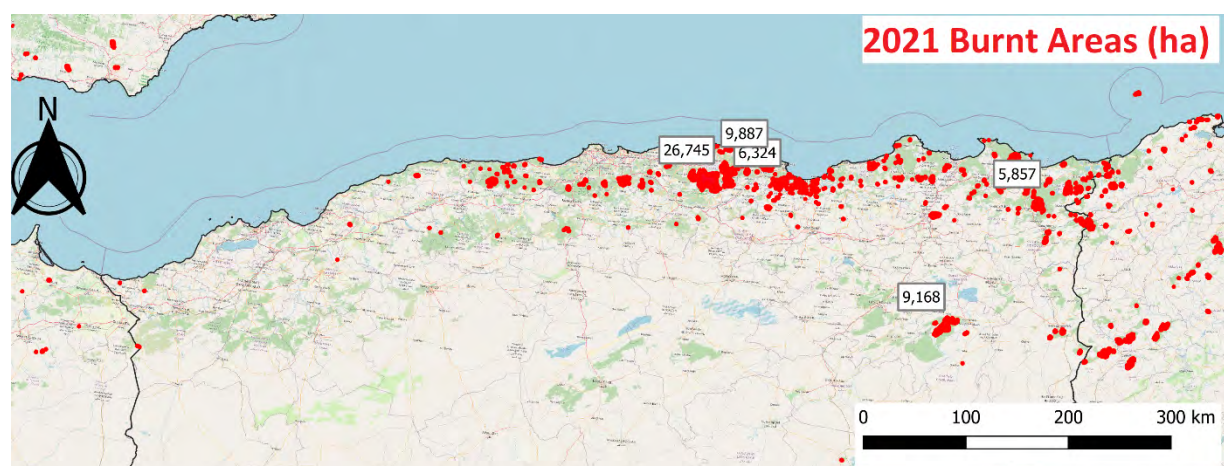


Figure 38. Burnt area scars in Algeria in 2021. Largest fires are indicated in ha.

1.4.2 Iraq

A fire of 25 ha was mapped in Iraq in July, mostly affecting Sclerophyllous Vegetation.

Table 37. Distribution of burnt area (ha) in Iraq by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	2	9.5
Sclerophyllous vegetation	23	90.5
TOTAL	25	100

1.4.3 Israel

In Israel there were 32 fires mapped, burning a total of 4 021 ha. Fires were mapped from May to November, but around three-quarters of the damage occurred in July and August, and almost half of the annual total came from two large fires in this period: one of 1 230 ha and the other of 529 ha. 57% of the total burnt area was in Agricultural Land.

Table 38. Distribution of burnt area (ha) in Israel by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Coniferous forest	40	1.0
Transitional	1418	35.3
Other Natural Land	237	5.9
Agriculture	2306	57.3

Other Land Cover	21	0.5
TOTAL	4021	100

1.4.4 Lebanon

50 fires were mapped in Lebanon, resulting in a total burnt area of 2 360 ha, somewhat less than the previous two years. There was one large fire of 882 ha in Andaket province, Akkar Governorate in July, making this the most affected month (Figure 39). Mapped burnt area scars can be seen in Figure 43 below. Table 39 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 39. Distribution of burnt area (ha) in Lebanon by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	57	2.4
Coniferous forest	303	12.8
Transitional	705	29.9
Other Natural Land	303	12.8
Agriculture	992	42.0
TOTAL	2360	100

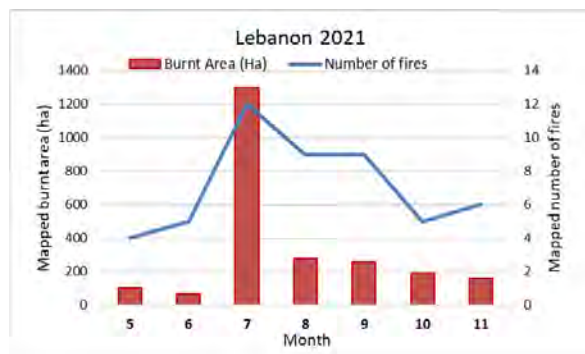


Figure 39. Monthly mapped burnt area and number of fires in Lebanon in 2021.

1.4.5 Libya

The fire season in Libya was relatively quiet. 11 fires were mapped, resulting in a total burnt area of 377 ha, most of which occurred in June/July.

Table 40 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 40. Distribution of burnt area (ha) in Libya by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Transitional	198	52.4
Other Natural Land	9	2.4
Agriculture	170	45.2
TOTAL	377	100

1.4.6 Morocco

The 2021 fire season in Morocco was somewhat better than that of 2020. The total mapped burnt area was 6 083 ha from 81 fires. Over 80% of the damage

occurred in July/August, in part because of the largest fire of the year which covered over 2 000 ha in Bab Taza, Chefchaouen Province (Figure 41). There was one other fire over 500 ha.

Of the annual total, 544 ha occurred in Protected Areas. This amounts to 9% of the total burnt in the year and 0.075% of the total protected areas of the country. The distribution of burnt area by land cover types, using Morocco's own land cover map but with terminology harmonised with CLC, is in Table 41.

Table 41. Distribution of burnt area (ha) in Morocco by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	2050	33.7
Coniferous forest	725	11.9
Mixed forest	649	10.7
Transitional	890	14.6
Other Natural Land	493	8.1
Agriculture	1273	20.9
Artificial Surfaces	4	0.1
TOTAL	6083	100

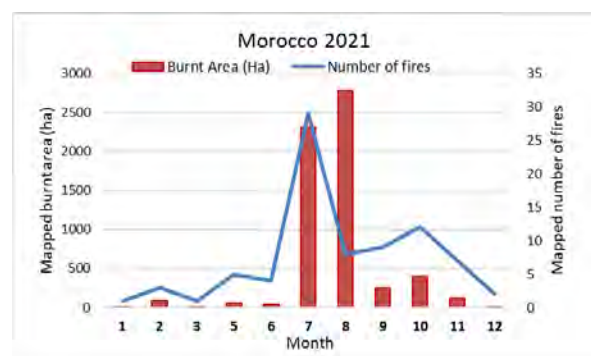


Figure 40. Monthly mapped burnt area and number of fires in Morocco in 2021.

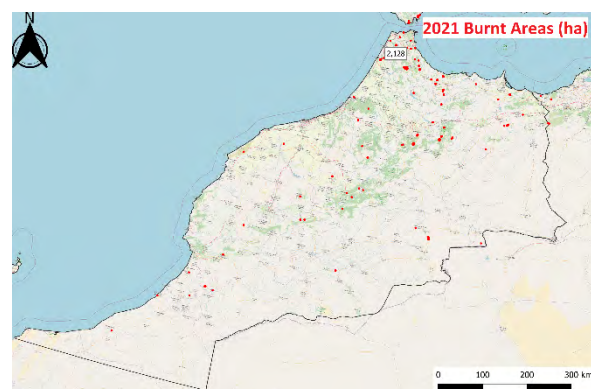


Figure 41. Burnt area scars in Morocco in 2021. Largest fire is indicated in ha.

1.4.7 Palestinian Territory

There were two fires mapped in the Palestinian Territory, one in May and the second in June, burning a total of 143 ha.

Table 42. Distribution of burnt area (ha) in Palestinian Territory by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Transitional	9	6.3
Other Natural Land	40	27.9
Agriculture	94	65.8
TOTAL	143	100

1.4.8 Syria

The total mapped burnt area in Syria was 18 798 ha from 118 fires, less than half the total for 2020. The peak of the fire season came relatively early, in May when half the annual burnt area was mapped (Figure 42). There were four fires of over 1 000 ha and a further five over 500 ha.

The Globcover land cover map, harmonised with CLC, was used to split the burnt area into different land type categories (Table 43).

Table 43. Distribution of burnt area (ha) in Syria by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	27	0.1
Coniferous forest	851	4.5
Mixed forest	16	0.1
Transitional	1674	8.9
Other Natural Land	8936	47.5
Agriculture	7275	38.7
Other Land Cover	19	0.1
TOTAL	18798	100

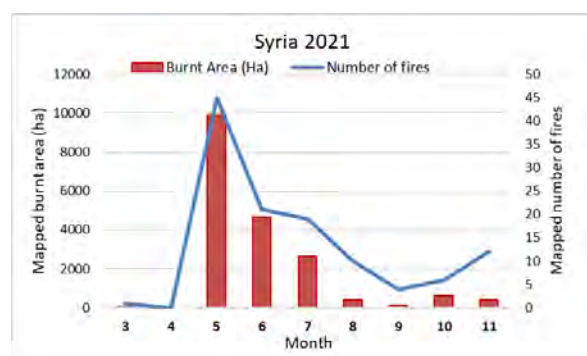


Figure 42. Monthly mapped burnt area and number of fires in Syria in 2021.

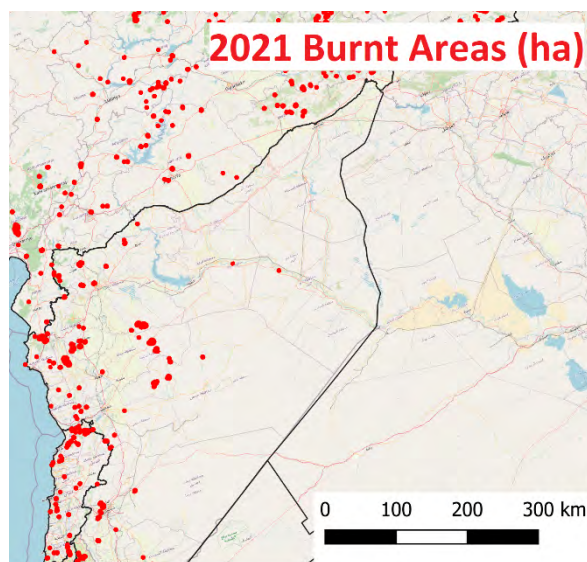


Figure 43. burnt area scars in Syria and Lebanon in 2021.

1.4.9 Tunisia

The 2021 fire season in Tunisia was the most severe for at least 12 years. A total of 29 009 ha of burnt area were mapped from 98 fires, mostly between June and August (Figure 45). There were 8 fires over 1 000 ha and a further 7 over 500 ha (Figure 44). Coniferous Forest was particularly impacted.

The distribution of burnt area by land cover types using Tunisia's own land cover map but with terminology harmonised with CLC, is given in Table 44.

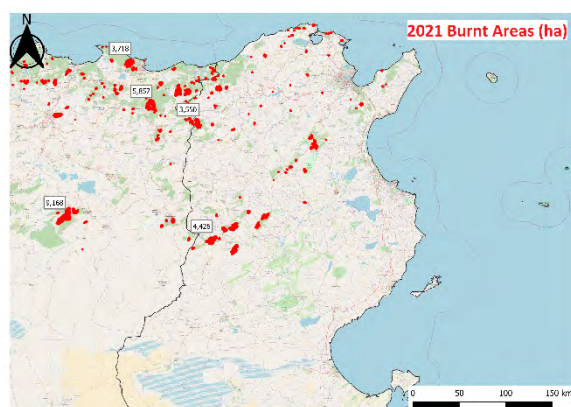


Figure 44. Burnt area scars in Tunisia in 2021. Largest fires are indicated in ha.

Table 44. Distribution of burnt area (ha) in Tunisia by land cover types in 2021.

<i>Land cover</i>	<i>Area burnt</i>	<i>% of total</i>
Broadleaf forest	2183	7.5
Coniferous forest	17700	61.0
Mixed forest	410	1.4
Transitional	4497	15.5
Sclerophyllous vegetation	1546	5.3

Other Natural Land	682	2.4
Agriculture	1905	6.6
Artificial Surfaces	18	0.1
Other Land Cover	69	0.2
TOTAL	29009	100

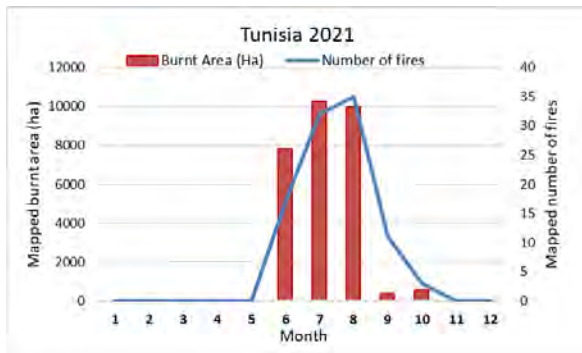


Figure 45. Monthly mapped burnt area and number of fires in Tunisia in 2021.

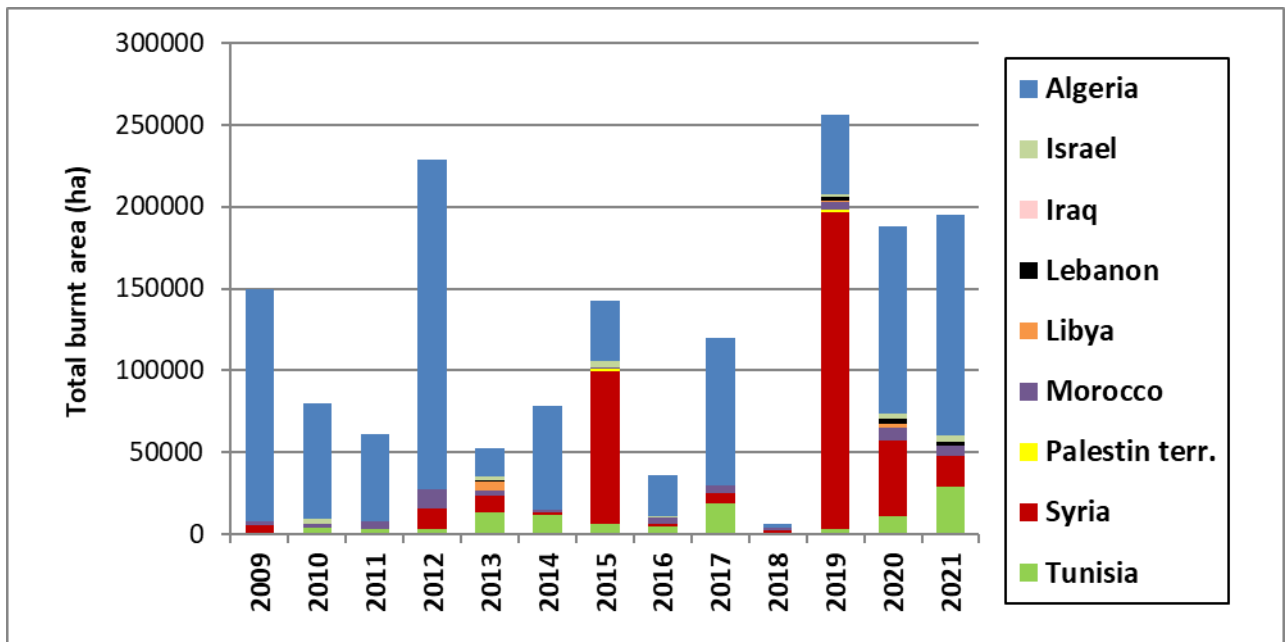


Figure 46. Overview of fires in the MENA region in the last 13 years.

1.5 Conclusions

The 2021 fire season was marked by a number of very large fires in August, particularly in Turkey and Greece, making this the most destructive month and accounting for almost half of the annual total area burnt. Protected areas were overall slightly less affected than in the previous two years, mostly because of better conditions in the Danube Delta, but Italy and Spain both showed sharp increases from 2020.

1.6 List of acronyms

ECHO European Civil Protection and Humanitarian Aid Operations

ECMWF European Centre for Medium Range Forecast

EFFIS European Forest Fire Information System

ERCC Emergency Response Centre

FWI Fire Weather Index

MENA Middle East and North Africa

RDA Rapid Damage Assessment

.

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: https://europa.eu/european-union/contact_en

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
- at the following standard number: +32 22999696, or
- by electronic mail via: https://europa.eu/european-union/contact_en

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: https://europa.eu/european-union/index_en

EU publications

You can download or order free and priced EU publications from EU Bookshop at: <https://publications.europa.eu/en/publications>. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en).

The European Commission's science and knowledge service

Joint Research Centre

JRC Mission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.



EU Science Hub
ec.europa.eu/jrc



@EU_ScienceHub



EU Science Hub - Joint Research Centre



EU Science, Research and Innovation



EU Science Hub



Publications Office
of the European Union

doi:10.2760/039729

ISBN 978-92-76-49633-5