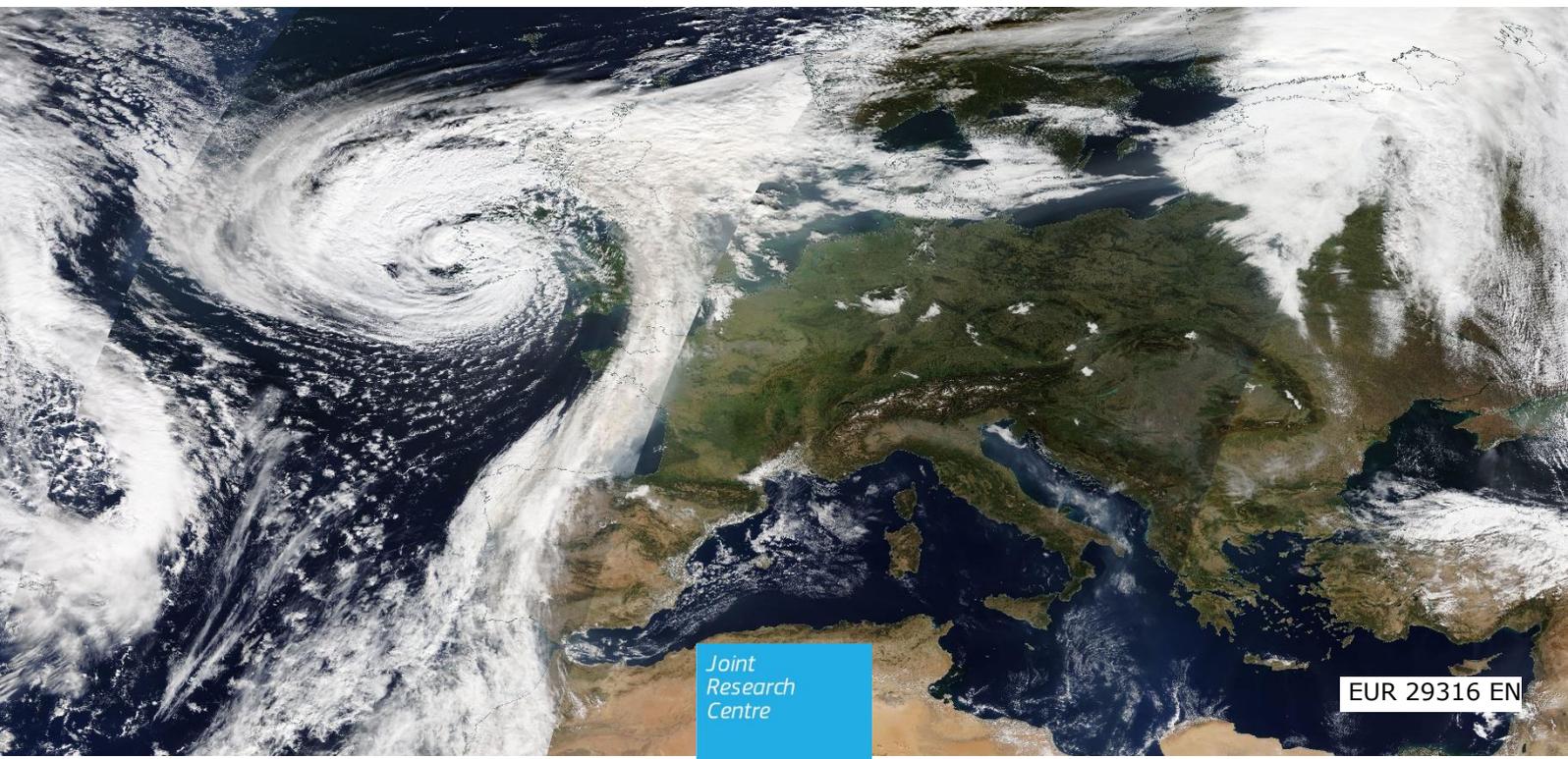


JRC TECHNICAL REPORTS

Advance EFFIS report on Forest Fires in Europe, Middle East and North Africa 2017

March 2018



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Title Advance EFFIS report on Forest Fires in Europe, Middle East and North Africa 2017

Abstract

This report contains the annual summary of the fire season of 2017 with an analysis of fire danger and areas mapped in the European Forest Fire Information System (EFFIS).

Cover image: Europe 16/10/2017 from the NASA Worldview application (<https://worldview.earthdata.nasa.gov/>) operated by the NASA/Goddard Space Flight Centre Earth Science Data and Information System (ESDIS) project.

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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 40 countries in Europe, Middle East and North Africa. EFFIS provides specific support to the Emergency Response Centre (ERCC) (formerly Monitoring and Information Centre (MIC)) of Civil Protection as regards near-real time information on wildfires during the fire campaigns and assists other DGs 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, and regularly sends updates to EC services during the main fire season. The information about the on-going fire season is continuously updated on the EFFIS web site (up to 3 times, daily), which can be interactively queried². EFFIS provides daily meteorological fire danger maps and forecasts of fire danger up to 10 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.

The damage caused by forest fires in Europe and neighbouring countries is estimated using the EFFIS Rapid Damage Assessment module. Since 2000, cartography of the burned 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 burned area mapped by EFFIS corresponds, on average, to around 75% to 80% of the total area burnt in Europe each year.

¹ <http://effis.jrc.ec.europa.eu>

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

1.1 EFFIS Danger Forecast: 2017 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 three different data sets from three providers: ECMWF (the primary), Meteo France and DWD; with a spatial resolution in a range from around 10 km to 25 km.

In this chapter the fire danger trends assessed by EFFIS in the different countries during the 2017 fire season are presented, comparing them with previous years.

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 through 2017 as determined by the average FWI values assessed during the fire season in the individual countries.

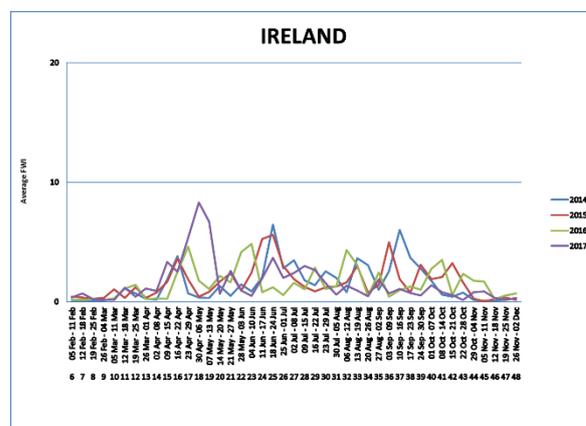
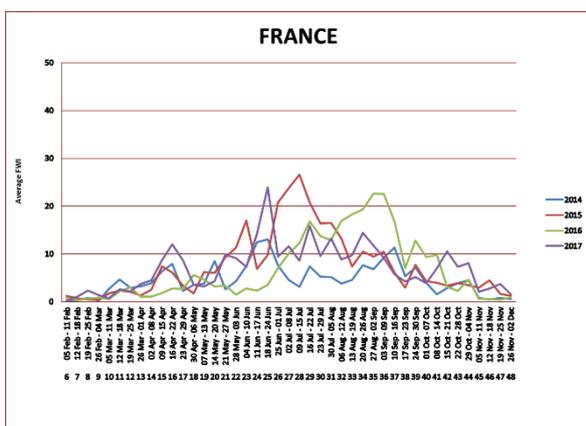
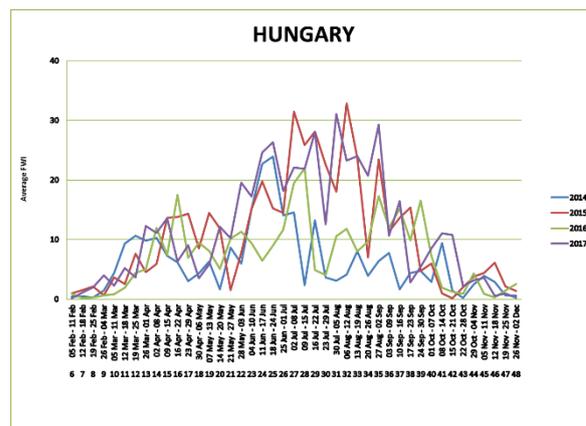
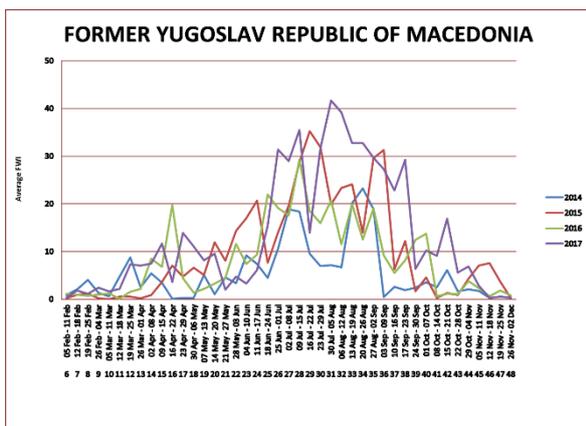
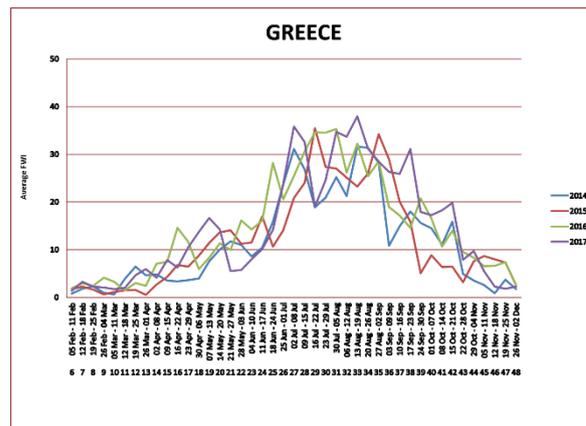
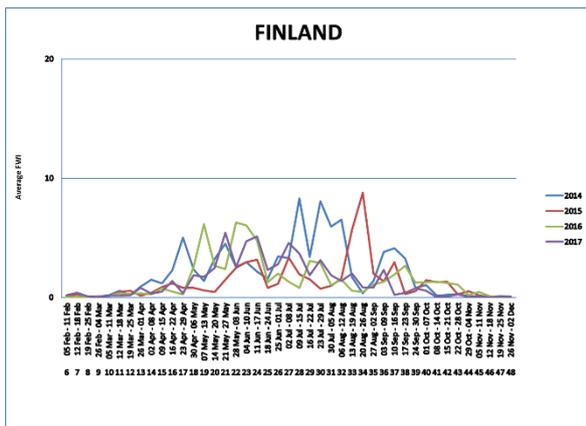
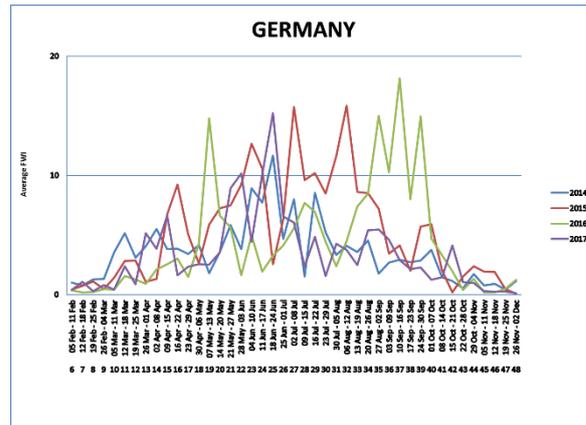
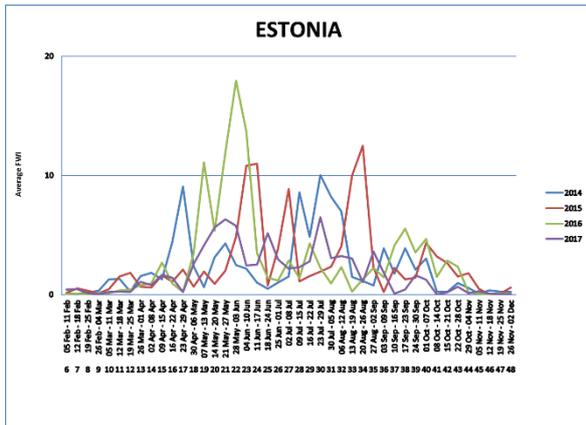
In 2017 the northern countries experienced relatively high FWI early in the year, as is usual. High values were seen across much of Europe during summer, and there was a noticeable extra peak late in the year in October for several countries.

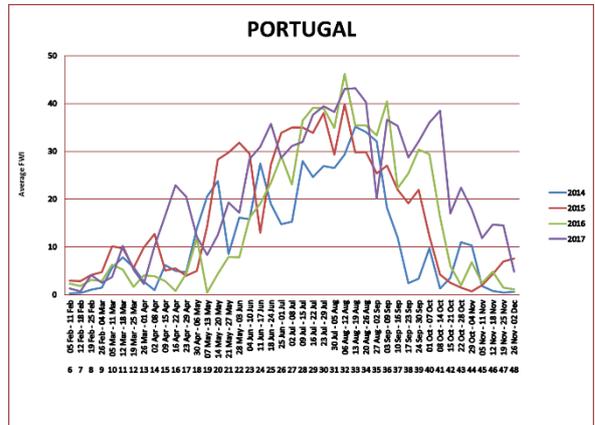
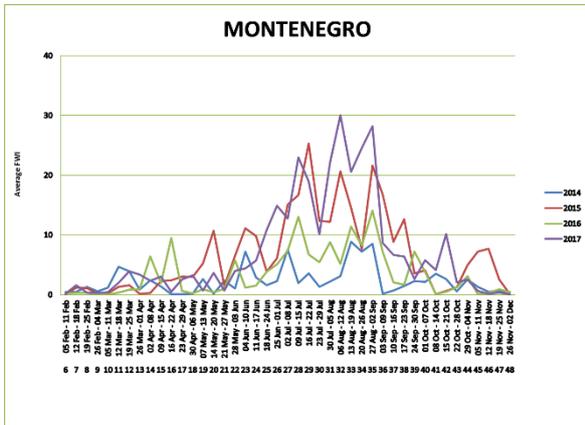
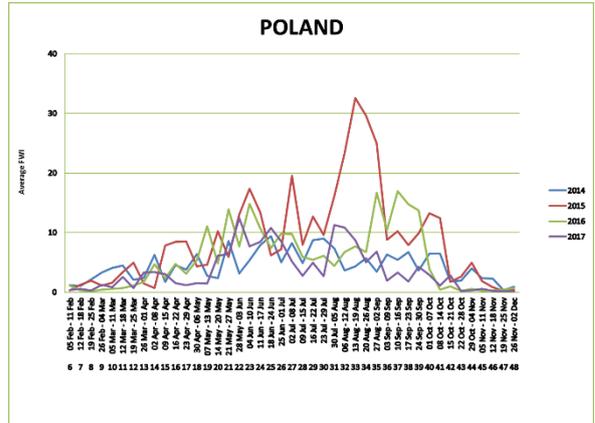
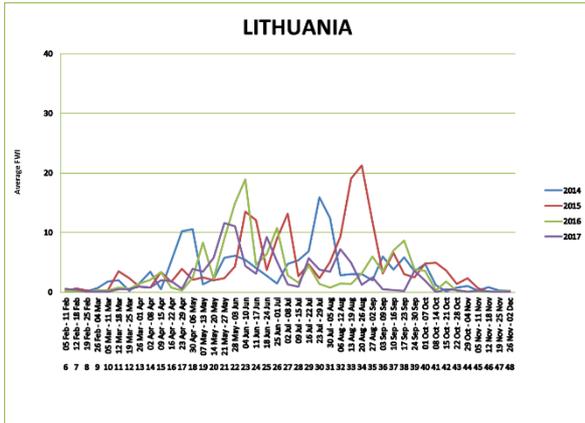
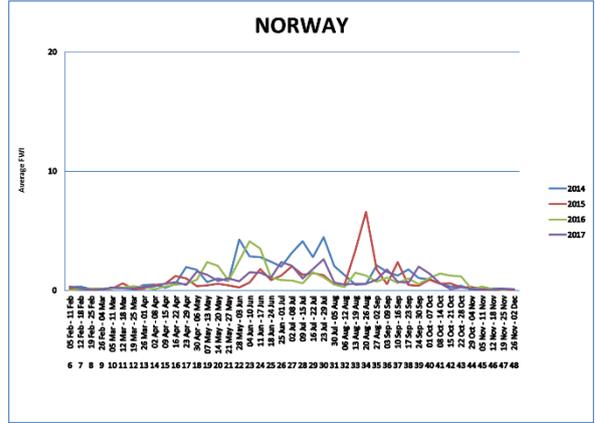
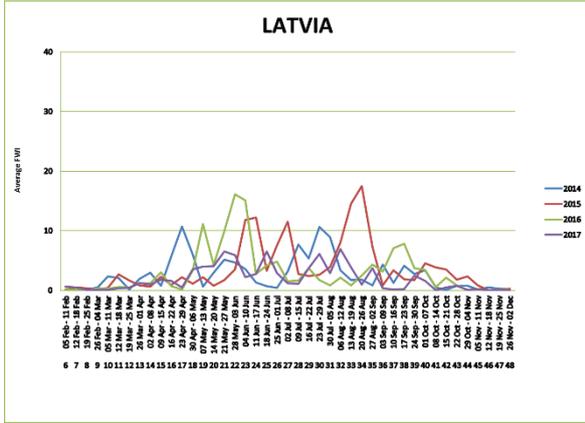
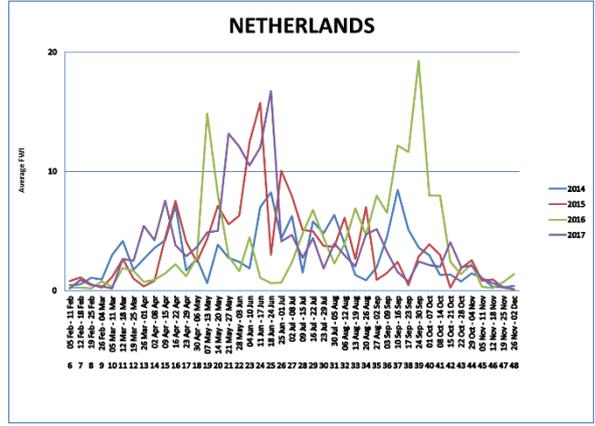
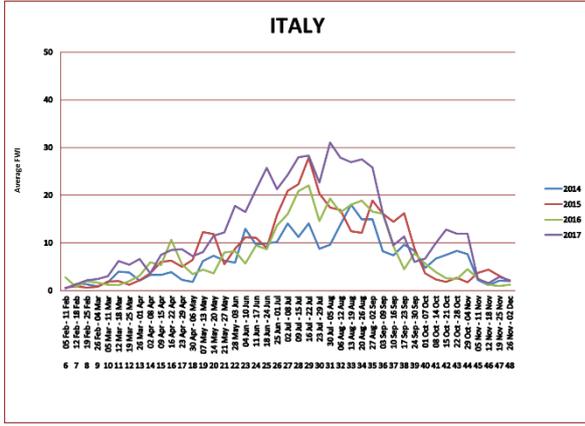
The graphs show the weekly averages of FWI over entire countries; therefore local peaks might have been flattened, especially in those countries such as France or Italy, where there are strong differences in fire danger level with changing latitudes; nevertheless the general trend is depicted providing relevant information about the fire danger level and trends of the year.

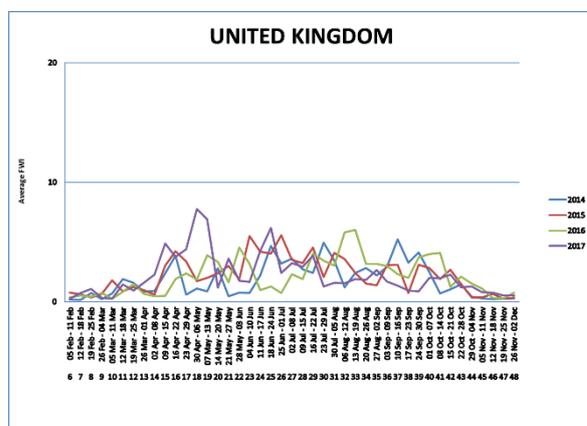
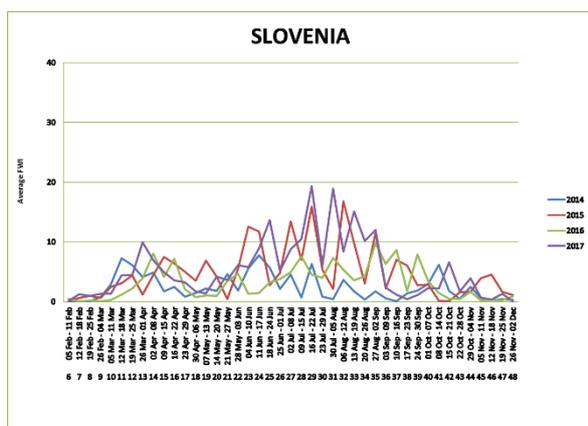
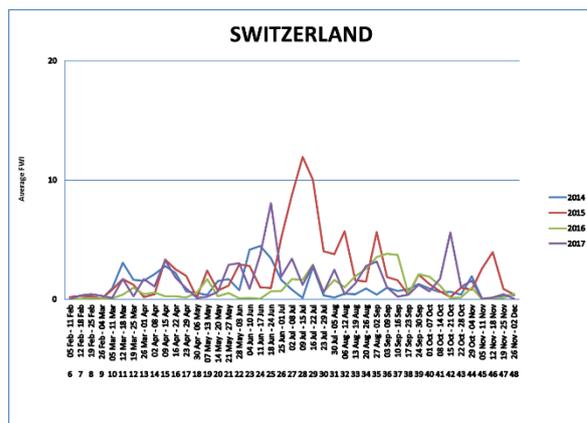
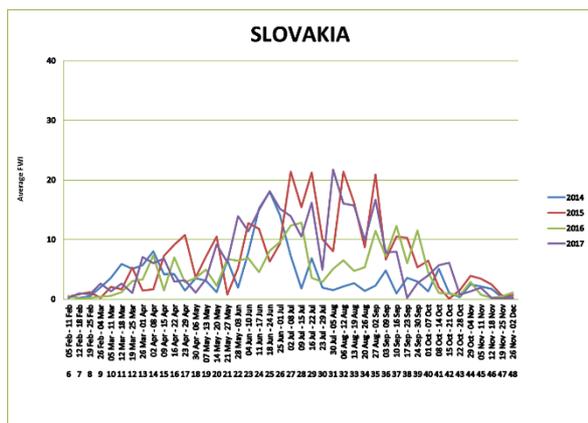
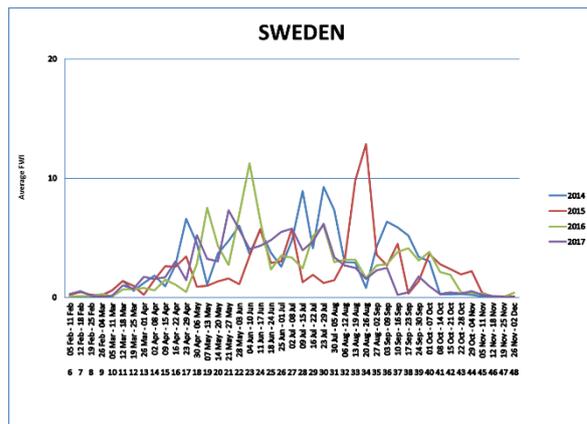
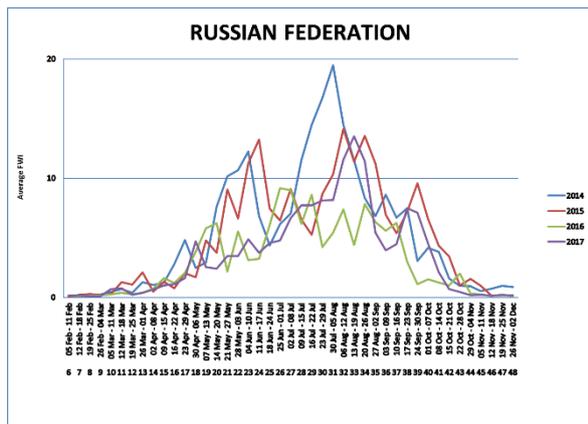
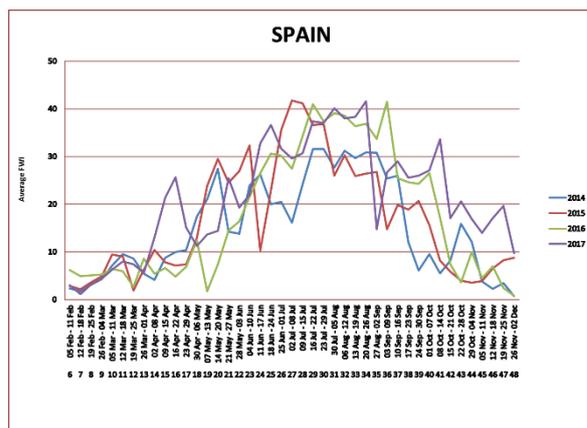
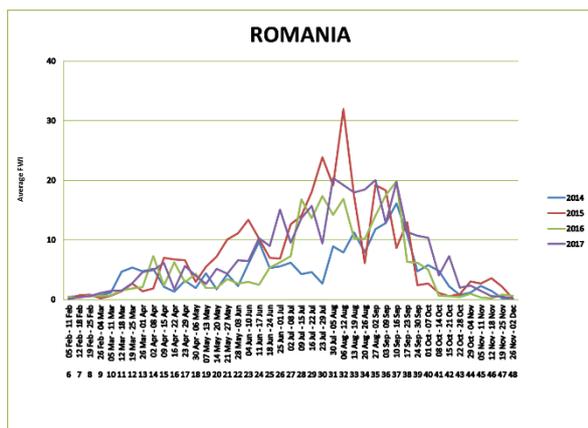
To allow a better comparison with past seasons, the curves of 2014-2016 are presented in conjunction with 2017 for all countries.

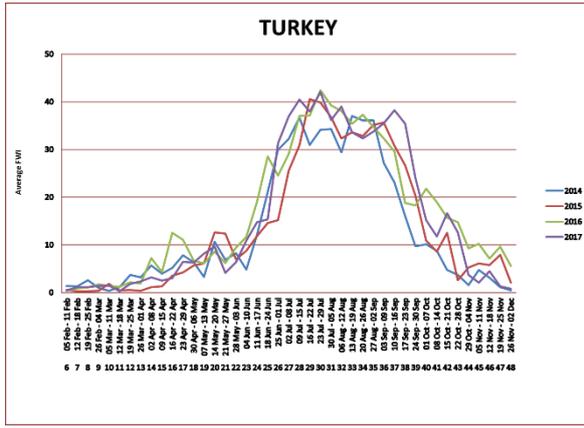
The countries analysed are those participating in the EFFIS network for which data are available, and are presented in alphabetic order within the two groups (European countries and MENA countries) in the graphs that follow.

NOTE: In order to make the graphs more readable, 4 colour-coded scales have been used to present the FWI: **0-20** for the most northern countries where fire danger rarely reaches high levels; **0-40** for central countries, **0-50** for the Mediterranean and Turkey, and **0-60** for the MENA countries.

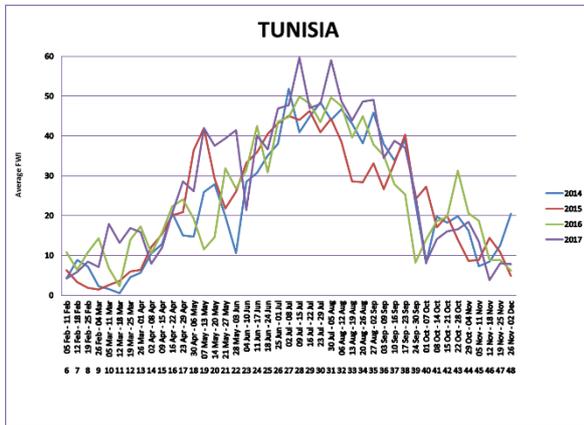
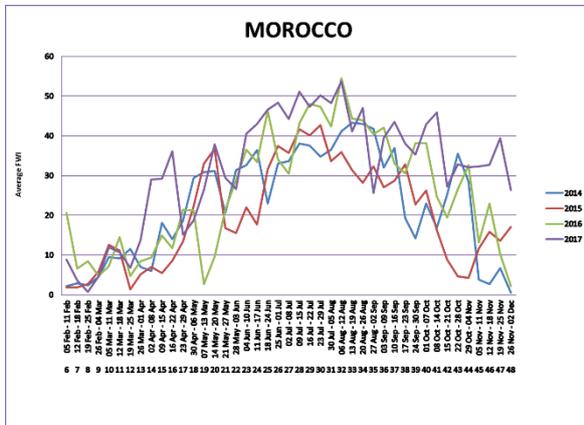
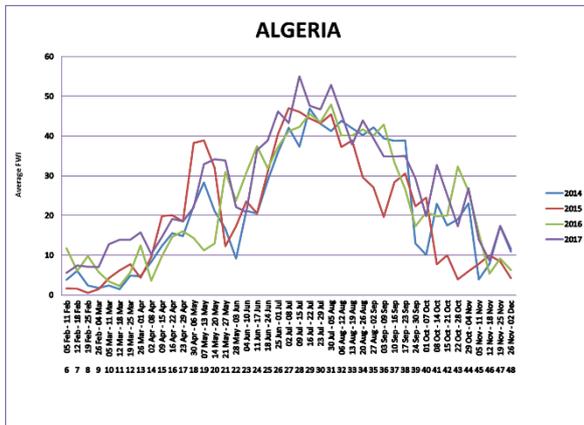








MENA Countries



As mentioned previously, weekly country averages tend to flatten local fire danger peaks, which as a consequence become less evident, especially in those countries such as France or Italy, where there are strong differences in fire danger level with changing latitudes.

Therefore, to show more clearly the seasonal changes in FWI in the larger EU Mediterranean countries, i.e. Portugal, Spain, France, Italy and Greece, their territory has been further divided for fire danger reporting, according to the map shown in Figure 1. The division criteria are mainly administrative and should be taken as provisional, since other fire risk reporting sub-regions, with a specific focus on environmental criteria, might be proposed in the future.

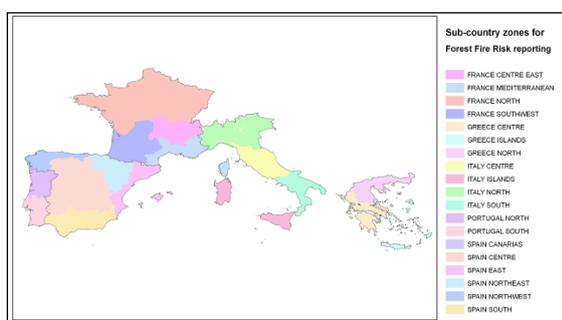


Figure 1. Sub-country regions identified for fire danger trend reporting in the five largest Mediterranean Member States.

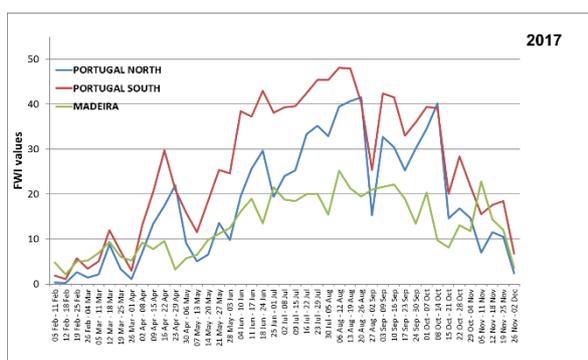


Figure 2. Fire danger trends in 2017 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal.

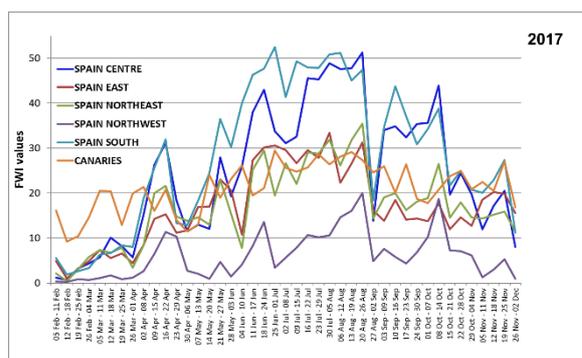


Figure 3. Fire danger trends in 2017 as determined by the Fire Weather Index (FWI) in the regions identified for Spain.

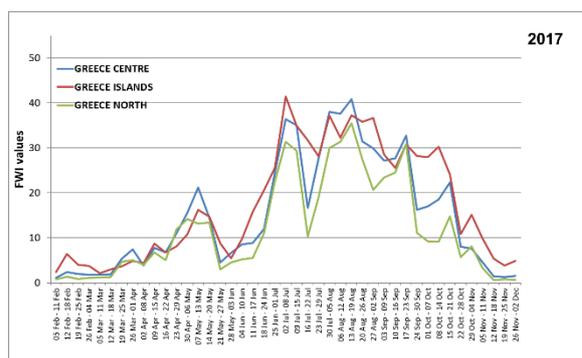


Figure 4. Fire danger trends in 2017 as determined by the Fire Weather Index (FWI) in the regions identified for Greece.

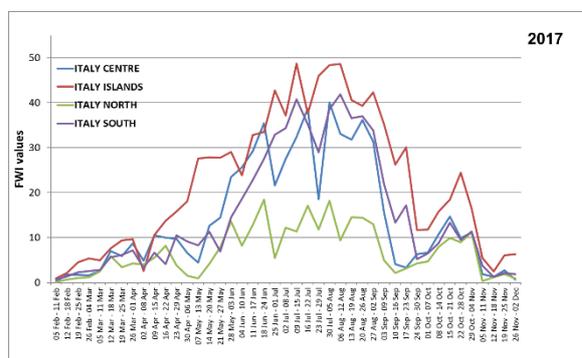


Figure 5. Fire danger trends in 2017 as determined by the Fire Weather Index (FWI) in the regions identified for Italy.

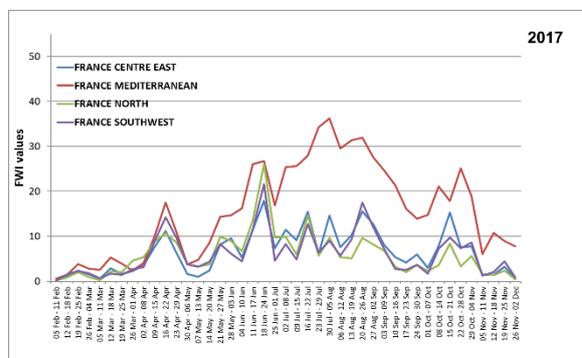


Figure 6. Fire danger trends in 2017 as determined by the Fire Weather Index (FWI) in the regions identified for France.

To facilitate the comparison among the different countries in EU, in the next graphs (Figure 7 to Figure 13), the fire danger trends as determined by FWI are shown for countries grouped by main bioclimatic type (e.g. Mediterranean, temperate or boreal). Data are given for 2015-2017.

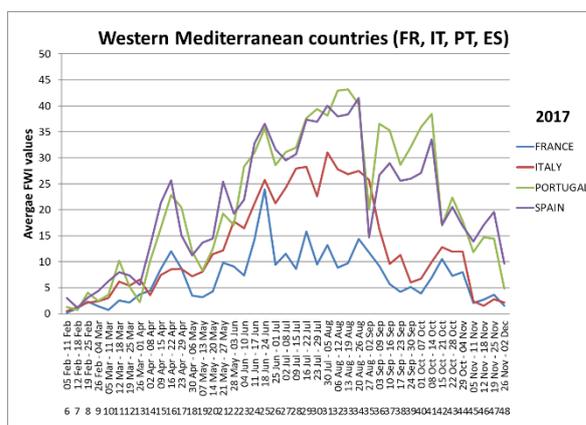
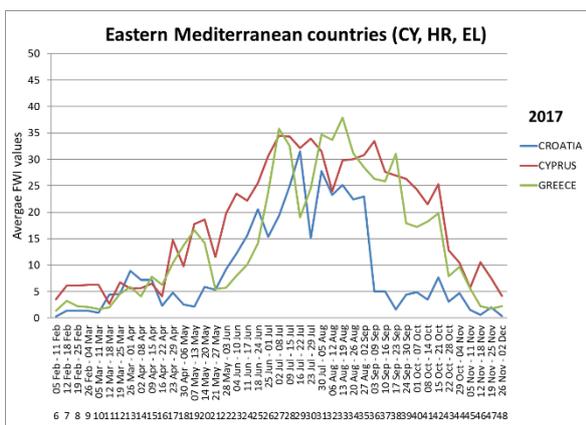
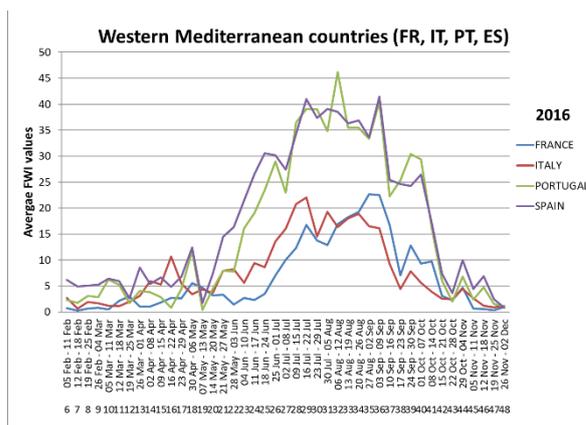
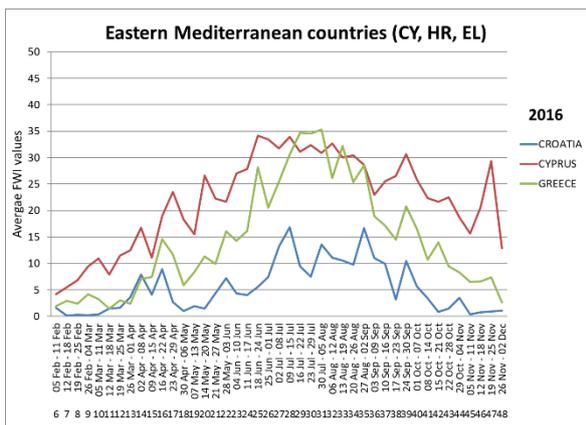
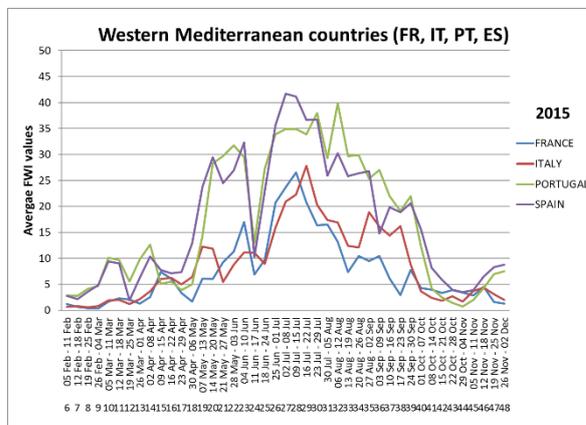
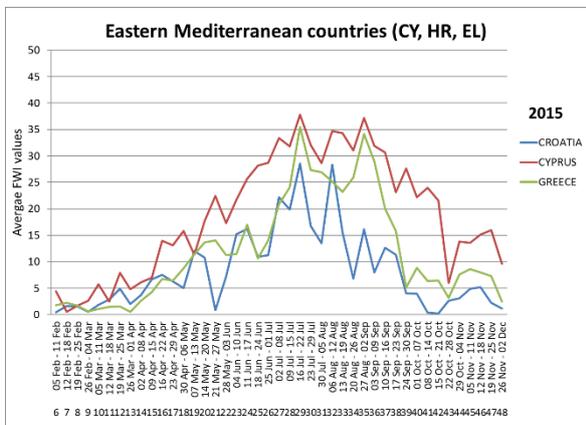


Figure 7. Fire danger trends 2015-2017 in eastern EU Mediterranean countries (CY, HR, EL).

Figure 8. Fire danger trends 2015-2017 in western EU Mediterranean countries (FR, IT, PT, ES).

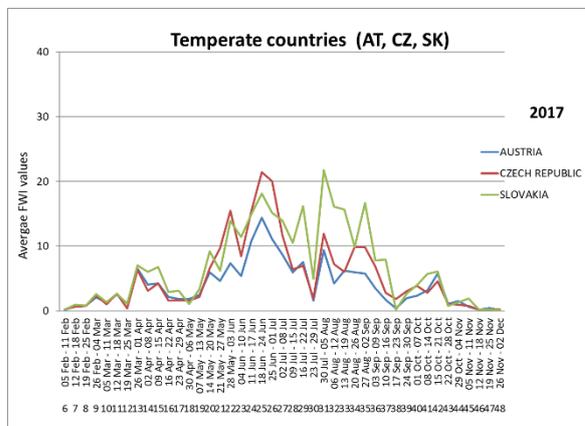
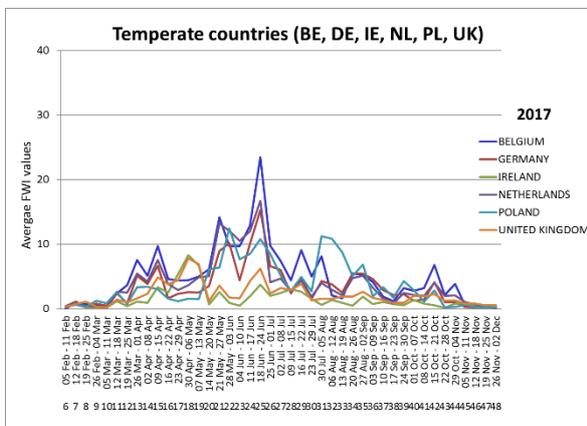
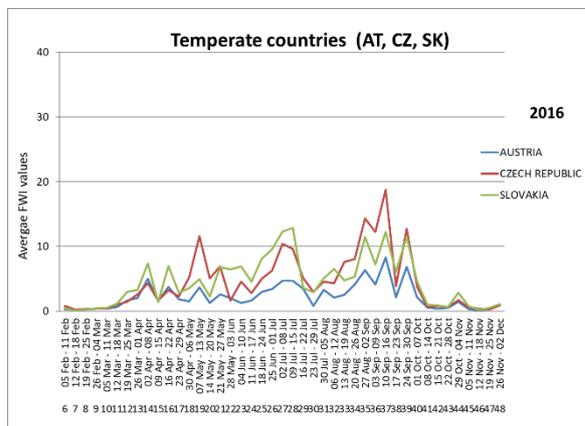
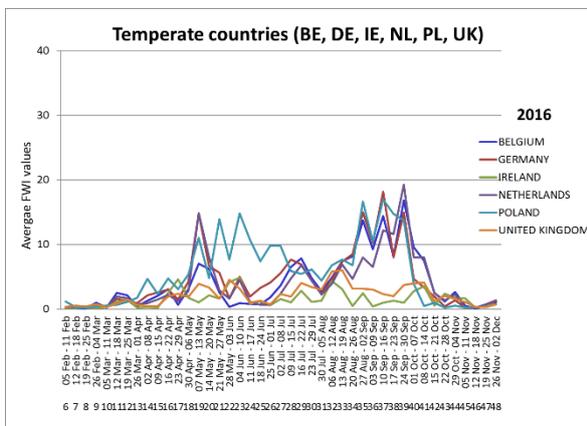
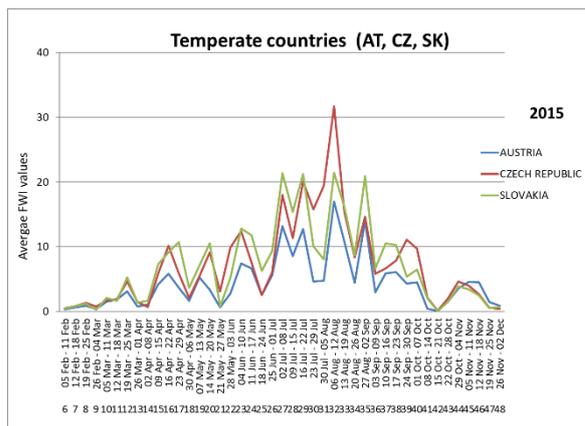
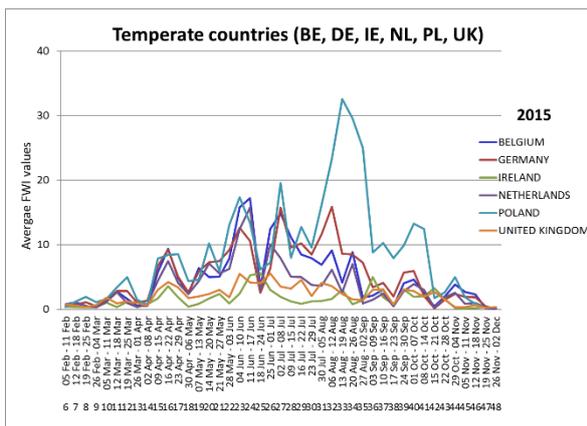


Figure 9. Fire danger trends 2015-2017 in some northern EU temperate countries (BE, DE, IE, NL, PL, UK).

Figure 10. Fire danger trends 2015-2017 in some central EU temperate countries (AT, CZ, SK).

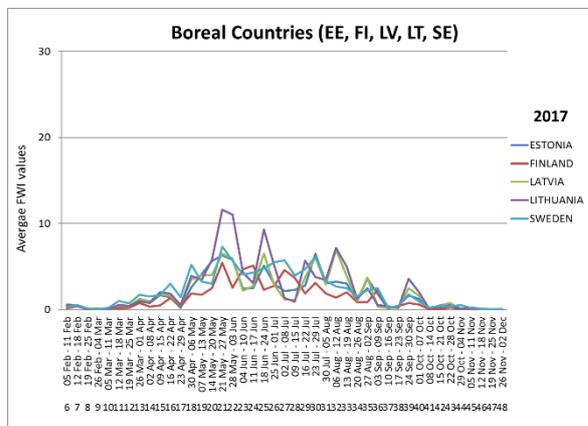
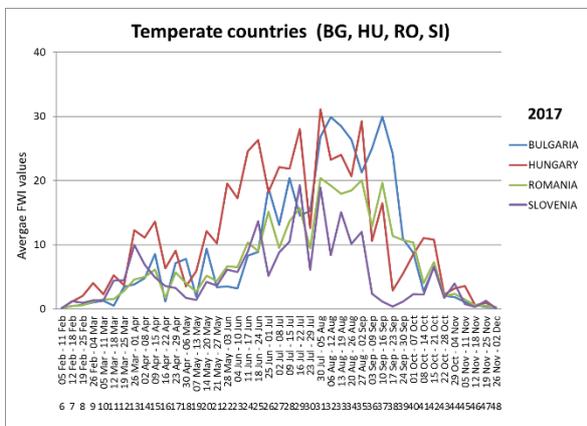
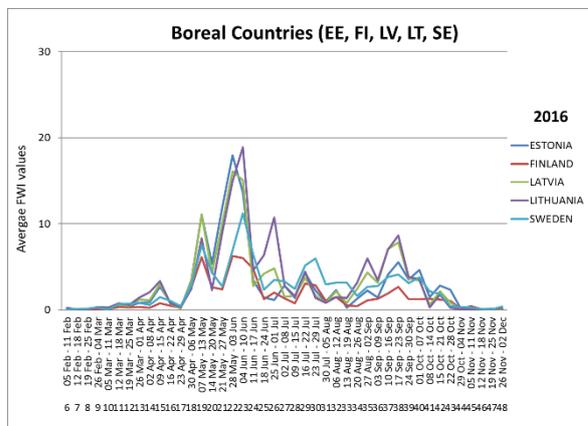
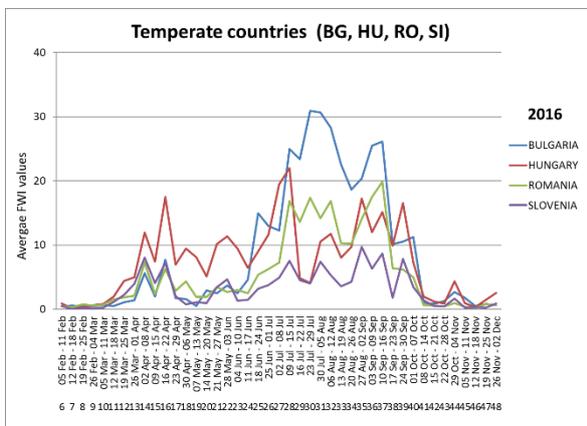
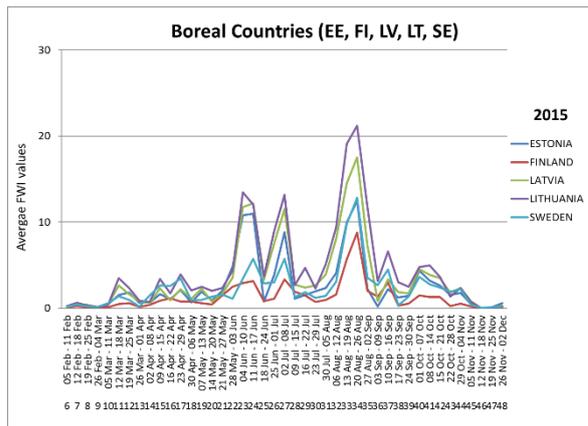
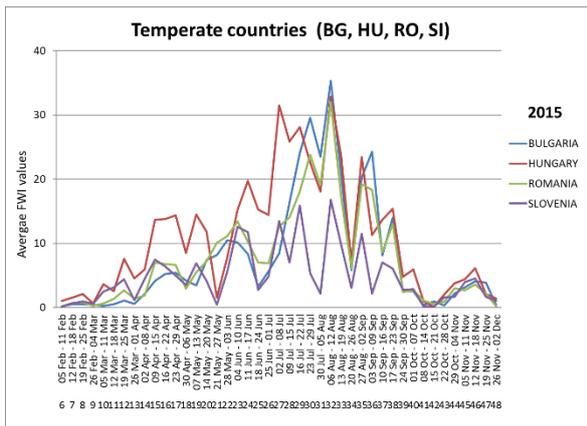
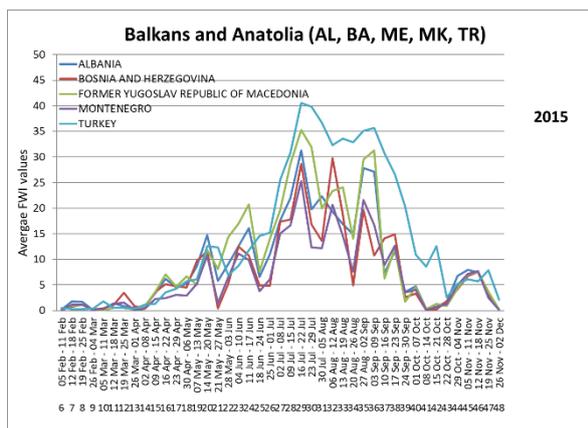
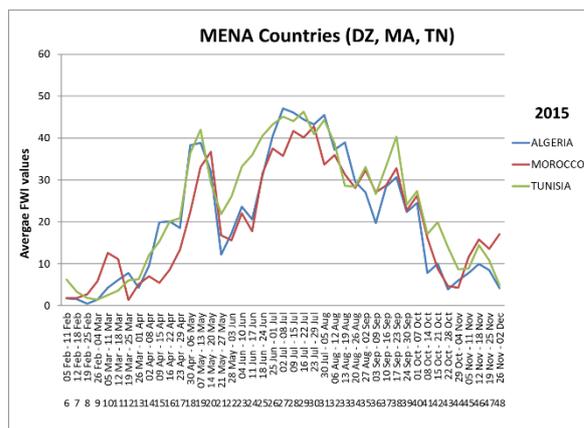


Figure 11. Fire danger trends 2015-2017 in some eastern EU temperate countries (BG, HU, RO, SI).

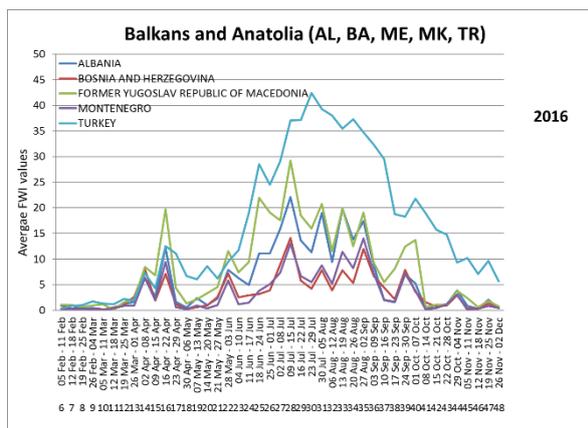
Figure 12. Fire danger trends 2015-2017 in some EU boreal countries (EE, FI, LV, LT, SE).



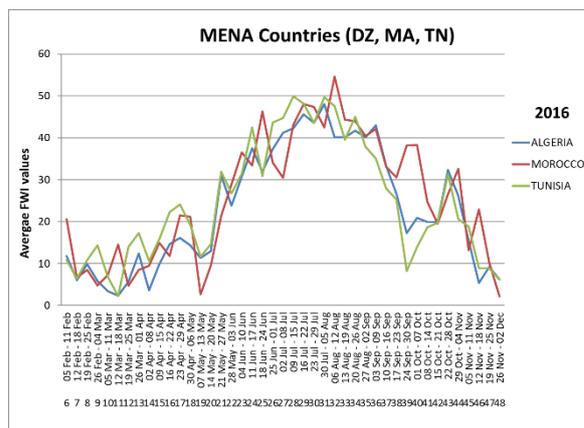
2015



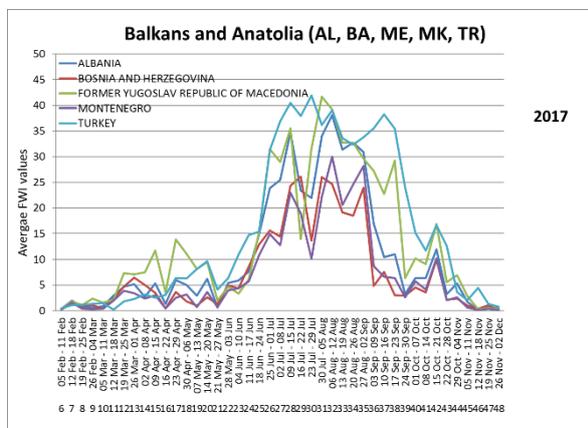
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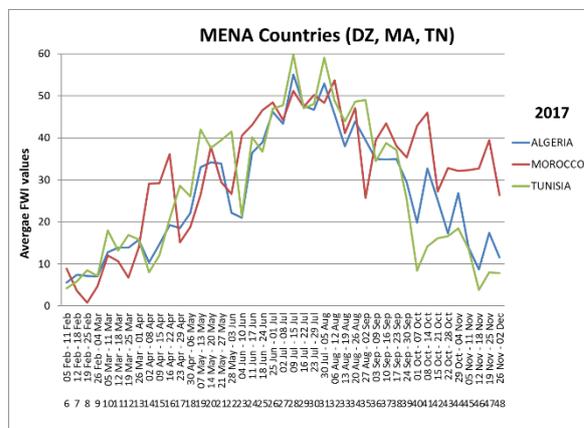
2016



2016



2017



2017

Figure 13. Fire danger trends 2015-2017 in the Balkans and Anatolia (AL, BA, ME, MK, TR).

Figure 14. Fire danger trends 2015-2017 in MENA countries (DZ, MA, TN).

As in previous years, the Member States gave very positive feedback on the danger assessment activity, urging that the EFFIS Danger Forecast should be continued and improved as part of the European Forest Fire Information System. This dialogue with users and other stakeholders is bound to result in an improved civil protection and forest fire service across Europe, and helps meet the EU's aim of providing environmental information and services that can be combined with other global environmental information products, in support of the Copernicus (formerly Global Monitoring for Environment and Security - GMES) initiative.

1.2 The EFFIS Rapid Damage Assessment: 2017 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 allows all fires of about 30 ha or larger to be mapped. In order to obtain the statistics of the burnt area by land cover type the data from the European CORINE Land Cover 2006 (CLC) database were used. Therefore the mapped burned 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 75% of the total area burnt every year in the Southern EU.

Since 2008, EFFIS has included Northern African countries in the mapping of burned area, following the agreement with FAO *Silva Mediterranea*, the FAO statutory body that covers the Mediterranean region.

The results for each of the countries affected by forest fires of over 30 ha are given in the following paragraphs in alphabetical order, followed by a section on the MENA countries.

The total area burned in 2017, 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 15 below shows the scars caused by forest fires during the 2017 season.

In 2017 fires of greater than 30 ha were observed in 35 countries and a total burnt area of 1 376 147 ha was mapped. This is more than double the previous year, and the highest amount ever recorded by EFFIS. Only a few countries in the south-east were less affected than in 2016. Values were higher than average from early in the year, becoming significantly higher by July. Huge fires in October, affecting Portugal and Spain, added a further 400 000 ha – more than the annual total of 2013, 2014 or 2015 – at a time when the fire season is usually relatively quiet (Figure 21 below).

Table 1. Areas burned by fires of at least 30 ha in 2017 estimated from satellite imagery.

Country	Area (Ha)	Number of Fires
Albania	42168.08	223
Algeria	89759.43	283
Bosnia & Herzegovina	83134.1	146
Bulgaria	5213.22	17
Croatia	67342.45	104
Cyprus	652.61	4
Czech republic	144.91	1
Denmark	130.39	2
Finland	233.96	4
France	20659.13	92
Georgia	853.97	1
Germany	56.67	1
Greece	19736.44	56
Hungary	458.28	3
Ireland	7241.12	18
Italy	140404.9	788
Kosovo under UNSCR 1244	4059.09	34
Latvia	34.52	1
Lebanon	45.36	1
Libya	233.96	3
Montenegro	51661.17	124
Morocco	4644.18	25
Norway	260.33	2
Portugal	563674.4	414
Romania	30480.05	65
Serbia	8170.02	37
Slovenia	187.65	2
Spain	131047.5	322
Sweden	732.85	8
Syria	5742.58	18
Former Yugoslav Republic of Macedonia	24969.34	87
Tunisia	19065.02	51
Turkey	47765.55	158
United Kingdom	5126.67	19
TOTAL	1376090	3114

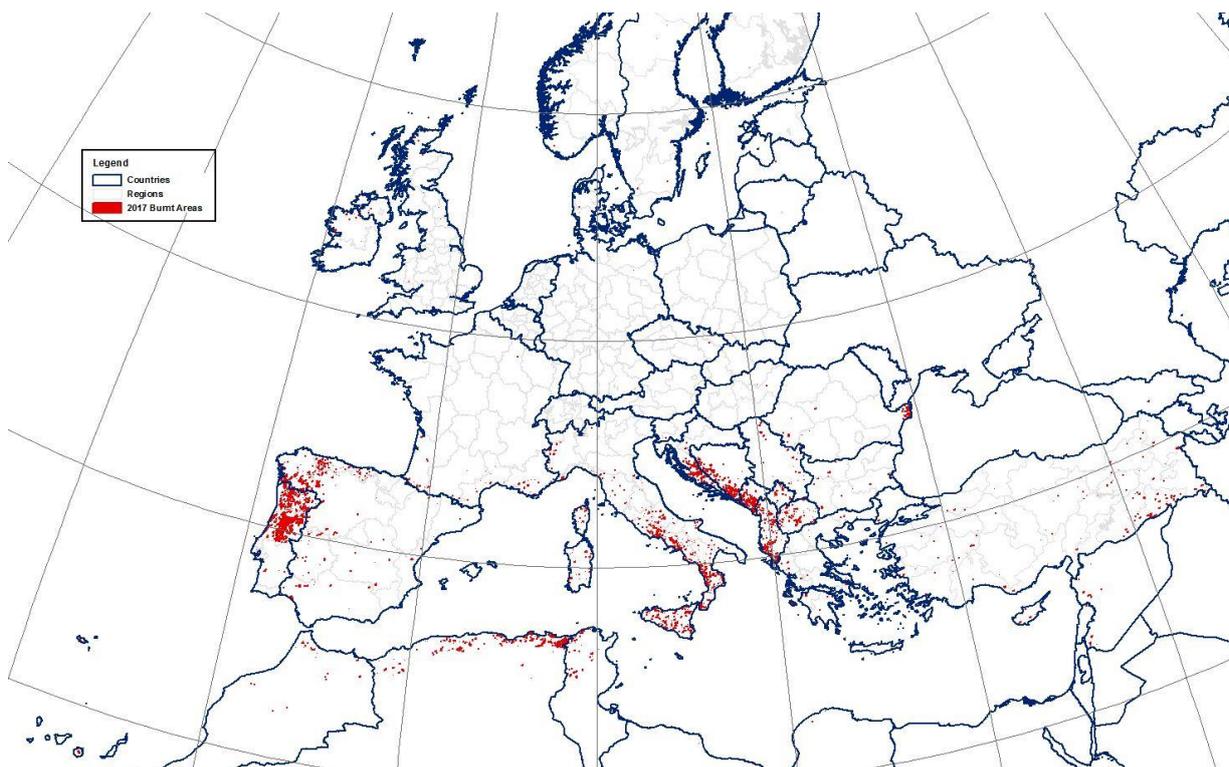


Figure 15. Burnt scars produced by forest fires during the 2017 fire season.

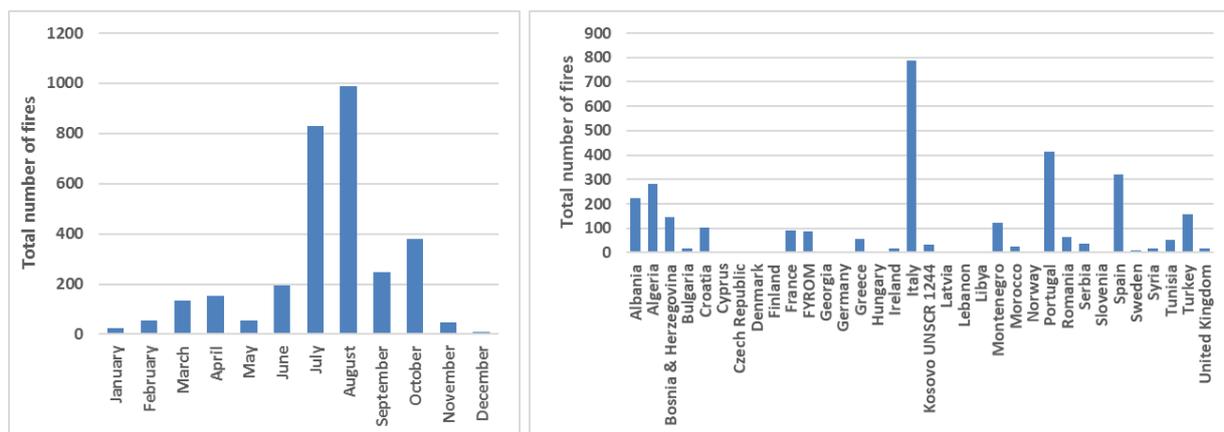


Figure 16. Total number of fires >30 ha by month and country in 2017.

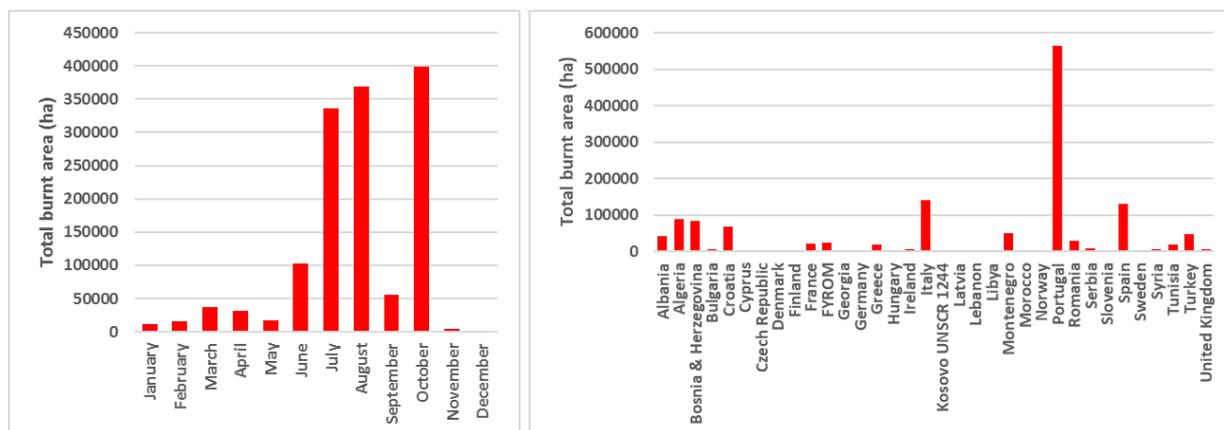


Figure 17. Total burnt area of fires >30 ha by month and country in 2017.

Damage to Natura2000 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
Bulgaria	4403.46	0.117	13
Cyprus	2.69	0.002	1
Czech Republic	144.91	0.013	1
Denmark	130.39	0.034	2
Finland	0.04	0	1
France	7115.47	0.104	48
Germany	56.67	0.001	1
Greece	4163.15	0.116	16
Hungary	458.28	0.023	3
Ireland	3442.37	0.378	7
Italy	52007.86	0.901	340
Latvia	34.52	0.005	1
Portugal	81490.46	4.265	124
Romania	29639.12	0.696	60
Slovenia	187.65	0.026	2
Spain	44742.81	0.326	144
Sweden	206.55	0.004	2
UK	799.59	0.045	7
EU28 total	229026		773
Albania	35.53	3.657	2
Algeria	12418.73	7.461	27
Morocco	341.74	0.045	3
TOTAL	241822		805

The total burnt in protected areas in 2017 was 241 822 ha, more than twice that recorded in 2016. Portugal was the most affected country in 2017, accounting for one third of the total Natura2000 burnt area, followed by Italy and Spain with around 20% each.

Summary	Total Area (Ha)
EU28	993557.7
Other European countries	263041.7
Middle East and North Africa	119490.5
Natura2000 and protected sites	241821.99

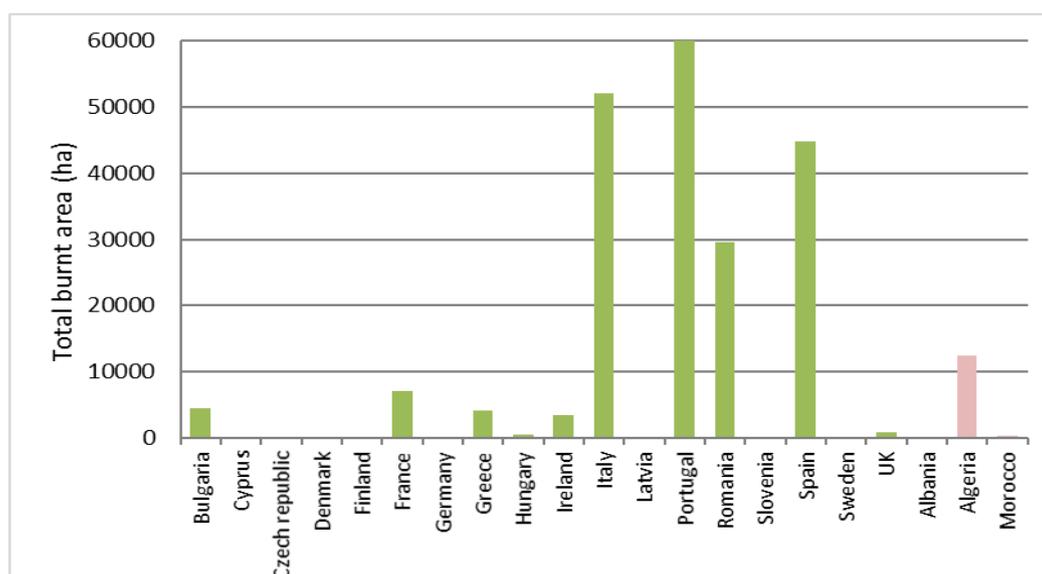
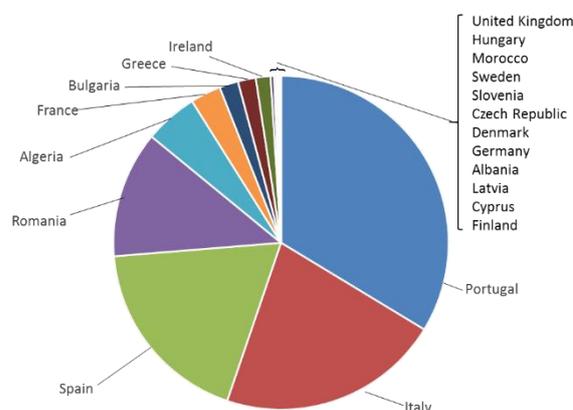


Figure 18. Burnt area in Natura2000 sites and other protected areas in 2017.

Affected land cover types

59% of the burnt area in 2017 was in Forest and Other Wooded Land, as identified by the CORINE Land Cover Type classification system (Figure 19).

This is somewhat higher than the previous 6 years, when the proportion burnt in Forest and Other Wooded Land was around 45% on average.

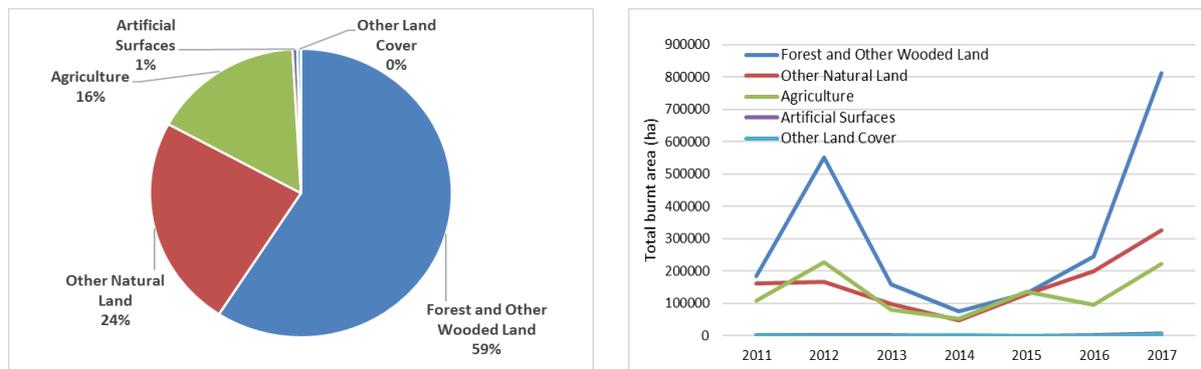


Figure 19. a) Proportions of land cover types affected in 2017 (all countries); b) Total burnt area by land cover type 2011-2017 (all countries).

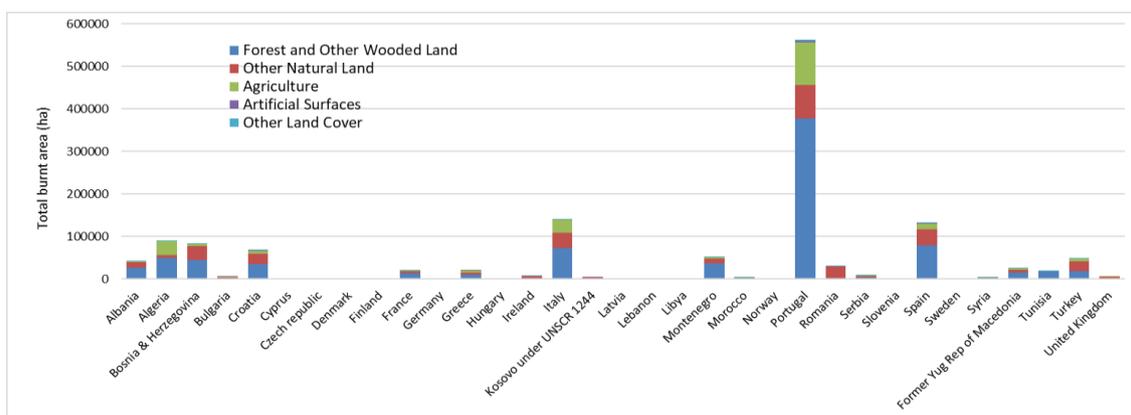


Figure 20. Burnt area in each country by CORINE land class

European countries

In 2017, 19 of the EU28 countries were affected by fires of over 30 ha: (Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Portugal, Romania, Slovenia, Spain, Sweden, United Kingdom), burning 993 558 ha in total (three times the amount that was recorded in 2016, and the highest since EFFIS started mapping burnt areas). Of this total, 229 026 ha (23%) were on Natura2000 sites.

Although Portugal was by far the country with the highest burnt area, Italy recorded more fires than any other country, as shown by Figure 16 and Figure 17 above. Unusually, October was the worst month for burnt area; this is almost all from the extremely large fires in Portugal.

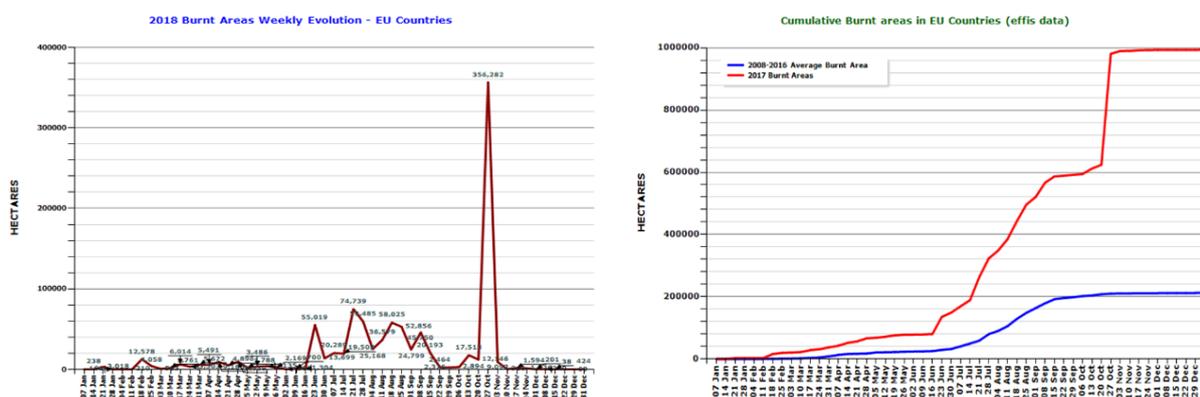


Figure 21. Burnt area weekly evolution and cumulative burnt area (European Union countries).

Burnt areas are split into different land cover types using the CLC 2006 database unless otherwise specified.

1.2.1 Albania

The total burnt area of 42 168 ha recorded in Albania was higher than the previous four years combined, although still below the amounts recorded in 2011 and 2012 (both over 50 000 ha). There were 223 fires of over 30 ha in 2017, ten times the number recorded in 2016. Most of them occurred in July and August. The largest fire of the year burnt 5 609 ha in Gjirokastrës Province in the south of the country, and 17 other fires over 500 ha were also recorded. The burnt area scars left by the 2017 fires in Albania can be seen in Figure 22.

Table 2. Distribution of burnt area (ha) in Albania by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	27082.18	64.22
Other Natural Land	13297.04	31.53
Agriculture	1639.16	3.89
Artificial Surfaces	141.09	0.33
Other Land Cover	8.57	0.02
TOTAL	42168.04	100

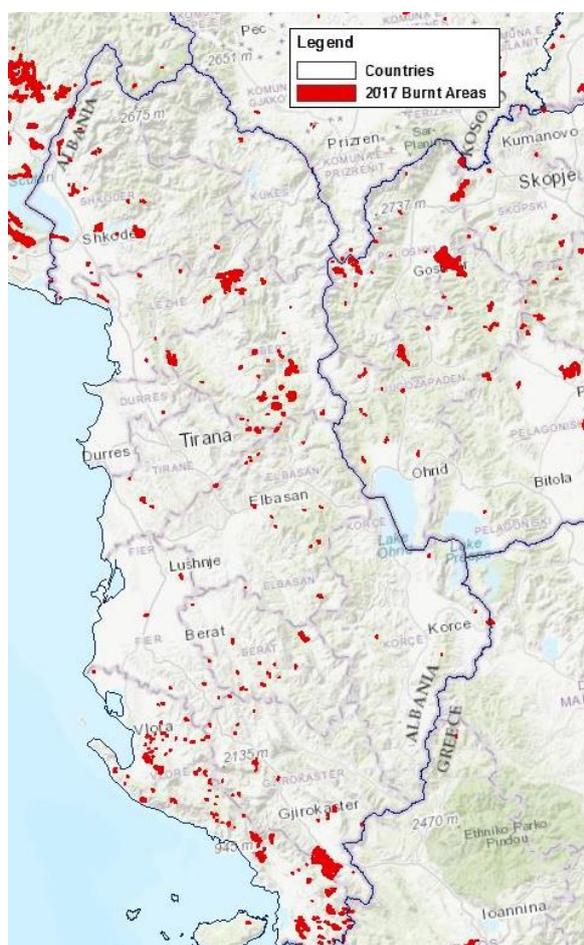


Figure 22. Visible fire scars in Albania 2017.

1.2.2 Bosnia and Herzegovina

In Bosnia-Herzegovina, similar to Albania, the 2017 total burnt area of 83 134 ha was more than the previous 4 years combined, making it the second worst season of the decade (after 2012), and among the worst affected countries of those covered by EFFIS. Three-quarters of the damage was recorded in July and August, but there was also significant damage in March. There were 40 fires with more than 500 ha mapped, including two of over 7000 ha. Visible fire scars caused by forest fires in Bosnia-Herzegovina can be seen in Figure 24 below.

Table 3. Distribution of burnt area (ha) in Bosnia-Herzegovina by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	45055.22	54.2
Other Natural Land	31692.81	38.12
Agriculture	5709.75	6.87
Artificial Surfaces	16.62	0.02
Other Land Cover	659.68	0.79
TOTAL	83134.09	100

1.2.3 Bulgaria

Bulgaria had a somewhat better season in 2017, with only half the burnt area recorded compared with 2016. A total of 17 fires of over 30 ha were recorded, the majority in August. Four fires burnt more than 500 ha, with the largest occurring in Blagoevgrad burning 1 646 ha at the end of August. Of the annual total, 4 403 ha occurred on Natura2000 sites, amounting to 84% of the total and 0.117% of Natura2000 land. The scars caused by these fires can be seen in Figure 23 below.

Table 4. Distribution of burnt area (ha) in Bulgaria by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	1567.89	30.08
Other Natural Land	2218.92	42.56
Agriculture	1411.04	27.07
Artificial Surfaces	15.37	0.29
TOTAL	5213.22	100

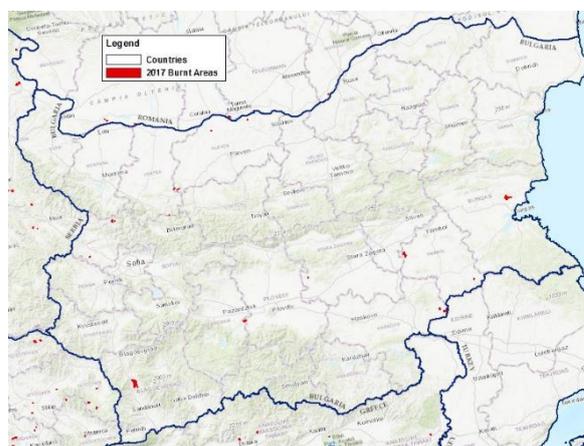


Figure 23. Fire scars in Bulgaria in 2017.

1.2.4 Croatia

It was the worst season by far in Croatia for more than a decade, and more than 7 times the average burnt area of the previous 10 years was recorded from 104 fires of over 30 ha. The season started early in March, when 31 large fires burnt over 10 000 ha, but most of the damage occurred in July and August. The largest fire of the season occurred in Splitsko-Dalmatinska Zupanija province in July and covered 5 122 ha, and there were 33 other fires over 500 ha.

The scars caused by these fires can be seen in Figure 24. Table 5 presents the distribution of the mapped burnt area by land cover type.

Table 5. Distribution of burnt area (ha) in Croatia by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	35052.66	52.05
Other Natural Land	24581.73	36.5
Agriculture	7063.98	10.49
Artificial Surfaces	598.42	0.89
Other Land Cover	45.65	0.07
TOTAL	67342.44	100

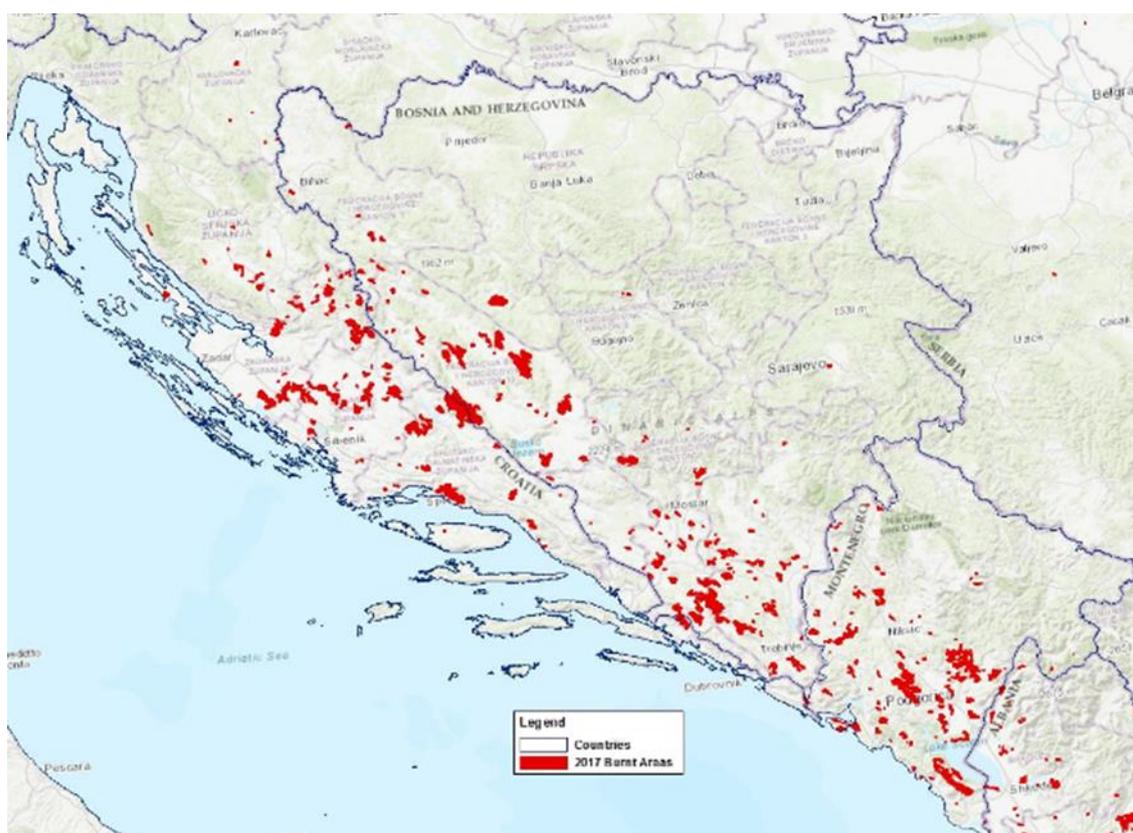


Figure 24. Burnt area scars in Croatia, Bosnia and Montenegro in 2017.

1.2.1 Cyprus

Cyprus had a relatively good year with just four fires over 30 ha. Almost all of the damage occurred in July. Of the total, less than 3 ha occurred on Natura2000 sites. Table 6 presents the distribution of the mapped burned area by land cover type.

Table 6. Distribution of burnt area (ha) in Cyprus by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	454.92	69.71
Other Natural Land	74.49	11.41
Agriculture	121.5	18.62
Artificial Surfaces	1.72	0.26
TOTAL	652.61	100

1.2.2 Czech Republic

The Czech Republic does not often experience large fires. In March 2017 a fire of 145 ha occurred on a Natura2000 site, mostly on Other Natural Land.

Table 7. Distribution of burnt area (ha) in Czech Republic by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	19.94	13.76
Other Natural Land	124.97	86.24
TOTAL	144.91	100

1.2.3 Denmark

Denmark is another Northern country with unusual fire activity in 2017. 2 fires occurred in May and June, burning a total of 130 ha, all on Natura2000 sites.

Table 8. Distribution of burnt area (ha) in Denmark by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	0.54	0.41
Other Natural Land	129.85	99.59
TOTAL	130.39	100

1.2.4 Finland

In Finland 4 fires burned a total of 234 ha between May and July. Natura2000 land was not affected.

Table 9. Distribution of burnt area (ha) in Finland by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	155.48	66.45
Other Natural Land	78.48	33.55
TOTAL	233.96	100

1.2.5 The former Yugoslav Republic of Macedonia

2017 was the worst year in the former Yugoslav Republic of Macedonia since 2012. 87 large fires burnt a total of 24 969 ha. Most of the damage was in July and August, but large fires occurred from February to November. The largest fire was in the Southwestern region and burnt over 5000 ha, and there were 9 other fires of over 500 ha. Visible scars from these fires can be seen in Figure 25.

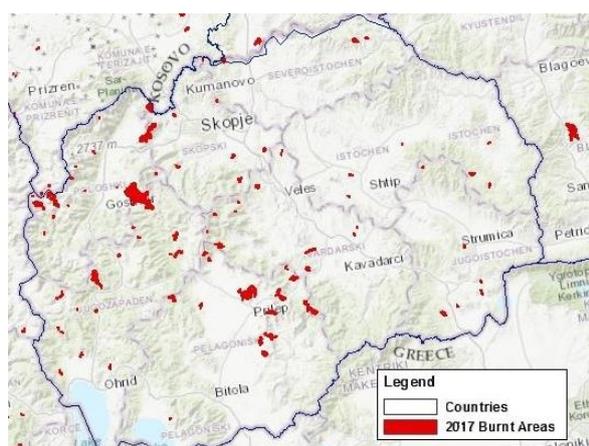


Figure 25. Fire scars in the former Yugoslav Republic of Macedonia 2017.

Table 10. Distribution of burnt area (ha) in the former Yugoslav Republic of Macedonia by land cover types in 2017.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	14653.05	58.68
Other Natural Land	7171.06	28.72
Agricultural Areas	3141.85	12.58
Artificial Surfaces	2.21	0.01
Other Land Cover	1.16	0
TOTAL	24969.33	99.99

1.2.6 France

France had a severe fire season. Twice the burnt area was recorded than occurred in 2016, which was itself the worst for more than a decade. Fires of over 30 ha were mapped in every month of the year, but nearly half of the damage occurred in July. In this month a total area of around 5000 ha was burnt in 3 very large fires on Corsica. In total 20 659 ha were affected by 92 fires of over 30 ha. Of this, 7 115 ha were on Natura2000 sites, corresponding to 34% of the total area burned, and 0.104% of the total Natura2000 areas in the country. Table 11 presents the distribution of the mapped burnt area by land cover type. The burnt scars left by the fires occurring in the southern region of the country and in northern Corsica are shown in Figure 26.

Table 11. Distribution of burnt area (ha) in France by land cover types in 2017.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	13171.05	63.75
Other Natural Land	5900.97	28.56
Agriculture	1334.87	6.46
Artificial Surfaces	216.08	1.05
Other Land Cover	36.16	0.18
TOTAL	20659.12	100



Figure 26. Visible burnt area scars in the South of France and Corsica in 2017.

1.2.7 Georgia

A fire of 854 ha was recorded in August at Borjomi, Samtskhe-Javakheti province.

1.2.8 Germany

A fire in a Natura site March caused 57 ha of damage in Germany, amounting to 0.001% of the Natura2000 area in the country.

Table 12. Distribution of burnt area (ha) in Germany by land cover types in 2017.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	33.67	59.42
Other Natural Land	22.99	40.58
TOTAL	56.67	100

1.2.9 Greece

Greece was one of the few countries that had a better season in 2017 than 2016, with a burnt area of around two-thirds of the previous year's total. 19 736 ha was mapped of which 4 163 ha occurred on Natura2000 sites, amounting to 21% of the total and 0.116% of the total Natura2000 area of Greece. Practically all of the damage occurred between July and September, including two fires of over 2 000 ha in Attiki province in August. Table 13 presents the distribution of the mapped burnt area by land cover type. Figure 27 shows the damage caused by forest fires in Greece.



Figure 27. Burnt area scars in Greece in 2017.

Table 13. Distribution of burnt area (ha) in Greece by land cover types in 2016.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	10111.52	51.23
Other Natural Land	4398.58	22.29
Agriculture	5170.06	26.2
Artificial Surfaces	56.26	0.29
TOTAL	19736.43	100

1.2.10 Hungary

In Hungary three fires of over 30 ha were mapped. All of the burnt area occurred on Natura2000 sites, representing 0.023% of the Natura2000 area in the country. Most of the damage came from one fire in August that covered 364 ha.

Table 14. Distribution of burnt area (ha) in Hungary by land cover types in 2017.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Other Natural Land	448.63	97.89
Agriculture	5.42	1.18
Other Land Cover	4.23	0.92
TOTAL	458.28	100

1.2.11 Ireland

Ireland's fire season was significantly worse than 2016, and comparable with 2015. Eighteen fires of over 30 ha burnt a total of 7241 ha, all but three of them occurring in May. More than half of the damage came from a single fire in the West province in early May that covered 3 865 ha (visible in Figure 28). 47% of the burnt area (3 442 ha) was recorded in Natura2000 sites, corresponding to 0.378% of the total Natura2000 land in the country. The most affected land type was Other Natural Land, as shown in Table 15.

Table 15. Distribution of burnt area (ha) in Ireland by land cover types in 2017.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	1315.41	18.17
Other Natural Land	5704.22	78.78
Agriculture	26.8	0.37
Other Land Cover	194.68	2.69
TOTAL	7241.12	100

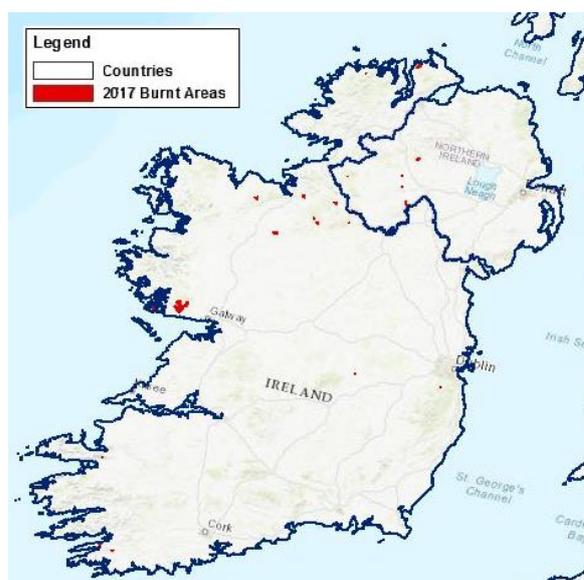


Figure 28. Burnt area scars in Ireland in 2017.

1.2.12 Italy

It was the worst fire season in Italy for a decade, with a burnt area of 140 405 ha. The most notable feature of the year, however, was the total number of fires, which was the highest recorded in any country in 2017 by a significant margin. 788 fires over 30 ha represents one quarter of all the fires mapped in 2017 and more than were observed in Portugal and Spain combined.

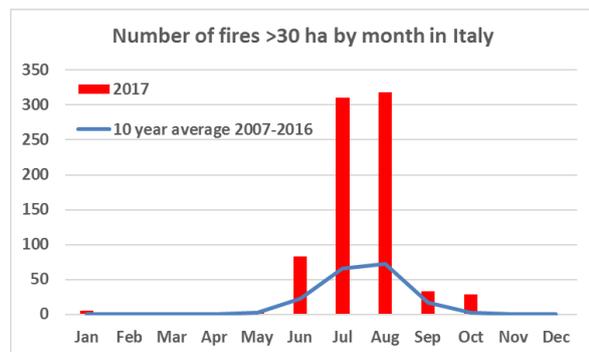


Figure 29. Monthly evolution of number of fires in Italy in 2017 compared with 10-year average.

The first major fire of the season was in January, when over 1 600 ha burnt in Imperia province, but large fires were also mapped in every other month from March to November. The largest fire of the year occurred in Torino province in late October and covered 3 533 ha (Figure 30).

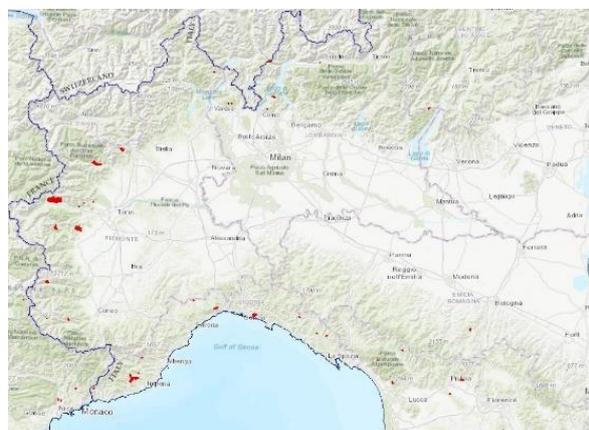


Figure 30. Burnt area scars in Northern Italy showing the damage from early (January, Imperia) and late in the season (October, Torino).

Much of the damage occurred in July and August when over 300 fires were mapped in each of these months. Of the year's total, 52 008 ha of damage occurred on Natura2000 sites, corresponding to 37% of the total area burned, and 0.9% of the total Natura2000 area in the country. Notable fires include several affecting the Vesuvius National Park area (Figure 31).

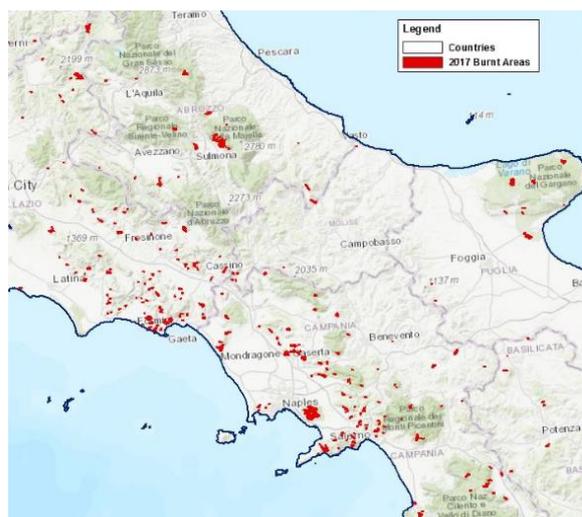


Figure 31. Burnt area scars in central and southern Italy, showing the significant damage around Vesuvius National Park.

The southern regions, Sicily and Sardinia were also heavily affected. Of the 41 fires over 500 ha mapped in 2017, 17 were in Sicily. Two fires around 3 000 ha were mapped in Trapani and Enna (Sicily) in July-August.



Figure 32. Visible fire scars in southern regions, Sicily and Sardinia in 2017.

Over half of the burnt area affected Forest and Other Wooded Land. Table 16 presents the distribution of the mapped burnt area by land cover type.

Table 16. Distribution of burnt area (ha) in Italy by land cover types in 2017.

Land cover	Area	% of total
Forest/Other Wooded Land	72118.7	51.36
Other Natural Land	36208.69	25.79
Agriculture	30813.82	21.95
Artificial Surfaces	1214.59	0.87
Other Land Cover	48.9	0.03
TOTAL	140404.6	100

1.2.13 Kosovo under UNSCR 1244

The fire season in Kosovo was the worst since 2012. 34 fires of over 30 ha burned a total of 4059 ha, mostly between August and September, but fires were also mapped from April to October. The largest fire of the season occurred in Kosovska Mitrovica province in August and covered 842 ha. Table 17 shows the classification of the burnt area by land type. The burnt area scars left by these fires can be seen in Figure 33.

Table 17. Distribution of burnt area (ha) in Kosovo by land cover types in 2017.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	2222.11	54.74
Other Natural Land	1091.93	26.9
Agriculture	707.84	17.44
Artificial Surfaces	37.21	0.92
TOTAL	4059.08	100

1.2.14 Latvia

In Latvia a fire of 35 ha was recorded in May, affecting a Natura2000 site on Forest and Other Wooded Land and representing 0.005% of the Natura2000 area of the country.

1.2.15 Montenegro

Montenegro's fire season was the worst for a decade. There were 124 fires of over 30 ha affecting a total of 51 661 ha, six times the area mapped in 2016. Fires were recorded through the year from February to November, although the worst of the damage occurred in July and August. The largest fire of the year burned 5 687 ha in Danilovgrad in July, but there were also 28 other fires larger than 500 ha. The scars from these fires can be seen in Figure 33, and Table 18 shows the classification of the burnt area by land type.

Table 18. Distribution of burnt area (ha) in Montenegro by land cover types in 2017.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	35968.59	69.62
Other Natural Land	12276.02	23.76
Agriculture	3219.96	6.23
Artificial Surfaces	47.84	0.09
Other Land Cover	148.74	0.29
TOTAL	51661.15	100

1.2.16 Norway

In Norway there were two fires in May that burned a total of 260 ha, mostly on Other Natural Land.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	43.3	16.63
Other Natural Land	217.03	83.37
TOTAL	260.33	100

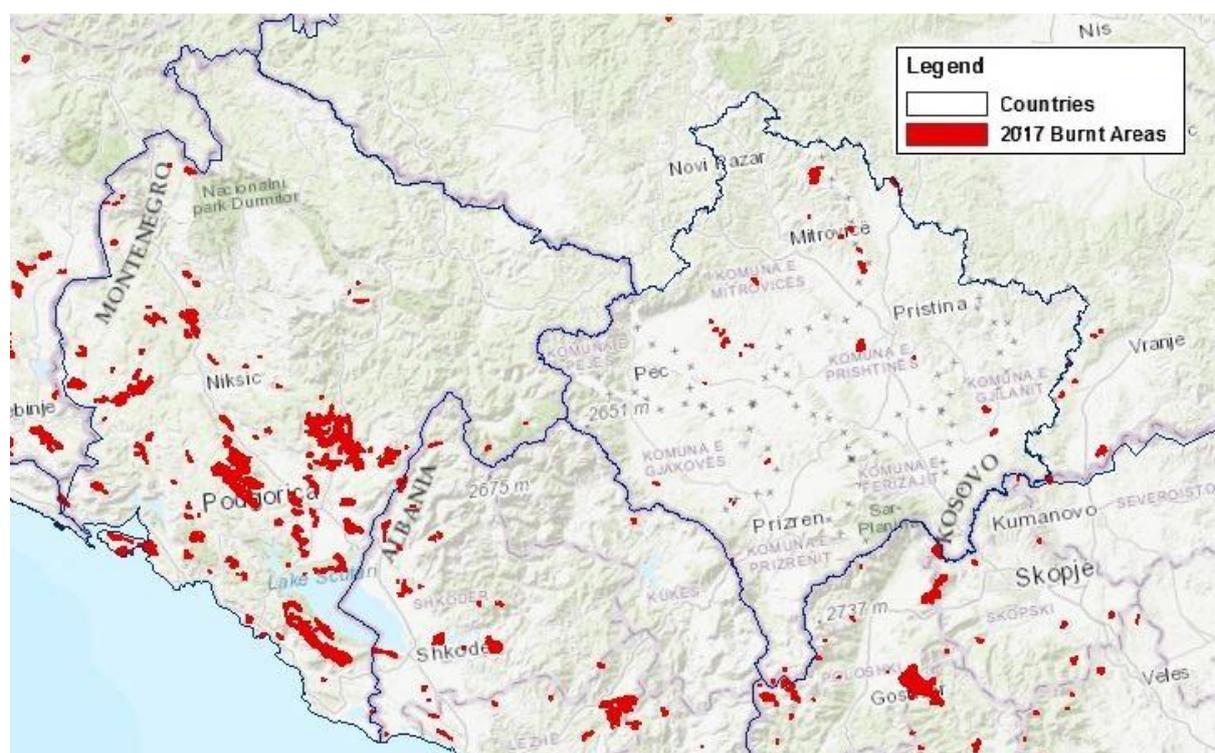


Figure 33. Visible fire scars in Montenegro and Kosovo in 2017.

1.2.17 Portugal

Portugal was by a huge margin the country most affected by forest fires, accounting for 41% of the entire burnt area mapped in 2017. There were fires of over 30 ha in every month of the year, and 2016's total (itself the worst for some years) was already surpassed in August.

The fire in Pedrógão Grande in mid-June was among the most deadly in history in terms of fatalities, but it was also remarkable for occurring relatively early in the season.

In October, the remnants of Hurricane Ophelia passed over the country, bringing strong dry southerly winds to a land already in drought conditions. Over a few days the annual burnt area total more than doubled. The damage in Portugal during one week in October exceeded the annual total of any other country mapped in the last decade.

While the number of large fires was greater than the 10-year average (Figure 34), the average size of these fires was significantly higher than usual, leading to unprecedented levels of damage (Figure 35). The fires were so large and so numerous that many merged together, making it problematic to classify the exact numbers and delimitations. 59 areas over 1 000 ha were mapped, and the largest burnt area (in Pinhal Interior Norte province in October, and probably comprising more than one fire) was mapped at over 67 000 ha.

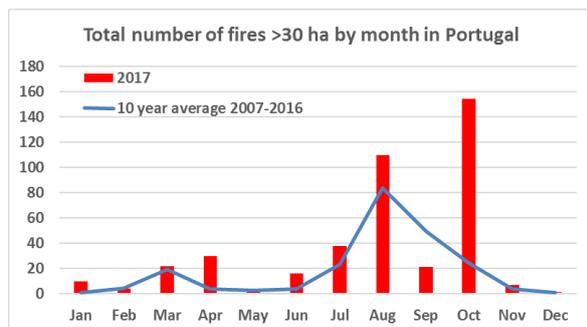


Figure 34. Monthly evolution of number of fires in Portugal in 2017 compared with 10-year average.

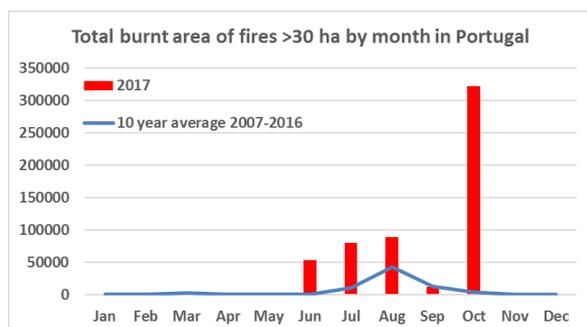


Figure 35. Monthly evolution of burnt area in Portugal in 2017 compared with 10-year average.

By the end of the year, 563 674 ha of burnt area had been recorded in Portugal, more than the previous 6 years put together and surpassing the total mapped over the whole of Europe, Middle East and North Africa in all but two of the last 10 years. The mapped burnt areas can be seen in Figure 39.

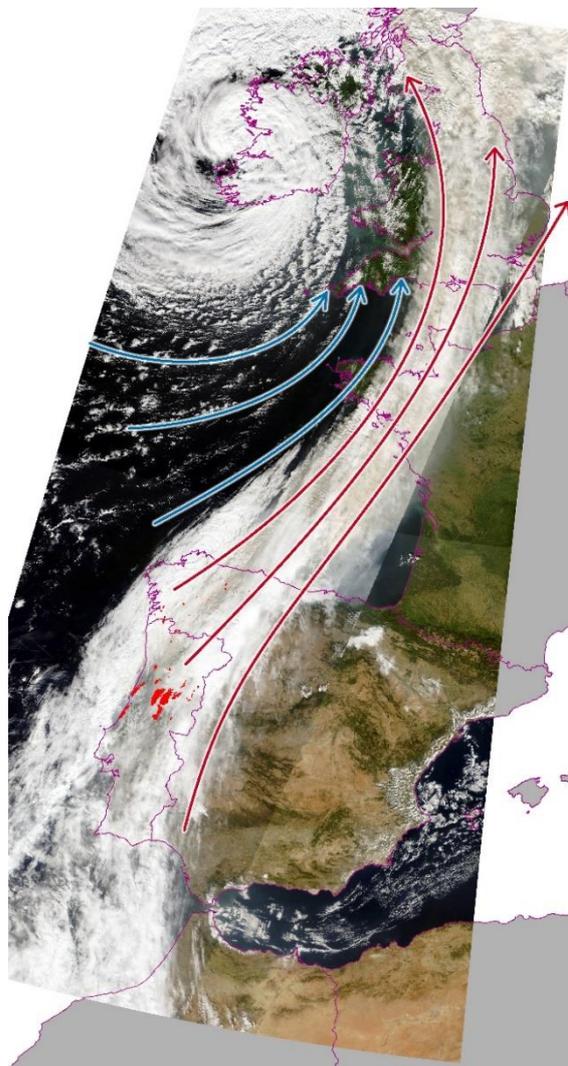


Figure 36. Path of Ophelia hurricane in October 2017 with fire scars superimposed showing south-north elongation caused by the strong winds.

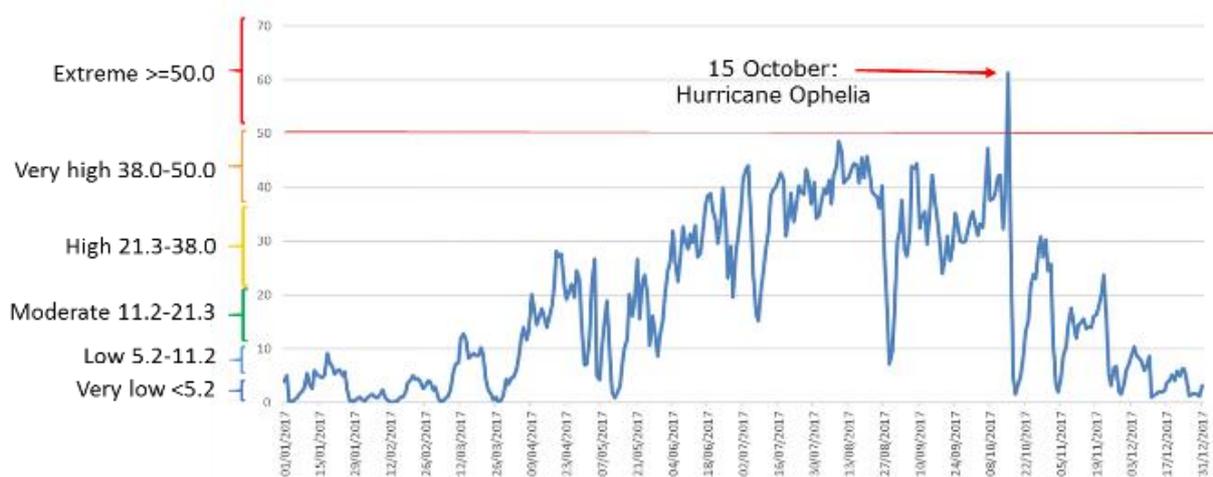


Figure 37. Daily average Fire weather Index over Portugal in 2017.

81 490 ha of the burnt area mapped in 2017 occurred on Natura2000 sites, corresponding to 14.4% of the total area burnt, and 4.3 % of the total Natura2000 areas in Portugal.

The distribution of the mapped burnt area by land cover type is shown in Table 19. Forest and Other Wooded Land was heavily affected, accounting for around two-thirds of the mapped burnt area (Figure 38).

Table 19. Distribution of burnt area (ha) in Portugal by land cover types in 2017.

Land cover	Area burned	% of total
Forest/Other Wooded Land	377967.8	67.05
Other Natural Land	78341.47	13.9
Agriculture	99168.29	17.59
Artificial Surfaces	4481.07	0.79
Other Land Cover	3715.67	0.66
TOTAL	563674.29	100

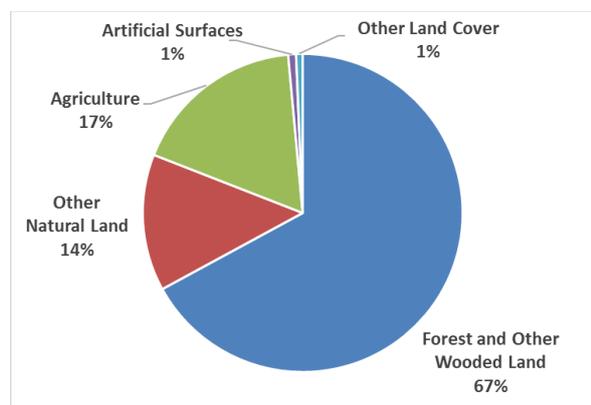


Figure 38. Distribution of burnt area (ha) in Portugal by land cover types in 2017.

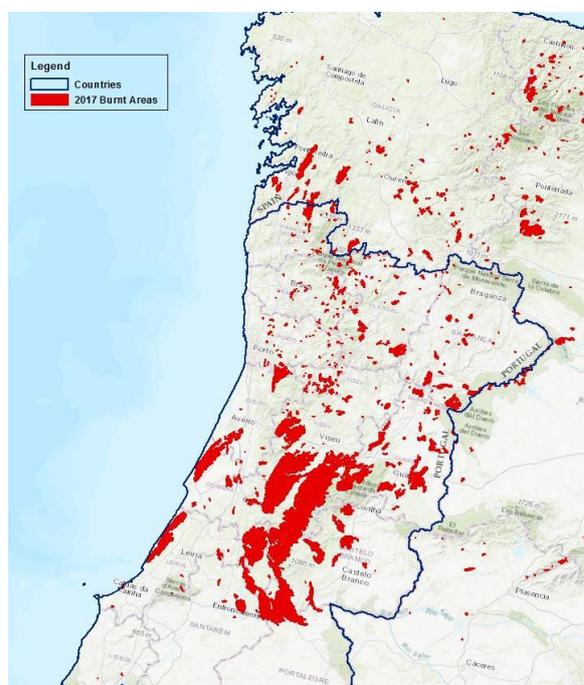


Figure 39. Burnt area scars in central and northern Portugal in 2017.

1.2.18 Romania

Romania's fire season was also the worst seen for several years, with a total burnt area larger than the previous 6 years combined. The fire season was long, with fires over 30 ha occurring from January to November. Two-thirds of the damage occurred between January and March, and much of the rest of the damage occurred in October. There were 12 fires of over 500 ha, all in Tulcea province, the largest of which covered over 4000 ha (Figure 40). As in previous years, almost all (97%) of the mapped burnt area was on Natura2000 sites. This represents 0.696% of the total Natura2000 area of Romania. Table 20 presents the distribution of the mapped burnt area by land cover type.

Table 20. Distribution of burnt area (ha) in Romania by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	1009.59	3.31
Other Natural Land	28365.19	93.06
Agriculture	990.55	3.25
Artificial Surfaces	6.62	0.02
Other Land Cover	108.1	0.35
TOTAL	30480.05	100

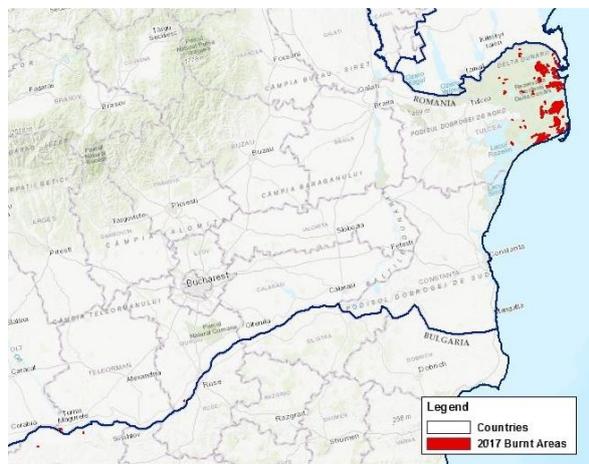


Figure 40. Burnt area scars in the eastern part of Romania in 2017.

1.2.19 Serbia

The fire season in Serbia was the worst since 2012, with 37 fires of over 30 ha burning a total of 8 170 ha. There were two peaks in the season; one in March when around 25% of the damage occurred, and the second around August, when the largest fire of the season also occurred (1 058 ha in Severno-Banatski province). Table 21 presents the breakdown of burnt area by land cover type. Figure 41 shows the location of these fires.

Table 21. Distribution of burnt area (ha) in Serbia by land cover type in 2016.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	3005.37	36.79
Other Natural Land	3339.83	40.88
Agriculture	1794.61	21.97
Artificial Surfaces	8.01	0.1
Other Land Cover	22.21	0.27
TOTAL	8170.02	100.01

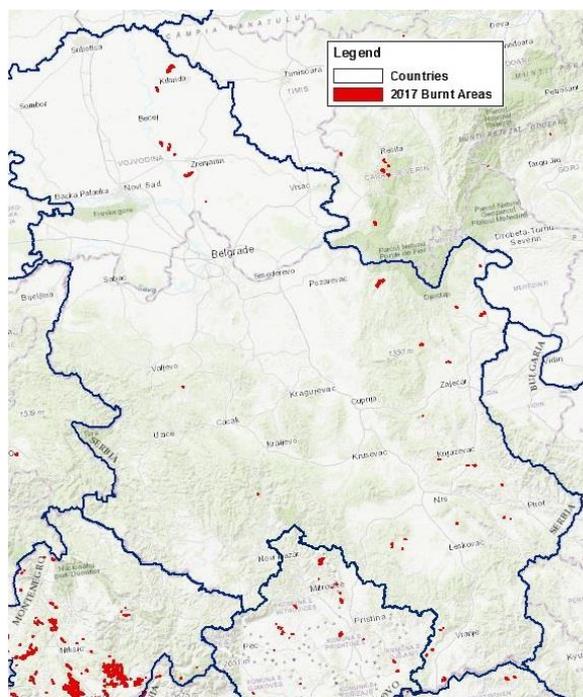


Figure 41. Burnt area scars in Serbia in 2017.

1.2.20 Slovenia

Slovenia was one of relatively few countries having a less severe fire season in 2017 than 2016. 2 fires of just over 90 ha each occurred in March and August, all on Natura2000 land, accounting for 0.026% of the Natura2000 area of the country. Table 22 presents the distribution of the mapped burned area by land cover type.

Table 22. Distribution of burnt area (ha) in Slovenia by land cover types in 2017.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded	70.74	37.7
Other Natural Land	87.07	46.4
Agriculture	29.84	15.9
TOTAL	187.65	100

1.2.21 Spain

Spain was the third most affected country in terms of both numbers of fires and burnt area in 2017, after Portugal and Italy. 322 fires burned a total of 131 048 ha, the highest total since 2012 and as much as the last three years combined. There were fires over 30 ha in every month of the year, but over 40% of the damage occurred in October (Figure 42), much of it as a consequence of the hurricane Ophelia that also affected Portugal (Figure 36 above). 52 fires were mapped over 500 ha, two of them over 10 000 ha (in Leon and Huelva provinces).

Of the total burnt area mapped in 2017, 44 743 ha were on Natura2000 sites, corresponding to 34% of the total area burned, and 0.326% of the Natura2000 areas in Spain. Table 23 presents the distribution of the mapped burnt area by land cover type. The most noticeable fires in Spain during 2016 are shown in Figure 43.

Table 23. Distribution of burnt area (ha) in Spain by land cover type in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	79955.92	61.01
Other Natural Land	36434.81	27.8
Agriculture	14248.43	10.87
Artificial Surfaces	323.4	0.25
Other Land Cover	84.95	0.06
TOTAL	131047.51	99.99

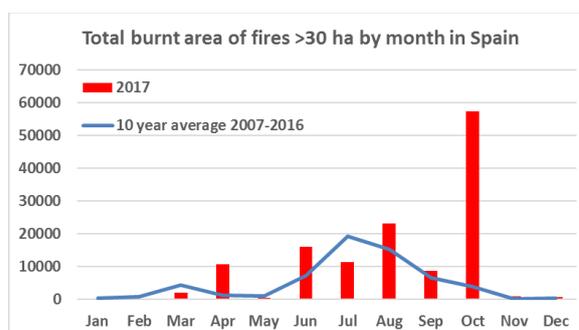


Figure 42. Monthly evolution of burnt area in Spain in 2017 compared with 10-year average.

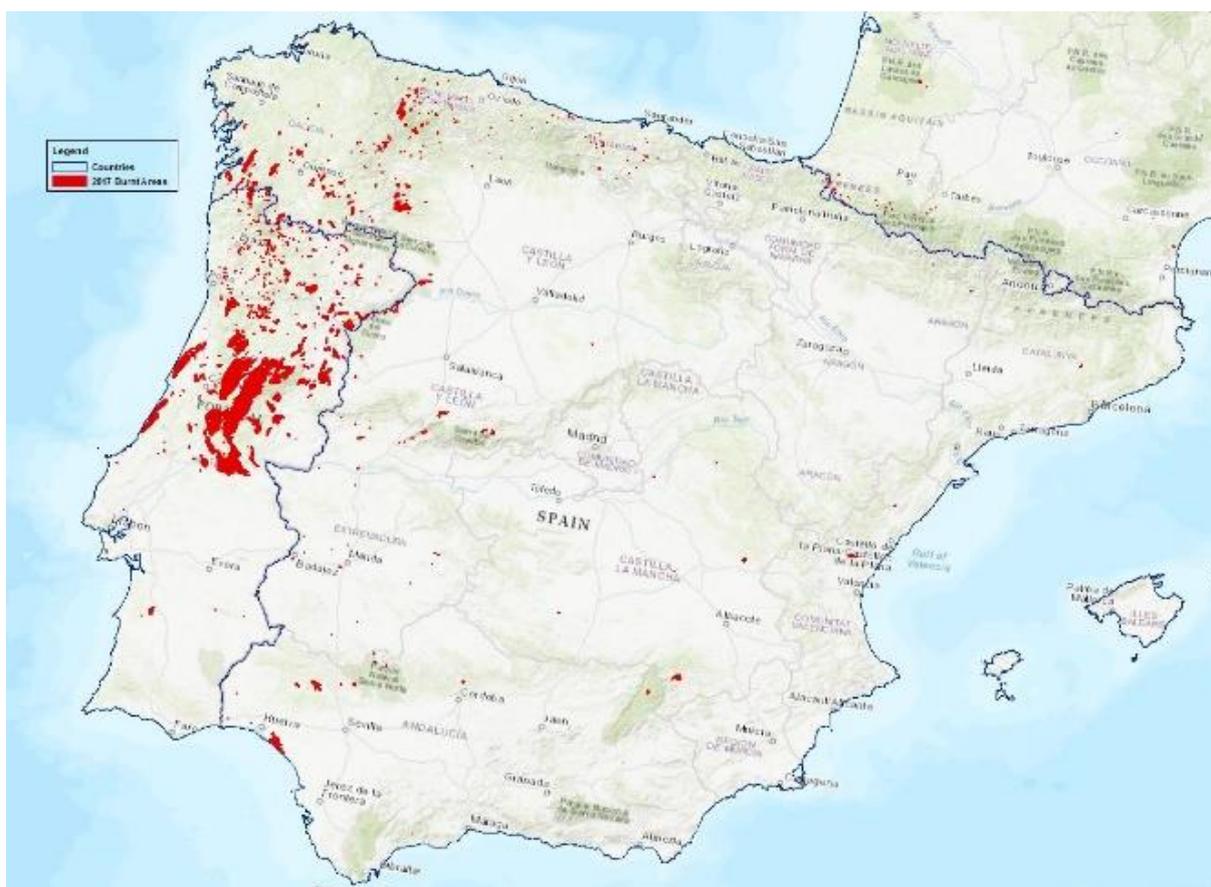


Figure 43. Burnt area scars in the Iberian Peninsula in 2017.

1.2.22 Sweden

In Sweden there were eight fires over 30 ha mapped in 2017. This is significantly more than the amount recorded in the last two years (although still far from the 2014 total, which included one of the largest fires ever seen in Sweden). Of the total burnt area mapped, 207 ha occurred on Natura2000 sites, amounting to 28% of the total and 0.004% of the Natura2000 area of the country.

Table 24. Distribution of burnt area (ha) in Sweden by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	400.99	54.72
Other Natural Land	331.86	45.28
TOTAL	732.85	100

1.2.23 Turkey

Turkey's fire season was significantly better than 2016, with less than 40% the burnt area of that year. 158 fires burned a total of 47 766 ha, mostly between July and September. The south-east of the country was the worst affected but some very large fires were also mapped in the west. There were 24 fires of more than 500 ha, and the largest of the year in Mardin province covered over 2500 ha. As in previous years, Other Natural Land including transitional woodland/shrubland was the most affected land type. Table 25 presents the distribution of the mapped burnt area by land cover type. The visible scars from forest fires in the south-east of the country are shown in Figure 44.

Table 25. Distribution of burnt area (ha) in Turkey by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	18192.16	38.09
Other Natural Land	22676.72	47.48
Agriculture	6839.53	14.32
Artificial Surfaces	34.25	0.07
Other Land Cover	22.86	0.05
TOTAL	47765.53	100.01

1.2.24 United Kingdom

In the UK there were 19 fires of over 30 ha, which burned a total of 5 126 ha, more than the last three years and comparable with 2013. Most of the damage occurred in May, including one fire of over 1 550 ha in Caithness & Sutherland and Ross & Cromarty province. There were three other fires of more than 500 ha, affecting Scotland, Wales and Northern Ireland. 800 ha of this occurred on Natura2000 land, amounting to 15.5% of the total burnt area and 0.045% of the Natura2000 land in the UK. Table 26 presents the distribution of the mapped burnt area by land cover type.

Table 26. Distribution of burnt area (ha) in the UK by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	255.49	4.98
Other Natural Land	4854.71	94.7
Agriculture	16.39	0.32
Other Land Cover	0.08	0
TOTAL	5126.67	100



Figure 44. Burnt area scars in Turkey in 2017.

1.3 Middle East and North Africa

The 2017 fire season in North Africa and the Middle East was somewhat worse than average, with a total burnt area recorded over the region of 119 491 ha, around three times the amount recorded in 2016. The most affected MENA countries were Algeria and Tunisia, amounting to around 75% and 16% of the total respectively.

1.3.1 Algeria

Algeria was the most affected of the MENA countries and the fourth most affected of all the countries covered by EFFIS. Almost all the fires occurred in July and August. The mapped burnt area of 89 759 ha was the highest since 2012, although well below the amount that burned then (over 200 000 ha). 283 fires of over 30 ha were recorded, of which 35 were over 500 ha. The largest covered 4 717 ha and occurred at the end of July in Et-Tarf province in the north-east of the country. In 2017, 12 419 ha of Protected Areas were burnt, amounting to 36% of the total burnt and 0.084% of the protected area in Algeria. The burnt scars left by these fires can be seen in Figure 45 below. 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 27.

Table 27. Distribution of burnt area (ha) in Algeria by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	48897.4	54.48
Other Natural Land	6895.31	7.68
Agriculture	33924.73	37.8
Other Land Cover	41.95	0.05
TOTAL	89759.39	100.01

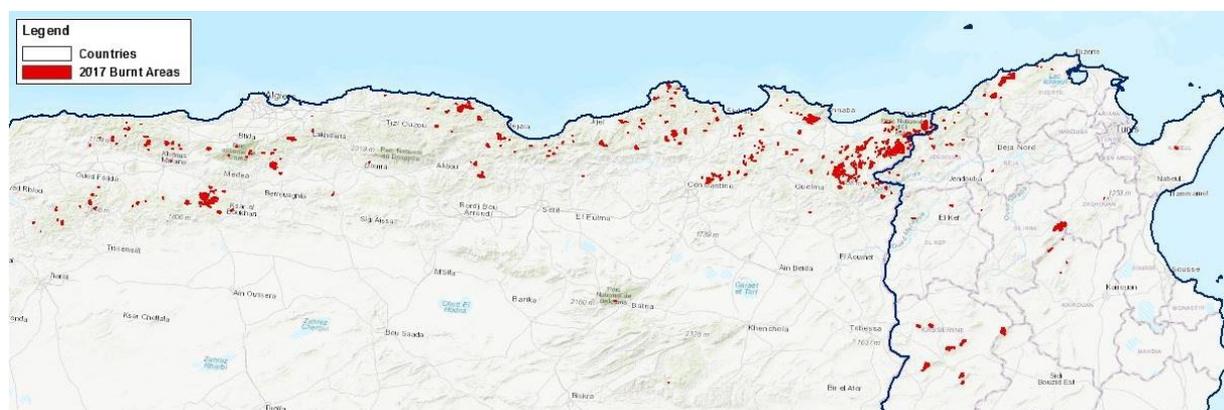


Figure 45. Burnt area scars in Algeria and Tunisia in 2017.

1.3.2 Lebanon

In Lebanon a fire in September burned 45 ha, mostly in Forest/Other Wooded Land. Table 28 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 28. Distribution of burnt area (ha) in Lebanon by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	38.33	84.49
Agriculture	7.03	15.51
TOTAL	45.36	100

1.3.3 Libya

There were three fires over 30 in Libya between June and November, covering a total of 234 ha. Three-quarters of the damage (168 ha) came from one fire in September. Table 29 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 29. Distribution of burnt area (ha) in Lebanon by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	94.69	40.47
Other Natural Land	14.41	6.16
Agriculture	124.86	53.37
TOTAL	233.96	100

1.3.4 Morocco

Morocco's fire season was a little worse than that of 2016. 25 fires burned a total of 4 644 ha between April and December, two-thirds of the damage occurring in July. Much of this came from the largest fire of the year in Jerada province at the end of July (1 470 ha). Of the annual total, 342 ha occurred in Protected Areas, amounting to 7% of the total burnt in the year and 0.045% 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 given in Table 30 and the burnt area scars left by the fires are shown in Figure 46.

Table 30. Distribution of burnt area (ha) in Morocco by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	2957.08	63.7
Other Natural Land	62.95	1.36
Agriculture	1622.43	34.95
TOTAL	4642.46	100

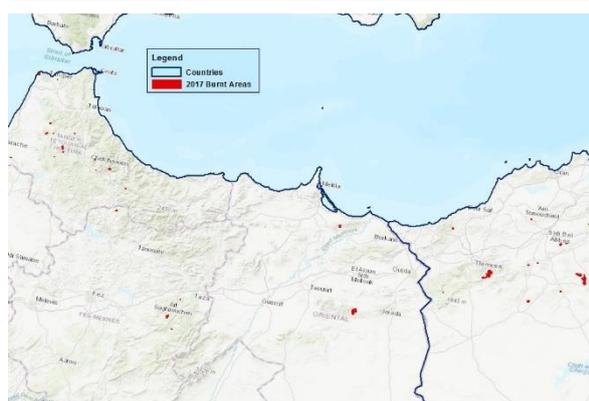


Figure 46. Burnt area scars in Morocco and western Algeria in 2017.

1.3.5 Syria

Although three times as much area was burnt in 2017 compared with 2016, it was still significantly less than the amount recorded in 2015, when over 90 000 ha was burnt. There were 18 fires of over 30 ha recorded between May and November, mostly near the start of the season, resulting in a total burnt area of 5 743 ha. The largest fire occurred in Dar'a province at the end of May and covered 2 512 ha, and there were two other fires of over 500 ha. The Globcover land cover map, harmonised with CLC, was used to split the burnt area into different land type categories.

Table 31 shows the distribution of burnt area in Syria by land type and the burnt area scars left by the fires can be seen in Figure 47.

Table 31. Distribution of burnt area (ha) in Syria by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	3705.15	64.52
Other Natural Land	69.23	1.21
Agriculture	1968.2	34.27
TOTAL	5742.58	100

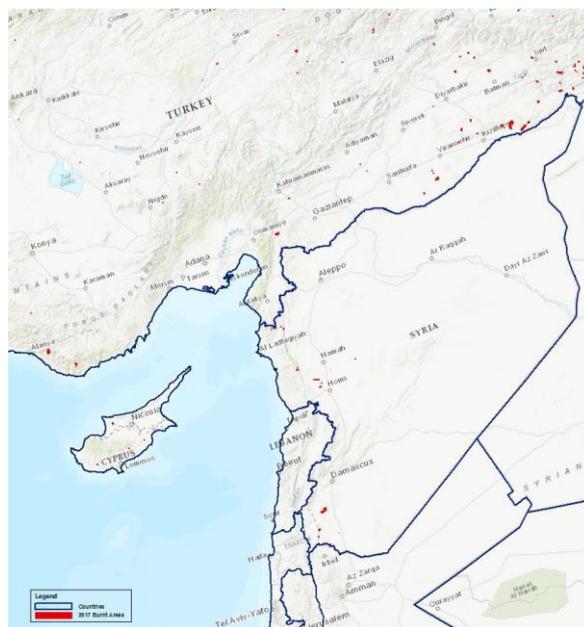


Figure 47. Burnt area scars in Syria in 2017.

1.3.6 Tunisia

In Tunisia it was the worst year for forest fires for nearly a decade. There were 51 fires greater than 30 ha recorded between June and September, burning a total of 19 065 ha. 60% of the damage occurred in August, including two fires over 3000 ha in Jendouba and Siliana provinces. Figure 45 on page 31 shows the burnt scars left by these fires. 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 32.

Table 32. Distribution of burnt area (ha) in Tunisia by land cover types in 2017.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	17709.22	92.89
Other Natural Land	93.52	0.49
Agriculture	1221.6	6.41
	3.54	0.02
	37.12	0.19
TOTAL	19065	100

Summary overview

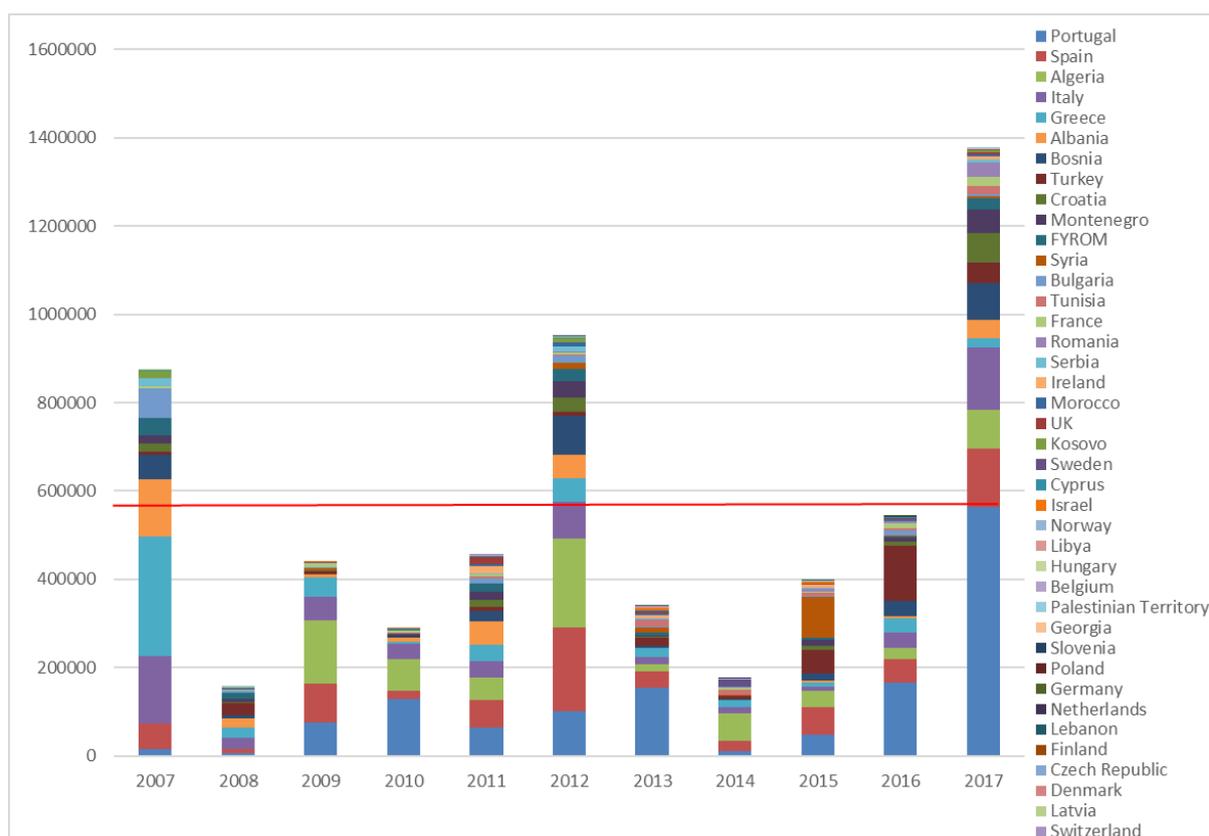


Figure 48. Overview of total burnt area across Europe and the Middle East for the last 11 years. Countries are ordered by size of total burnt area over this period. Note that the burnt area mapped for Portugal in 2017 exceeds the combined total for all countries in all except 2 of the previous 10 years.

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