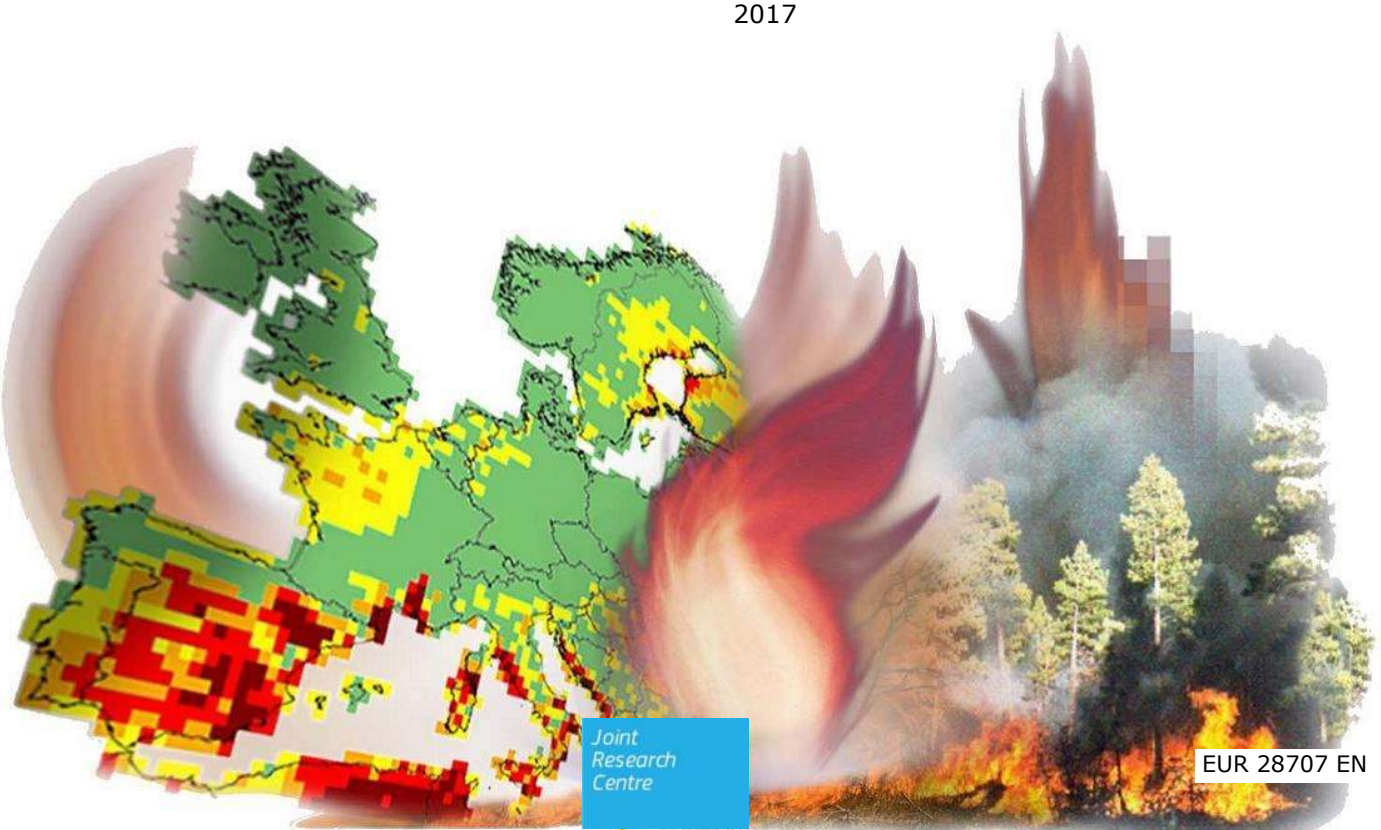
European Commission

JRC SCIENCE FOR POLICY REPORT

Forest Fires in Europe, Middle East and North Africa 2016

2017



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Title Forest Fires in Europe, Middle East and North Africa 2016

Abstract

This report contains the annual summary of the fire season of 2016 with official figures provided by 30 contributing countries for the number of fires, burnt areas and fire prevention efforts, and the analysis of fire danger and areas mapped in the European Forest Fire Information System (EFFIS).

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Foreword

Forests, agricultural land and natural areas continue to burn, both within and outside Europe. Lives of European citizens are lost and endangered. By early September 2017, wildfires have already burnt nearly 700 000 ha of land in the EU; hence this season will most likely be remembered as one of the most devastating wildfire seasons in Europe since records began. Moreover, sadly this year's fires have taken a huge toll of lives in Southern Europe. Extreme weather conditions such as extended heat waves, drought, and strong winds can be expected to affect many of Europe's forests more frequently and more severely as a consequence of climate change.

Large-scale, catastrophic 'megafires', whatever their origin, are caused mainly by the combined effect of these extreme weather conditions together with the degree of fire-proneness of forests, which in itself may reflect a degradation of forest ecosystem conditions and services. Thus, regardless of how much is spent on firefighting means and preparedness, concentrating on firefighting alone will neither be effective enough nor cost-efficient, and even less so when adaptation to climate change is increasingly needed.

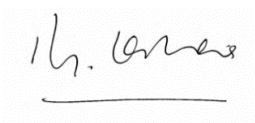
We need to increase the efforts in preventing the outbreak of wildfires and particularly in minimizing conditions for their progression. These efforts should aim at increasing forest resilience and the protection of EU citizens, natural capital and the economy, namely in protected areas such as the Natura 2000 sites, which hold a large proportion of forests and represent the backbone of nature protection action in the EU.

Unsustainable land use decisions and natural resource mismanagement play a clear role in exacerbating forest fire risk and severity. More investments are needed to increase the health and the resilience of forest ecosystems, for instance by avoiding highly fire-prone forests as compared to more natural mixed or broad-leaved forests, particularly if left unmanaged. The overexploitation of water bodies in some regions has repeatedly been a cause for concern, although its influence on the recent fires remains to be assessed. Neglect or complete abandonment of land management practices, such as pastoralism, which reduces fire risk and/or fire intensity, can also be an important factor.

The EU is already very actively engaged in support of forest fire prevention, forest fire fighting and the restoration of burnt forest land, as well as education and awareness-raising actions through its Regional Development Fund and Rural Development Programmes. Exchange of good practices to improve intervention effectiveness and European coordination is ensured in the frame of the Expert Group on Forest Fires (EGFF) which includes experts from 40 countries in Europe, Middle East and North Africa. That coordination is also supported by the European Forest Fire Information System (EFFIS) within the Copernicus programme. EFFIS provides access to near real-time information on wildfires and supports the European Response Coordinating Centre (ERCC), which coordinates the help among countries on firefighting operations.

The Commission will continue working together with the national administrations through EU plans and programmes to increase the resilience of forest habitats and ecosystems, in line with the EU Action Plan for nature, people and the economy adopted few months ago and in view of the revision of the EU Strategy on adaptation to climate change.

We will further strengthen cooperation with the members of the EGFF, especially on fire prevention and lessons learned. Our common aim is to maintain and protect our natural capital, avoiding or minimising the impacts of wildfires on our citizens, their properties and their natural environment. Publications such as the "Forest Fires in Europe, Middle East and North Africa 2016" report, the 17th report of its series, which summarizes the fire events of 2016 in Europe, Middle East and North Africa, will contribute to this endeavour.



Daniel CALLEJA CRESPO
Director-General for Environment

European Commission
Directorate General for Environment

Executive summary

This is the 17th issue of the EFFIS annual report on forest fires for the year 2016. This report is consolidated as highly appreciated documentation of the previous year's forest fires in Europe, Middle East and North Africa. In its different sections, the report includes information on the evolution of fire danger in the European and Mediterranean regions, the damage caused by fires and detailed description of the fire conditions during the 2016 fire campaign in the majority of countries in the EFFIS network. The chapter on national reporting gives an overview of the efforts undertaken at national and regional levels, and provides inspiration for countries exposed to forest fire risk.

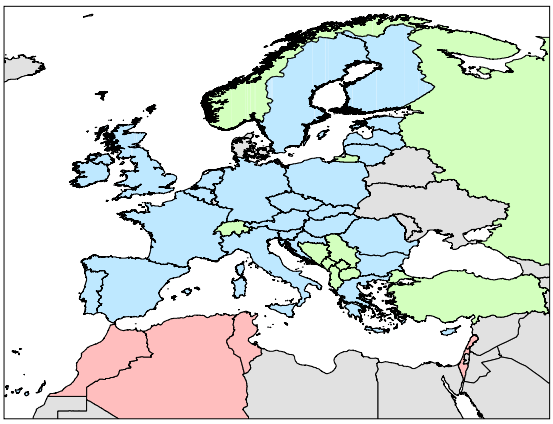
The preparation and publication of the report aims also at improving cooperation with the members of the EGFF especially with regard to fire prevention actions. Our common aim is to maintain and protect our landscapes and natural heritage, to avoid loss of human lives and to minimise the damage caused to property by uncontrolled forest fires.

The aim of the European Forest Fire Information System (EFFIS) is to provide harmonised information on forest fires and assessment of their effects in the pan-European region. For this purpose, collaboration with EU Member States and neighbouring countries has been on-going since 1998. EFFIS started as a pilot project of collaboration between the European Countries and the European Commission in the area of fire information and fire prevention.

On the Commission side, EFFIS was initiated by the Joint Research Centre in collaboration with the DG Environment. Due to the high support from the Expert Group on Forest Fires, which constitutes the network of experts from the countries contributing to EFFIS, the system was developed to an operational level supporting national and European policies and providing the information basis for the discussion of issues related to forest fires in the European Parliament[1]. Currently, EFFIS provides operational support to DG ECHO in the area of civil protection, DG GROW in the implementation of the Copernicus Regulation as well as to DG REGIO regarding the implementation of the EU Solidarity Fund Regulation for critical fires. In 2015, EFFIS was adopted as one of the components of the EU Copernicus Program, which provides a legal and financial basis for its operation under this framework.

EFFIS provides an ideal platform for countries to exchange good practices on fire prevention, firefighting, restoration practices and other activities related to fire management, and for the European Commission to update the forest fire services in the countries on relevant initiatives at the European level.

Since its first operation in the year 2000, the number of countries contributing to the information on forest fires in EFFIS and receiving data from it has increased steadily.



Currently, the EFFIS network constitutes 40 countries, including 25 EU Member States (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, the Netherlands and the United Kingdom), 10 European non-EU countries (Albania, Bosnia & Herzegovina, former Yugoslavian Republic of Macedonia, Kosovo, Montenegro, Norway, Russia, Serbia, Switzerland and Turkey), and 5 MENA countries (Algeria, Israel, Lebanon, Morocco and Tunisia).

[1] http://www.europarl.europa.eu/plenary/en/parliamentary-questions.html

1 Forest Fires in 2016

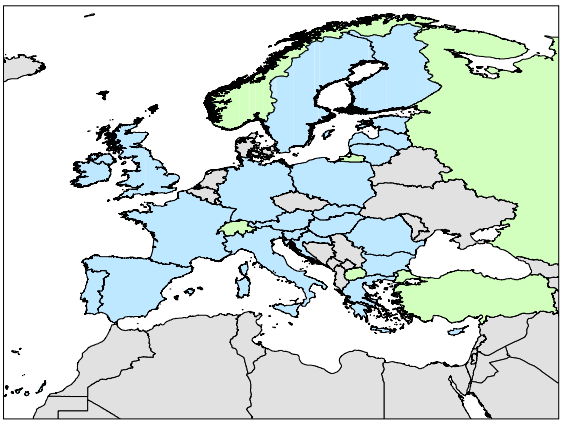
1.1 Introduction to the 2016 fire season in Europe, Middle East and North Africa

Table 1. Overview of the number of fires and burnt areas reported by the contributing countries in 2016.

Country	Number of fires			Burnt area (ha)			Notes
	2016	2006-15 average	2016 as % of average	**2016**	2006-15 average	2016 as % of average	
Austria	**317**	423	75	**398**	106	375	
Bulgaria	**584**	549	106	**6340**	8878	71	
Switzerland	**63**	85	75	**463**	96	483	
Cyprus	**119**	107	111	**3205**	1921	167	
Germany	**608**	767	79	**283**	339	84	
Algeria	**3150**	3410	92	**18370**	36437	50	Average 2011-15
Estonia	**84**	66	127	**123**	501	25	
Spain	**8817**	13255	67	**65817**	100385	66	
Finland	**933**	1385	67	**310**	627	49	
France	**4285**	3720	115	**16093**	9330	172	
FYROM	**60**	307	20	**450**	8180	6	
Greece	**777**	1209	64	**26540**	48054	55	
Croatia	**151**	232	65	**7100**	8811	81	
Hungary	**452**	947	48	**974**	4818	20	
Italy	**4793**	5993	80	**47926**	73759	65	Provisional data in 2016
Lebanon	**260**	107	243	**1871**	753	248	Only 1 previous year to compare
Lithuania	**98**	342	29	**26**	223	12	
Latvia	**641**	654	98	**467**	639	73	
Morocco	**422**	451	94	**2585**	3137	82	
Norway	**345**	89	388	**1884**	1037	182	Change in method of recording fires
Poland	**5286**	8260	64	**1451**	3745	39	
Portugal	**13261**	18923	70	**161522**	76588	211	
Romania	**174**	263	66	**675**	1616	42	
Russian Fed	**10089**	18623	54	**2419254**	2311075	105	Average 2010-2015
Sweden	**5454**	3877	141	**1288**	3319	39	
Slovenia	**90**	96	93	**526**	336	156	
Slovakia	**136**	280	49	**175**	468	37	
Turkey	**3188**	2330	137	**9156**	8903	103	

1.2 European countries

The following chapters contain the reports from the contributing European countries. The reports are arranged in alphabetical order and comprise reports from 22 Member States and 5 other non-EU members of the EFFIS network.



1.2.1 Austria

General information

The area of Austria is 83 858 sq km and is divided into 9 provinces, 15 towns with separate charter, 84 administration districts, and 2 350 municipalities. There are 4 567 voluntary fire brigades and 6 professional fire brigades (Vienna, Graz, Linz, Salzburg, Innsbruck, Klagenfurt). On average there are 2 fire brigades per municipality and a total of around 290 000 fire-fighters. The response time for action on the plains and near villages (excluding mountain areas) is between 10 and 15 minutes leading to a very small burnt area per fire (e.g.: ~1 000 m2).

Fire danger in the 2016 fire season

In the last year in Austria we had a long season with a high level of forest fire danger In particular in the southern / south-west part of Austria (Kärnten, Tirol, Niederösterreich) we had 6 fires of more than 50 ha. Three of them were in the Alps.

Fire occurrence and affected surfaces

The area of Austria is 83 858 sq km and it is divided into 9 provinces, 15 towns with separate charter, 84 administration districts, and 2 350 municipalities. There are 4 567 voluntary fire brigades and 6 professional fire brigades (Vienna, Graz, Linz, Salzburg, Innsbruck, Klagenfurt). On average there are 2 fire brigades per municipality and a total of around 290 000 fire-fighters. The response time for action on the plains and near villages (excluding mountain areas) is between 10 and 15 minutes leading to a very small burnt area per fire (e.g.: ~1 000 m^2). The largest burnt area was about 75 ha.

In Austria there are special courses for forest fire fighting, in particular for actions in the mountain areas, and some of them are specialized for working with helicopters and airplanes all over Austria. The education is done in nine fire service colleges (provinces). All the courses are only for firefighters in cooperation with the army. In the last season we organized meetings for team-leaders to change their experience (lessons learned) Table 1 shows the number of fires and burnt area in Austria in 2014, calculated by the Austrian federal fire brigade association based on the reports of the different fire brigades.

12 fires burned more than 5 ha.
6 fires burned more than 50 ha.

Table 2. Number of fires and burned area in Austria in 2016.

Fire type	No. of Fires	Burned area(ha)
Non forest fires	767	37
Forest fires	317	398

Attention: We still have the same problem with the database as in the past, because there are mistakes in the operational reports of the fire service in the municipalities.

Firefighting means and information campaigns

An average of two fire departments per community is standard. They have no special equipment. In the districts there is special equipment in store; for example extinguishing containers for helicopters etc. In the Alps and other mountains they will be supported by helicopters from the army or private companies.

We have special courses for forest fire, in particular for actions in the mountains; some are specialist courses for working with helicopters and airplanes all over Austria. The education will be done in nine fire service colleges (provinces). All the courses are only for firefighters in cooperation with the army. We also organize meetings for team-leaders to share their experience (lessons learned).

Fire prevention activities

In case of a lot of wildland and forest fires 2016 we have some special campaigns. The risks for forest fires in Austria is now a sensitized topic for the Austrian inhabitants.

- The governments and the communities write more regulations on forest fire danger than they did in the past. They have also for example forbidden cultural fires (midsummer).
- TV and radio reports on current forest fire hazard in Austria. (for example based on EFFIS database)
- A working group of ÖBFV (Österreichischer Bundesfeuerwehrverband) worked intensively with the issue of forest fire danger. A special regulation for fire services will be created in 2017.
- ÖBFV has installed an EU module for forest fire fighting with helicopter support and two for forest fire ground fire fighting. Some special training courses have already been held.

Injuries and loss of human lives

In 2016 there were no deaths (either firefighters or civilians) during forest fires.

(Source: The Austrian Federal Fire Brigade Association, Austria).

1.2.2 Bulgaria

Activities for forest fire prevention are the priority of the Ministry of Agriculture and Foods and the Executive Forest Agency EFA. Annually before the active fire season, all regional authorities develop an annual plan for forest fire protection of the forest areas and an action plan for forest fire fighting. Those documents are to be submitted annually to the committee of representatives from EFA and to the Directorate General for Fire Safety and Protection of the Population.

According to the Executive Forest Agency database in 2016 the number of forest fires in Bulgaria was 584 and the burnt area is estimated to be 6 340 ha. The average size per forest fire in 2016 increased to 10.8 ha. The biggest forest fire affected 871.7 ha of forest territories, but the biggest fire burned more than 4 500 ha, 500 ha of them in forest.

The largest number and area burnt by forest fires were reported in Regional Forest Directorate /RFD/ Kardzhali – 91 fires burning 3495 ha, RFD Stara Zagora with 34 burning 695.5 ha and RFD Burgas with 45 fires affecting 497.5 ha. All of them are situated in South – Central part of the country.

According to the ownership, distribution of the burnt areas in 2016 is:

- State forest - 66%,
- Municipal forest – 20%
- Private forest – 12%
- Other forests – 2%.

The main causes for the forest fires during 2016 are as follows:

- Carelessness – 441 in number (76%)
- Arson - 31 in number (5%)
- Natural - 22 in number (4%)
- Unknown - 90 in number (15%)

The direct losses by forest fires in 2016 are estimated to be around 3 000 000 Euro, although the average damage for the last 10 years is about 2 500 000 Euro.

Table 3. Forest fire statistics for Bulgaria 2006-2016.

Year	Burnt area (ha)		Fire causes (number)			Total number of fires
	Total	Forest lands	Human activities	Natural	Unknown	
2007	42999	42999	1163	18	298	1479
2008	5289	5289	484	8	90	582
2009	2276	2276	231	5	76	314
2010	6526	6526	191	1	30	222
2011	6883	6883	418	7	210	635
2012	12730	12730	669	42	165	876
2013	3314	3314	334	12	62	408
2014	916	916	128	3	20	151
2015	4313	4313	335	12	82	429
2016	6340	6340	472	22	90	584
Mean	**9158**	**9158**	**442**	**13**	**112**	**568**

The total number of fires, burnt area and average fire size from 1991 to 2016 is presented in Figure 1.

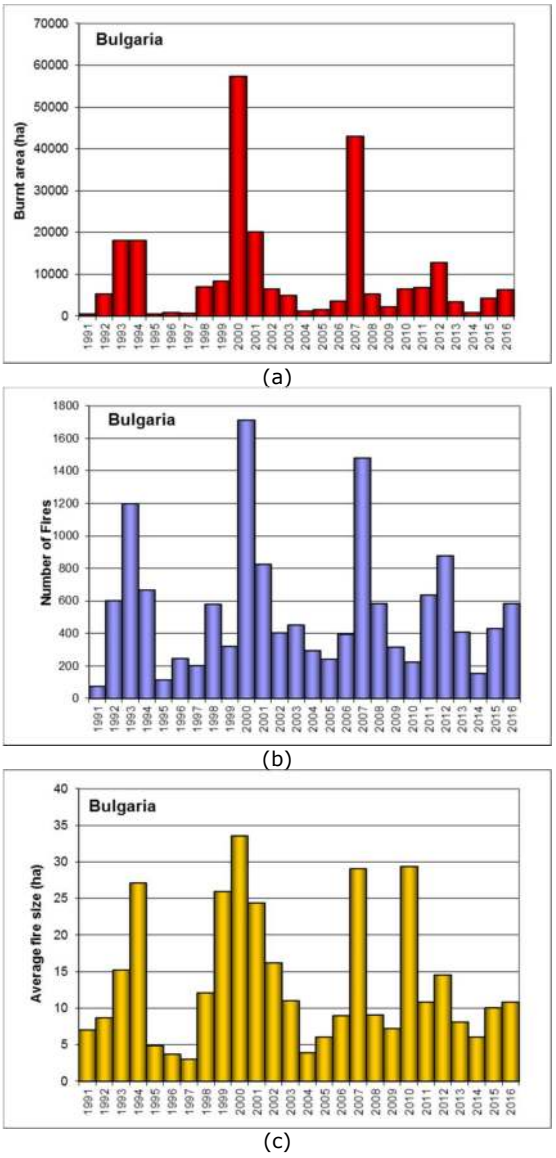


Figure 1. Burnt areas (a), number of fires (b) and average fire size (c) in Bulgaria from 1991 to 2016.

Injuries and loss of human lives

During 2016 there were no reported losses of human lives or injuries from forest fires.

(Source: Executive Forest Agency, Bulgaria).

1.2.3 Croatia

Fire danger in the 2016 fire season

The analysis of this year's average monthly danger rating for the occurrence and spread of vegetation fires (according to the Canadian method) for June 2016 indicates that it was mostly low, moderate in the Kvarner region and Middle Dalmatia, and very low inland, and was generally lower than last year.

A simple verification; i.e. a comparison of the total number of predicted and actual danger rating, is indicated in Figure 2. The analysis shows that the ratings are reasonably well-tuned. In addition, the high and very high ratings practically did not exist.

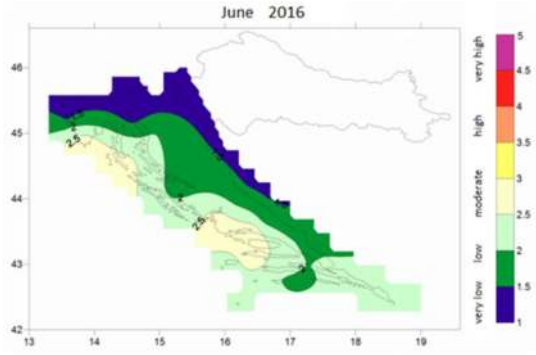


Figure 2. Median monthly danger rating for the occurrence and spread of vegetation fires for June 2016.

In June, as in the previous months, there was a penetration of humid and unstable air that reached the Adriatic coast, bringing occasional rain and thunderstorms. The effects of frontal and cyclonal systems were frequent until June 20, but precipitation was unevenly distributed, and in some locations the plant cover was somewhat drier, and in that period fires also occurred.

In the area of Skradin, there was a vegetation fire on 16 June. Due to the approaching and moving of the cold front, a moderate to strong sirocco started, and then the wind changed direction, so the fire spread rapidly. According to the available data, it was most likely caused by a thunder strike. Because the wind changed direction and speed as the latitude increased, problems with extinguishing occurred.

Between 21 and 26 June, the weather was affected by a field of high or elevated air pressure, and very warm air came from the south, so it was the first heat wave in 2016. Danger ratings also increased in that period. Then, the entire country was affected by a cold front, but precipitation on the Adriatic coast was relatively low. By the end of the month the weather stabilized.

The weather in July was most commonly affected by a field of high or medium even air pressure. It was warm and hot, and some days were very hot. The second heat wave of this summer with extreme air temperatures lasted from 8 to 12, and in Dalmatia until 13 July. The air temperatures were above the average during the night and in the morning. The minimum temperatures in the Adriatic were mostly from 22 to 28, and maximum from 30 to 36 °C. It was a consequence of very hot air flowing in the high south and southwest current. In this period, the danger ratings for the occurrence and spread of vegetation fires also increased.

However, on 13 and 14 July a cold front from the northwest of the continent and the upper level through crossed Croatia, while humid and cold air from the north flowed in. On 15 and 16 July, a high altitude cyclone was formed with damp and relatively cool air in its backside due to the strengthening of the Western European anticyclone ridge. Strengthening of the anticyclone ridge from the west of the continent continued during the following days, and the weather stabilized. There was heavy rain and thunderstorms, but on the Adriatic coast the precipitation was unevenly distributed.

Due to such synoptic situation, there was strong, even severe bora, with hurricane force gusts in the Velebit Canal. Synoptically speaking, these are not typical situations for summer months.

Since there was localized thunder in the Adriatic, which was not accompanied by significant precipitation everywhere, vegetation fires occurred. The fires were difficult to extinguish due to strong bora, but also wind shear with the altitude (change in wind direction and speed).

The most critical day was 15 July, which was predicted in the weather forecasts. Both in the Adriatic and in the coastal area it was noticeably cooler, with some precipitation, and the meteorological danger index; i.e. danger rating, decreased. With the weather stabilizing and hot air flowing in mostly with the west and southwest current, the maximum air temperatures were again around 30°C or higher, so the danger ratings on 23 July increased to high and very high.

An unstable period followed from 24 to 28 July, but rain and thunderstorms on the Adriatic were localized, so the risk of vegetation fires was only somewhat reduced. Lightning caused fires on 24 and 25 July, and the instability and moderate to strong wind made their extinguishing more difficult.

The analysis of this year's average monthly rating for July indicates that it was high in most areas, and even very high in certain places in central Dalmatia (Šibenik and Split area). In northern Istria, in the Kvarner region and in the mountains it was only moderate, as in the southernmost Dalmatia (Figure 3).

The analysis of this year's average monthly rating for August indicates that it was moderate in the north and part of the middle Adriatic, as well as in the mountainous regions and Dalmatian hinterland. In most of Dalmatia, the middle rating was high, while it was low in the smaller part of Lika and Gorski Kotar.

This year's August is characterized by intermittent penetrations of damp and slightly cooler air, most commonly associated with the shifting of cold fronts and troughs, whereby precipitation is most often and most abundant in the continental part.

Precipitation was also present on the coast, but was less frequent, and localized along the coast and on the islands. On the other hand, after the passing of the atmospheric fronts, and with the strengthening of the anticyclone ridge from the west of the continent, bora and the north-western wind would become stronger.

Such weather conditions are particularly unfavourable for fire protection, as local rainfall is often not sufficient to mitigate soil and vegetation dryness, and lightning associated with the passing of the front may cause a fire. This happened several times this year. There was moderate and strong, even severe bora, with hurricane force gusts in the Velebit Canal. Such wind quickly dries the plant cover, while extinguishing is significantly more difficult if a fire occurs. An example are the vegetation fires in the Šibenik area from 23 to 25 August.

The weather conditions in September this year in most areas did not favour the occurrence and spread of vegetation fires, especially in the second half of the month. Although the field of high or elevated air pressure most frequently influenced the weather on the Adriatic and the coastal area until 15 September, there was still a penetration of humid and unstable air, which reduced the fire risk in some areas. The effects of expressed cyclones and atmospheric fronts followed, and the main firefighting season is considered closed on 16 September.

The climate analysis indicates that the summer (June, July and August) this year was warmer than the multiannual average (1961-1990) throughout the country. According to percentile distribution, the temperature conditions in the Adriatic and the coastal area were extremely hot and very warm. June and July were warmer than the average, contributed to by the daily, especially night air temperatures, while August was mostly within the average.

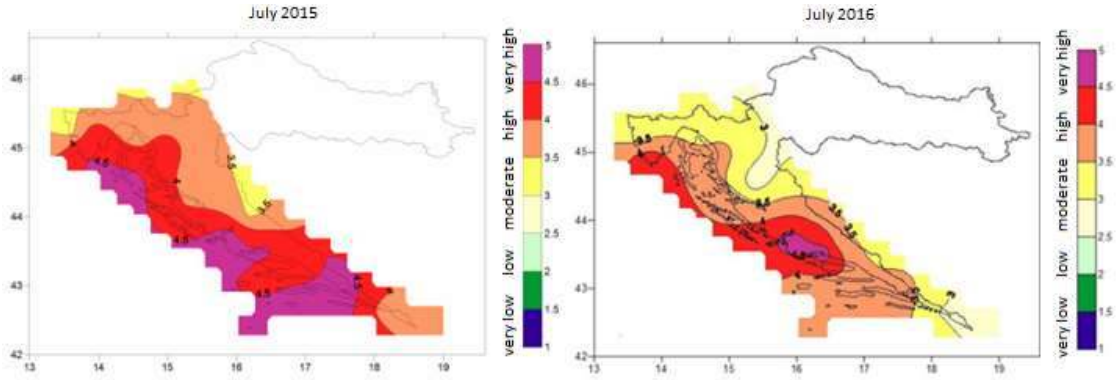
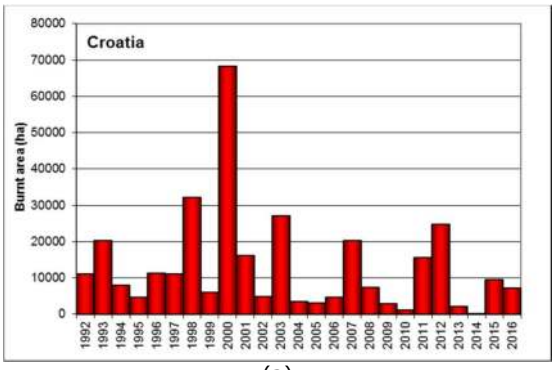


Figure 3. Median monthly danger rating for the occurrence and spread of forest fires according to the Canadian method (MIOP) for July 2016 compared to July 2015.

Fire occurrence and affected surfaces

During 2016, 151 wildfires affected 7 100 hectares of land. Most fires (111) occurred in Split area (58% of the number of fires and 95% of the affected surfaces). The trend of number of fires, burnt area and average fire size can be seen in Figure 4.



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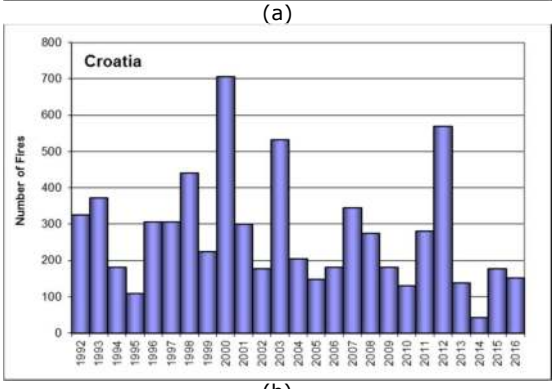

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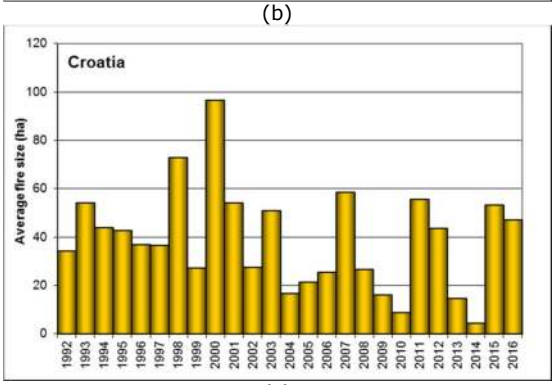

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Figure 4. Burnt areas (a), number of fires (b) and average fire size (c) in Croatia from 1992 to 2016.

Of the total affected surfaces, 329 hectares or 4.6% of high forests were affected, 3 959 ha or 55.8% of other forests (medium forest, coppice, bushes and shrubbery, macquis, garigue) and 2 812 ha or 39.6% of unwooded forest and agricultural land.

As far as the ownership structure of the affected surfaces is concerned, it can be noted that 6 721 ha or 95% of the state owned surfaces and 379 ha or 5% of the private surfaces (forest and agricultural land) were affected.

Table 4. Burnt area in Croatia by land type.

Year	Area burned in forest fires (ha)			
	Forest	Non-forest	Other/ Agricultural	Total
2008	4119	2865	356	7343
2009	2316	446	138	2900
2010	753	267	101	1121
2011	6937	3106	5512	15555
2012	15515	6201	3106	24804
2013	942	628	429	1999
2014	120	45	23	188
2015	6569	1462	1385	9416
2016	**4288**	**2698**	**114**	**7100**

Fire prevention activities

Prevention measures regarding fire protection and operational functioning of the firefighting system are defined by the Fire Protection Act, the Firefighting Act and accompanying by-laws. In addition to the aforementioned Acts, the Government of the Republic of Croatia stipulates additional fire protection activities each year (Program of activities in the implementation of special fire protection measures of interest to the Republic of Croatia). The program is implemented by state administration bodies, public institutions and fire brigades, and the Program grants additional funding for the operational functioning of the firefighting system. The National Protection and Rescue Directorate is responsible for coordinating and monitoring the implementation of fire protection measures.

An integral part of the Program is the State Plan for the Engagement of Firefighters. The State Plan defines fire commands, standard operational procedures and instructions according to which the firefighting system takes action. The standard operating procedures also determine the operation of aircrafts during the extinguishing of forest fires. Prior to the start of the fire season, estimates were prepared and Fire Protection Plans were developed for the following especially endangered areas: islands of Korčula, Lastovo, Brač, Hvar, Vis, Mljet, Dugi otok and the Pelješac peninsula.

Firefighters and firefighting equipment from the continental part of the country were relocated during the summer months to a total of 10 endangered coastal locations. In one shift, 62 firefighters and 17 firefighting vehicles were relocated to the coastal part of the Republic of Croatia.

In addition to the local firefighters, during the summer in the coastal area there were an additional 1 110 seasonal firefighters deployed in professional and voluntary firefighting units and 36 local professional firefighters deployed in the State Fire Department and the Seasonal Emergency Fire Department on the islands of Mljet, Korčula, Brač and the Pelješac peninsula.

Firefighting means and information campaigns

During the fire season in 2016, the National Protection and Rescue Directorate - Fire Operations Centre carried out the coordination of ground and air firefighting forces across the coastal area and communication with the Air Force Command operating within the Ministry of Defence.

The National Protection and Rescue Directorate - Firefighting Sector together with the representatives of the National Hydrometeorological Institute reported once a week on the situation to the Emergency Response Coordination Centre (ERCC) in Brussels, while presenting weekly events in the Republic of Croatia through a video conference.

The National Hydrometeorological Institute prepared a fire weather index on a daily basis. Prior to the start of the fire season, additional firefighter training in extinguishing forest fires (assault operations and joint action with aircrafts) was conducted.

The air forces consist of six "Canadair" CL-415 type aircraft, six Air Tractor AT-802 A/F type aircraft and two Mi-8 MTV1 type helicopters. By 31 December 2016, the firefighters of the Croatian Air Force and Air Defence Forces had 6 364 flights and 937:05 hours of flight time performing 268 interventions using firefighting aircraft, for which 618 852 litres of fuel were consumed and 34 228 tons of water were discharged.

The Ministry of the Interior performed additional inspections of areas, forests, tourist destinations, hotels, camps and national parks endangered by fires. Information campaigns were also held with the aim of informing the population and tourists of fire hazards through printed flyers and placing billboards. Other competent inspection departments conducted supervision of all other fire endangered areas. The supervision covered the firefighting forest roads and belts, railway lines, public roads of state importance and facilities on those roads, as well as those areas where fires that hindered the flow of road traffic occurred in previous years.

Supervision was performed of roads of local significance that were under increased traffic load during the tourist season (access roads to resort hotels, auto camps, public garages, cultural and historic sites and other facilities where a large number of tourists or guests are staying). Furthermore, supervision was performed and measures were taken in national parks, nature parks and other protected forest areas, municipal waste landfills, where municipal waste is disposed of under controlled conditions, especially in the coastal area.

Operations of mutual assistance

In accordance with the concluded inter-state Agreements on mutual assistance in major accidents, further contacts with Bosnia and Herzegovina, Montenegro and Slovenia are ongoing. There is a standard operating procedure signed with Bosnia and Herzegovina, Montenegro and Slovenia with regard to unhindered crossing of state borders by land and air forces in large-scale fires in the border area.

During 2016, the Republic of Croatia provided assistance to the state of Israel in extinguishing a fire using air forces, while it did not request the aforementioned.

Loss of human lives

During fire extinguishing in the coastal and karst areas in 2016, 11 firefighters (minor injuries) and 2 civilians (no tourists) were injured, while there were no reports of fatalities.

(Source: National Protection and Rescue Directorate, Republic of Croatia; Ministry of Agriculture, Registry on Forest Fires, Croatia).

1.2.4 Cyprus

Review of the 2016 fire season

The 2016 fire season in Cyprus was severe from a variety of standpoints and will go down in history as one of the most destructive on record. The country experienced an aggressive fire activity, an above-average number of hectares burned and significant impacts on the natural environment, people and communities. The decreasing trend of the total annual burned area that was displayed during the period 2014-2015 was interrupted abruptly, mainly due to the catastrophic fires that ignited during June 2016 and caused the death of two forest fire fighters and the serious injury of others, the evacuation of villages, the exposure of homes and structures of historical value to fire threat and the devastation of thousands of hectares of pine forest.

Fire danger in the 2016 fire season

In January 2016, unstable weather conditions prevailed giving rain, local thunderstorms, hail and snow. The mean air temperature was 0,5°C below normal and the area average precipitation was 80% of normal.

In February the weather was extremely dry and hot. The mean air temperature was approximately 3°C above normal and the average precipitation was 31% of normal.

March was relatively warm. The mean air temperature was approximately 2°C above normal and the area average precipitation was 80% of normal.

In April the weather was dry and relatively warm. The mean air temperature was about 3°C above normal and the area average precipitation was 39% of normal.

In May the weather was relatively wet. The mean air temperature was around normal and the area average precipitation was 134% of normal.

The weather in June was relatively dry and hot. The mean temperature was approximately 2°C above normal and the area average precipitation was 52% of normal. During the period 21-24 of June extremely high temperatures were recorded.

During July and August the weather was relatively warm and dry and the mean temperature was approximately 1°C above normal.

In September the weather was relatively wet. The mean air temperature was about 0,5°C above normal and the area average precipitation was 167% of normal.

In October the weather was relatively dry and warm. The mean air temperature was about 1,5°C above normal, while the area average precipitation was 70% of normal.

The weather in November was relatively dry. The mean air temperature was about 0,5°C above normal and the area average precipitation was 58% of normal.

In December the weather was wet and relatively cold. The mean air temperature was about 1,5°C below normal and the area average precipitation was 151% of normal.

Fire occurrence and affected surfaces

During 2016, Cyprus experienced 119 forest fires that burned 3 205 hectares, mostly forest and other wooded land. The total burned area showed an annual increase of almost 400%, compared with the previous year. There were 4 fires with burnt area greater than 50 ha, that affected an area of 2 911 ha.

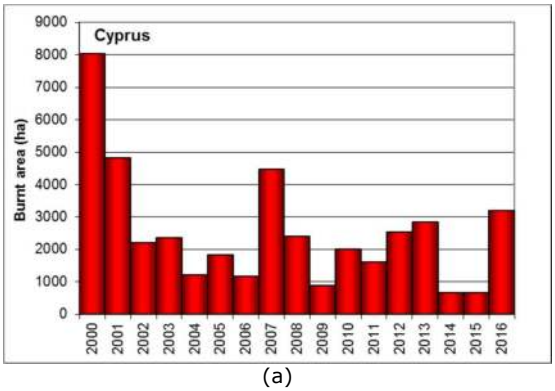
<u>Major fires in 2016</u>

- During the afternoon of the 18th of June 2016, Cyprus experienced a destructive forest fire near Argaka village, Paphos district. Fanned by strong winds, the blaze burned 7.6 km² (763 ha) of pine forest.
- On June 19, only a day after the large fire at Argaka village, one of the largest and most catastrophic forest fires in recent history of Cyprus, swept through "Solea" region of the Troodos mountain range. Due to strong winds the fire raged out of control, leaving behind several square kilometres covered in ash. The fire claimed the lives of two forest fire-fighters and destroyed almost 19 km² (1886 ha) of forest and other wooded land.

Table 5. Number of forest fires and burnt areas in Cyprus from 2012 to 2016.

Year	Number of fires	Burned area (ha)		
		Total	Forest and other wooded land	Agriculture and other artificial land
2012	78	2 531	2 330	201
2013	135	2 835	1 681	1 154
2014	68	669	496	173
2015	87	652	350	302
2016	**119**	**3205**	**2946**	**259**

The trends regarding both the number of fires and burnt areas over the last 17 years (2000-2016) are shown in Figure 5.



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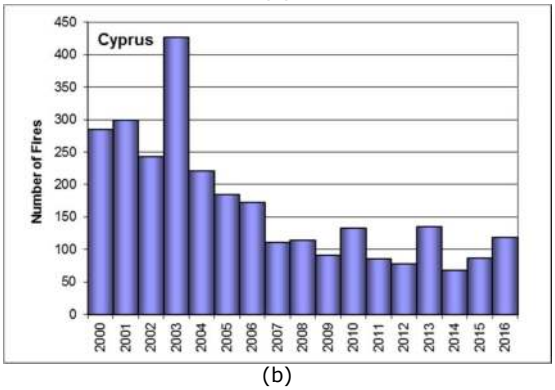

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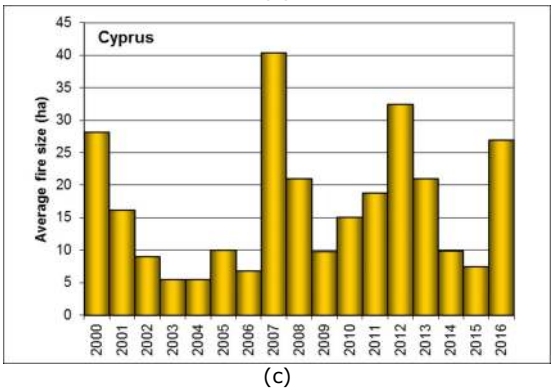

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Figure 5. Burnt areas (a), number of fires (b) and average fire size (c) in Cyprus from 2000 to 2016.

Loss of human lives

Two forest fire fighters died battling the massive fire at "Solea" valley, when their fire engine overturned down a cliff.

Fire prevention activities and fighting means

The 2016 fire prevention program consisted of multiple activities, including fire break construction and maintenance, vegetation management aiming at fuel reduction, law enforcement, education and information. All firefighting means, especially fire fighting aircrafts and fire engines, were subjected to their annual inspection and maintenance, before the starting of the fire season. Fire detection was achieved mostly through the operation of a network of 37 lookout stations. The Fire Fighting Task Force operated with a total number of 435 forest fire fighters.

Operations of mutual assistance

- Aerial means, including fire fighting aircrafts and helicopters, from Greece, Israel, France, United Kingdom (Sovereign Base Areas) and Italy, were sent to assist the battle against the massive forest fire in "Solea" region.
- Fire fighting aircrafts from Israel and helicopters of the United Kingdom (Sovereign Base Areas), assisted in the efforts to extinguish the major fire at Argaka village.
- During November 2016, the Republic of Cyprus assisted Israel with one fire fighting aircraft and 4 persons support crew, together with a ground team of 69 fire fighters and rescuers from the Department of Forests, the Fire Service and the Civil Defense, in the battle to extinguish the huge fires that were raging in the country for days.

(*Source: Ministry of Agriculture, Rural Development and Environment, Department of Forests, Cyprus*).

1.2.5 Estonia

Fire occurrence and affected surfaces

In 2016 a total number of 1 214 forest fires and wildfires were recorded; 84 of these were classified as forest fires. The biggest fire threat was in the spring and therefore half of the forest fires (43) occurred in May.

Table 6. Forest fires in Estonia 2000-2016

Year	Number	Area (ha)			
		Forest	Non-forest	Total	Average
2000	158	487.5	196.4	683.9	4.3
2001	91	54.6	7.2	61.8	0.7
2002	356	1055.1	1026.6	2081.7	5.9
2003	111	129.5	77.1	206.6	1.9
2004	89	297.2	81.7	378.9	4.3
2005	65	76.2	10.3	86.5	1.3
2006	250	2467.0	628.6	3095.6	12.4
2007	64	61.3	231.1	292.4	4.6
2008	71	340.4	939.4	1279.8	18.0
2009	47	41.4	17.9	59.3	1.3
2010	30	20.6	4.1	24.7	0.8
2011	24	15.5	3.8	19.3	0.6
2012	5	2.5	-	2.5	0.5
2013	15	33.4	45.1	78.5	5.2
2014	91	68.0	9.8	77.8	0.9
2015	67	77.7	5.4	83.1	1.2
2016	**84**	**117.7**	**5.2**	**122.9**	**1.5**

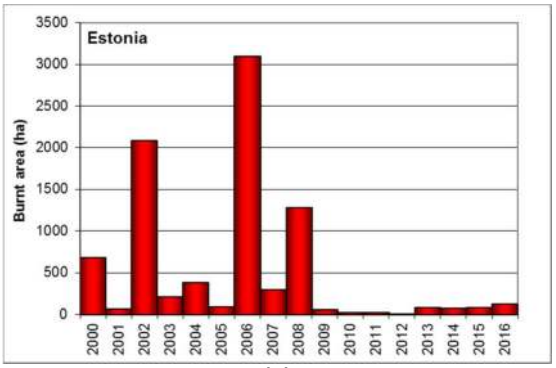
Forest fires in 2014 were recorded in 14 counties. The only county without forest fires was Järva county. The first fire in 2016 was recorded in March, the last one in October. The largest fire of 2016 occurred in May in Valga county Hummuli and burnt an area of 30.5 ha.

In 2016, all of the forest fires were of human direct or indirect origin. 64 % of fires were caused by accident/negligence.

The burnt area, number of fires and average fire size for the years 2000-2016 are shown in Figure 6.

Firefighting means and information campaigns

The Estonian Rescue Board is responsible for fighting forest and wildfires. The Estonian Rescue Board cooperates in its operations with the Police and Border Guard Board, Estonian Defence Forces, Environmental Board, State Forest Management Centre, Private Forest Centre, Environmental Inspectorate and local governments. Regional cooperation training sessions in fighting forest fires and wildfires are held for institutions engaged in the process.



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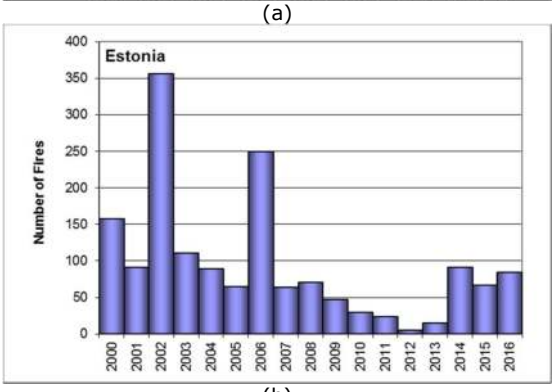

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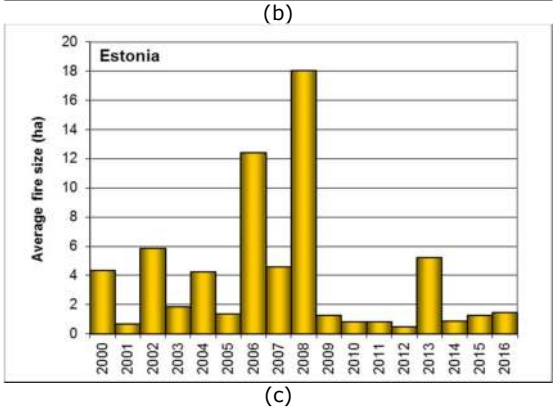

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Figure 6. Burnt areas (a), number of fires (b) and average fire size (c) in Estonia from 2000 to 2016.

Loss of human lives and other damage

This year there were no casualties and no buildings were destroyed in forest fires and wildfires.

(Source: The Estonian Environment Agency, Estonia).

1.2.6 Finland

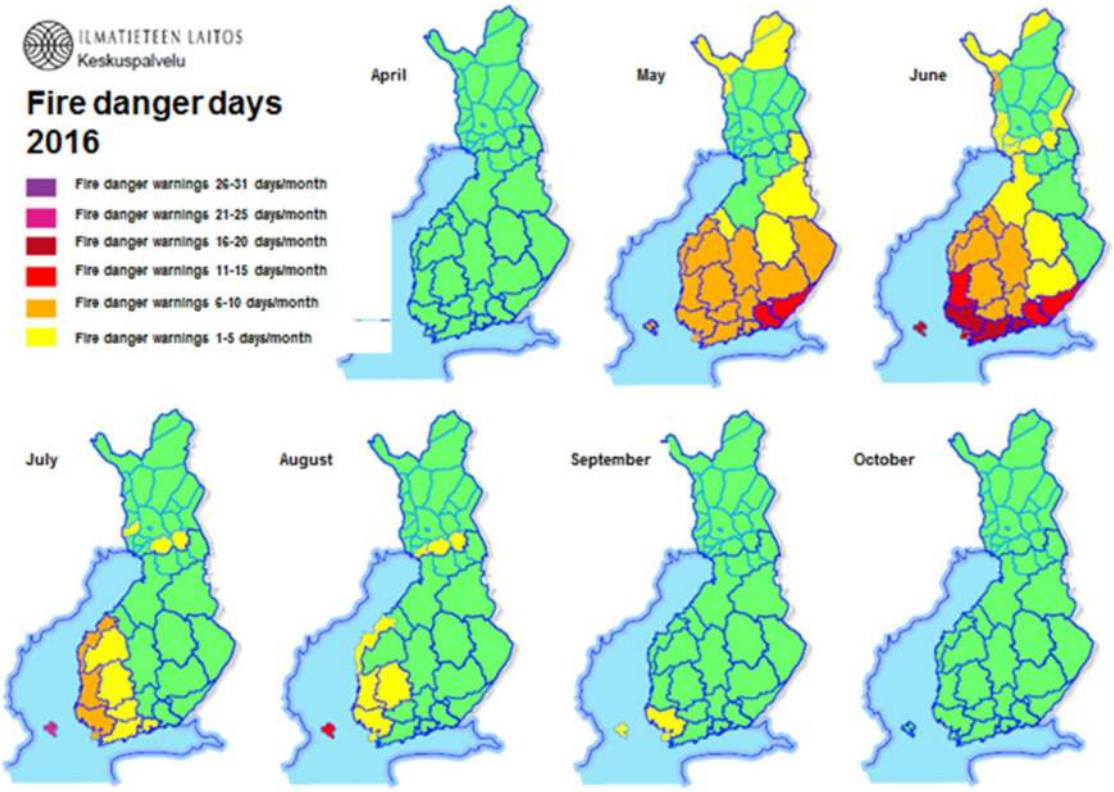
Fire danger in the 2016 fire season

Based on information from the Finnish meteorological institute, overview from summer 2016 was wet and quite cold in Finland. However, June was warm and dry in the southern part of Finland. Fire danger days for 2016 are presented below in Figure 7.

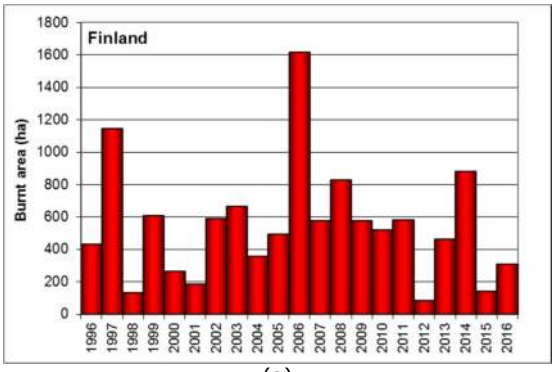
Fire occurrence and affected surfaces

The number of forest fires in 2016 in Finland was slightly lower than the normal average level. There were 2 008 wildfires in Finland last year and 933 of them were reported as forest fires. The total burned area was around 532 ha, of which 310 ha was forest land. The average burned forest area per fire was 0.33 ha.

Figure 7. Fire danger days in Finland 2016



The yearly trends in terms of number of fires and burnt area from 1996-2016 in Finland are shown in Figure 8 and Figure 9.



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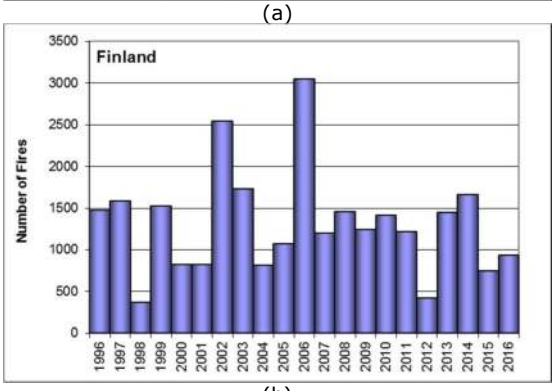

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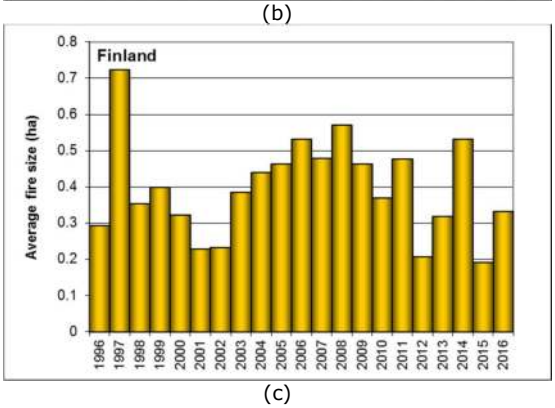

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Figure 8. Burnt areas (a), number of fires (b) and average fire size (c) in Finland from 1996 to 2016.

Fire causes

The most common cause of wildfires in Finland was human actions. These caused more than 70%, mainly from accidents. The second biggest reason was natural (less than 10% of fires). The reason for the fire could not be found in over 10% of the cases.

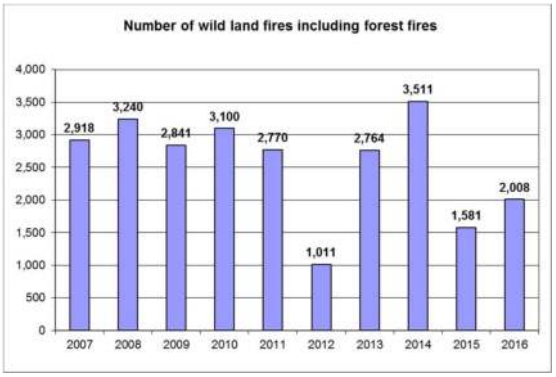


Figure 9. Total number of wildfires including forest fires from 2007-2016.

Fire prevention activities

There was more cooperation with institutes such as the Finnish meteorological institute, for example projects for improving situation awareness.

Firefighting means and information campaigns

- Finnish military forces NH 90 helicopters are available to extinguish forest fires.
- More co-operation between other authorities such as the border guard.
- Continuation of forest fire aerial officer education for some fire officers.
- Development and integration between operative forest fire management system and prediction system for smoke spread.
- Development of the forest fire index system. The new system will be ready for next season (2018).

Loss of human lives

No person died in Finland forest fires in 2016. Four people were injured in different wildfires, suffering from burns. Some of the wildfires caused damage to buildings; and conversely some of the wildfires were caused by fires in buildings or vehicles.

Operations of mutual assistance

Finland sent two CP experts to support the ERCC, 2017 Forest and Wild Fire Season, June-September 2016. There has also been information sharing between neighbourhood countries and the EU.

(*Source: Ministry of the Interior, Finland*).

1.2.7 France

Fire danger in the 2016 fire season

The prevailing meteorological danger during the summer of 2016 on the Mediterranean coast was particularly high: intense drought, which in some sectors (Roussillon, Languedoc-occidental, Rhône valley, coastal Var) reached a record level, frequent strong winds in the valleys of the Rhône and Aude, and strong heat waves. 2004 was the last year to have a comparable level of danger.

The measurements carried out by the National Forestry Office show that the vegetation was very weakened by this situation, which encouraged the outbreak and spread of fires.

The very exceptional conditions of propagation that occurred during the Rognac fire (over 5000 m / hour) testify to the intensity of the danger that prevailed in the Bouches-du-Rhône.

Outside the Mediterranean region, drought conditions did not occur until later, and the level of danger was therefore more limited.

Fire occurrence and affected surfaces

In 2016, 16 093 ha were affected by 4 285 fires in metropolitan France; this is higher than the decennial average.

- 12 139 ha were burnt in the Mediterranean departments (the 10-year average is 6 530 ha), 10 873 ha of which was during the summer (1 258 fires),
- 3 255 ha were in the southwest quarter (average 3 100 ha), of which 832 ha were in the Landes massif (compared with 1 000 ha on average) and 1 500 ha in the Pyrenean range,
- 699 ha were affected in the other metropolitan departments.

This distribution is consistent with what is usually observed, with about three-quarters of the fires in France in 2016 located in the Mediterranean departments. Two thirds of the burnt area occurred during the summer.

<u>Fires in the Mediterranean Region</u>

With a total of 12 139 ha, areas affected by wildland fires have not been this high since 2005, when they amounted to 17 300 ha.

This total is mainly a result of the fires that developed during the 3 particularly windy episodes that took place on the following dates:

- from 13 to 19 July (2 560 hectares affected, mainly in Aude, Bouches-du-Rhône, Var),
- then 10 and 11 August (5 000 ha affected in the Bouches-du-Rhône - of which 2 663 ha for the Rognac fire alone, which developed on the outskirts of Marseille - Hérault and the Pyrénées-Orientales)
- finally on 5 September: 1 140 ha were affected in the Aude and in the Bouches-du-Rhône.

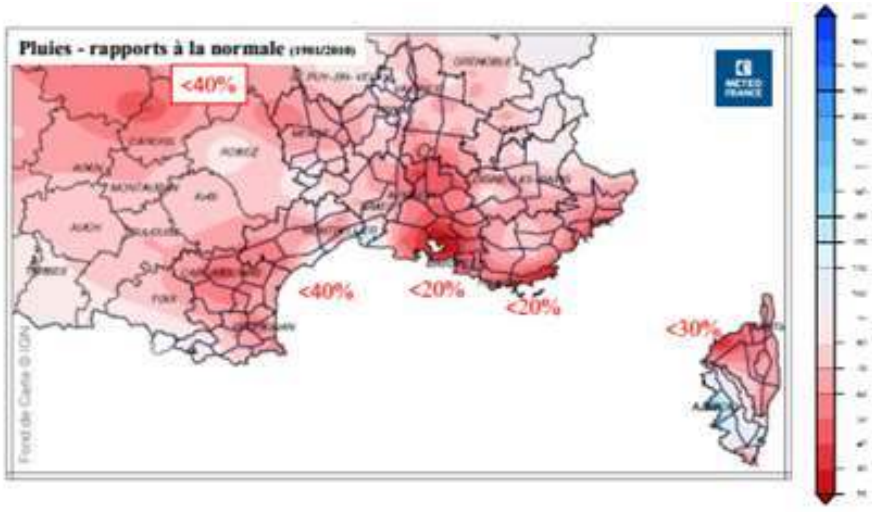


Figure 10 Rainfall deficit in summer 2016. Summer rainfall is deficient over most of the South Zone, and near or slightly above normal in the mountains and in the Ajaccio region. In the driest areas, rainfall amounts are in the order of 20-25 mm in the Salon-Fos-Marseille triangle, in the Balagne and in the south of the Var. These values are remarkable, often in the highest ranks of the driest years.

During these fires, serious measures had to be taken to protect populations and infrastructures. However, a number of buildings were affected.

In total, two fires burned more than 1 000 ha during the summer and eleven affected more than 100 ha (4 in the Bouches-du-Rhône, 3 in Aude, 2 in Hérault, 1 in Haute-Corsica, 1 in the Var).

The most important fires occurred in:

- Rognac (Bouches-du-Rhône): 2 663 ha
- Montalba le Château (Pyrenees Orientales): 1 308 ha
- Padern (Aude): 789 ha Bizanet (Aude): 716 ha
- Fos sur Mer (Bouches-du-Rhône): 711 ha
- Barbaggio (Haute-Corse): 553 ha
- Ensuès la Redonne (Bouches-du-Rhône): 400 ha

In the south-west quarter, forest fire activity became sustained only at the end of August, as the conditions of drought occurred later.

The largest affected areas were found in the Pyrenees (1 500 ha). Often linked to the practice of agricultural burning, the fires continued, due to the drought, until the end of December,

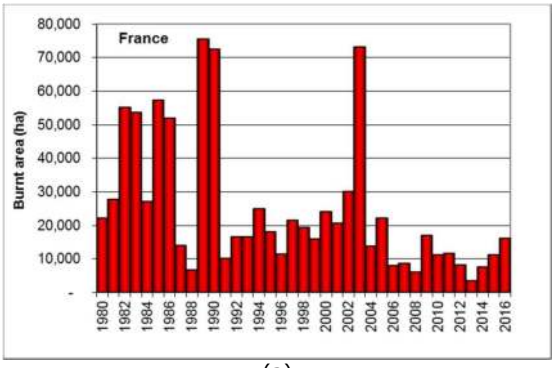
In the whole of the Landes massif, 835 ha were affected by fire, which is below the decennial average.

Forest fires in Réunion Island

The *Direction Générale de la Sécurité Civile et de la Gestion des Crises* (DGSCGC) also mobilized reinforcement means in Réunion. Having sent air and ground reinforcements to this department for large fires in 2010 and 2011, in 2016 it pre-positioned a Dash water bomber aircraft during the sensitive period, as it has done since 2012. The Area Headquarters was also reinforced by sending a support module to the command.

The areas affected during the sensitive period in La Réunion were limited, as less than 140 ha of various vegetation were burned, compared with an average of 275 ha over the last 4 years.

The yearly trends in terms of numbers of fires and burnt areas in France since 1980 are shown in Figure 11.



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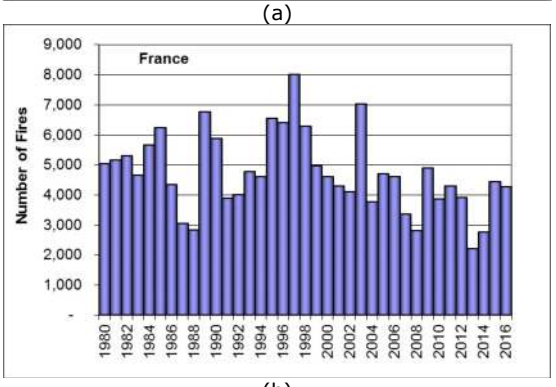

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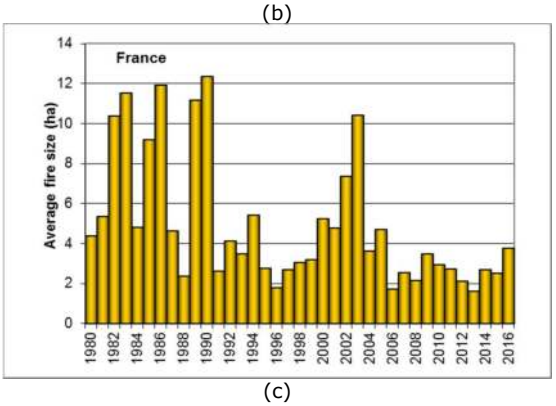

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Figure 11. Burnt areas (a), number of fires (b) and average fire size (c) in France from 1980 to 2016.

Fire prevention activities

In autumn 2015 a joint mission of the ministries of agriculture, ecology and interior was initiated on the assessment of the protection of forests against fire. The report was submitted in April 2016 and contains many recommendations that will be implemented over several years.

Priorities identified by the Ministry in charge of forests include the legal obligations of clearing brushwood and the development of forest protection plans against fire (PPFCI).

Most of the preventive actions were in the Mediterranean region:

- 116 meteorological zones are equipped with a network of stations, of which 73 are dedicated to forecasting forest fire danger;

- These forecasts were supplemented by monitoring the state of dryness of the vegetation at 30 sites (Figure 12);

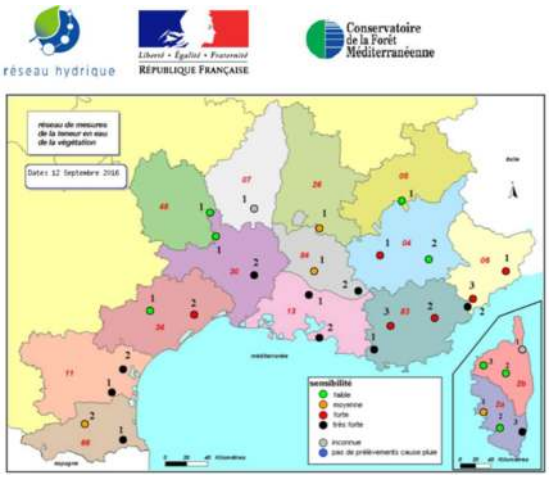


Figure 12. Example of state of vegetation monitoring September 2016.

- During the summer, around a thousand foresters participated in surveillance and alert (lookouts, deterrence and first response) for a total of about 36 000 man-days funded by the state and communities;
- Investment in ground facilities continued, representing approximately €8 million of work, which received financial support from the European Union (approximately €1.38 million from EAFRD: the European Agricultural Fund for Rural Development) for the maintenance of existing amenities (tracks, water points ...);
- Information campaigns were conducted at departmental level (NUTS3) and across the entire region (NUTS1), to publicize the preventive regulations (limiting or banning the use of fire, movements in the massifs, clearing obligations ...) and dissemination of safety recommendations;
- Interdisciplinary teams (foresters, firefighters, policemen) worked together in most departments to investigate the causes of fires, in order to guide preventive actions and improve the criminal justice response.
- In terms of communication, the *Délégation à la Protection de la Forêt Méditerranéenne* (DPFM) has a website (www.dpfm.fr) which provides information on regulations and relays the main events and francophone articles on DFCI.

Figure 13. Fire-fighting means deployed in 2016.

<u>Firefighting means</u>

To support firefighters funded by local authorities (numbering 37 000 in the Mediterranean departments and 7 700 in the Landes massif), the Ministry of the Interior deployed reinforcing means which included:

- 700 military personnel of investigation and intervention units of the civil protection (UIISC);
- 23 water bombers;
- 3 reconnaissance and coordination aircraft, and 35 rescue and command helicopters.

Under a protocol signed with the Ministry of Defence, with funding from the Ministry of Interior, 45 men, 15 vehicles and three helicopters were assigned to the work of protecting forests.

Finally, around ten reserve firefighters from departmental fire and rescue services outside the Mediterranean area (strictly respecting the required qualifications) coming from different areas of defence were positioned. At the request of the *Centre Opérationnel de Gestion Interministérielle des Crises* (COGIC) of the Directorate General of Civil Security and crisis management, they were thus able to supplement local arrangements on demand.

The effectiveness of the intervention mechanism depends on its ability to act without delay by applying a strategy of fast attack for incipient fires based on the forecast mobilization of resources to combat during periods of high risk. Ongoing cooperation with *Météo France* and the *Office National des Forêts* (ONF) makes it possible to have specifics on the level of foreseeable danger to anticipate the danger and to be more reactive in operational response in the case of incipient fires.

Thus, in periods of high risk, both national and local resources are mobilized proactively according to the danger level to act promptly while the fire is still manageable: the UIISC elements are deployed in the most sensitive forests alongside local fire brigades, water bombers provide armed air surveillance missions, and the military provide patrols alongside local actors (foresters, firefighters, members of community committees for forest fires).

Because of the meteorological and operational conditions, activity of the national means was greater than in recent previous years.

The water bomber planes of the Civil Defense intervened during the summer on 280 occasions (in more than a hundred cases during armed air surveillance missions), against 200 on average during the last 10 summers.

Suspension of operation of the Civil Defense fleet of 12 CL415 in order to carry out checks following an accident involving one of its aircraft, and its phased return to service, also penalized the response of the intervention means during the first part of August, at a time when the level of danger was particularly high.

The prepositioning of air assets in Bordeaux on thirty occasions starting in mid-August to take account of the increased risks, made it possible to contain the fires starting in the Landes massif.

In total, air assets were committed 324 times this year, carrying out 2 000 hours of fire intervention and 1 650 hours of flying time during armed flight observation missions, in situations of very severe risks.

The military civil defense units were engaged on 130 occasions on firefighting and carried out more than 500 missions of grid of the ground in Corsica.

The mobilization of forest fire reinforcement columns made up of firefighters from all over France to strengthen the Mediterranean system was important. These forces were deployed on a curative or forecast basis, according to the risks announced, to reinforce the local teams by decision of COGIC. Their mobilization represents a volume of 19 400 man-days. This is the highest commitment since 2003.

Loss of human lives

The measures taken to prevent and fight against forest fires were effective in protecting the population but the damage to infrastructure (housing, buildings) was significant (in particular from the fire in Rognac).

The consequences of these fires were compounded by accidents in the Pyrénées-Orientales (one firefighter died in an accident in his truck on the way to a fire, three firefighters were very badly burned in the fire at Hérault, one of them succumbed to his burns).

Operations of mutual assistance

A favourable response was made to an application for assistance submitted by the Cypriot authorities, who were then faced with major fires at the end of June. One reconnaissance aircraft and two Canadair aircraft were made available from 21 to 24 June. The aircraft carried out 24 hours of on-site flight during the mission carrying out 55 drops.

One reconnaissance aircraft and two Canadair aircraft were also made available to the Israeli authorities from 26 to 30 November at the request of the ERCC.

(Source: Ministère de l'Intérieur – DGSCGC / SDPGC / BERR; Ministère de l'Agriculture et de l'Agroalimentaire : DGPAAT / SFRC / SDFB / BFTC, France).

1.2.8 The former Yugoslav Republic of Macedonia

The Republic of Macedonia covers a total area of 25 713 km^2, with 997 000 ha of forest land and 1 244 000 ha of agricultural land. As a result of very specific natural and geographical features there are two climatic types that collide in Republic of Macedonia: Mediterranean and Continental, which results in cold and severe winters and hot and dry summers. The annual average air temperature is 11.3 degrees Celsius with average precipitation of 983.7 mm/m^2 and average sunshine period of 2450 hours per year.

Fire danger in the 2016 fire season

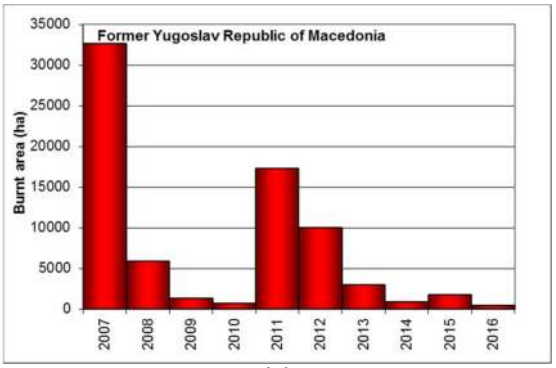
The fire danger in the 2016 season in Macedonia was at a minimum level. The majority of fires occurred in the late spring and during the summer months.

Fire occurrence and affected surfaces

During the year 2016 there were 435 fires of which 60 were forest fires, affecting in total area of 449.5 ha. The forest land affected was 1064.8 ha and the total affected area were 1514.3 ha. 13.8% of the fires were forest fires and they burned around 30% of the total area. The comparative charts for burnt area, number of fires and average fire size for the years 2007-2016 are shown in Figure 14. The number of fires and burnt area according to fire type for the year 2016 are shown in Figure 15.

Firefighting means and information campaigns

Fire prevention and firefighting activities were undertaken along with public information campaigns. For the purpose of awareness raising, media events such as press conferences, short reports and announcements on the TV and radio were organized.



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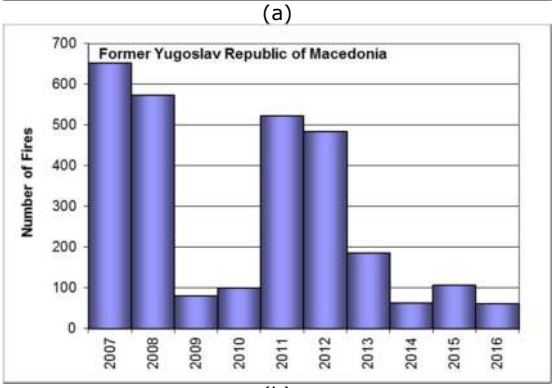

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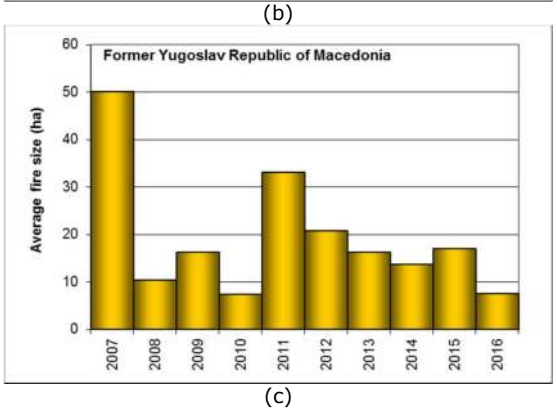

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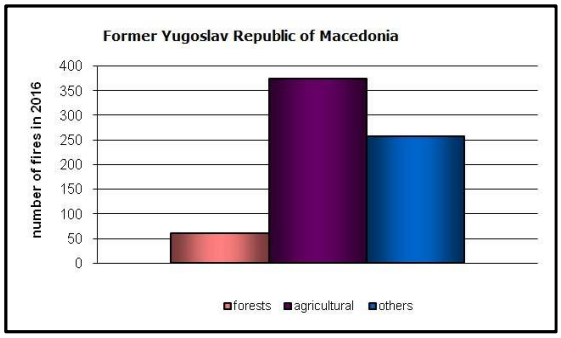
Figure 14. Burnt areas (a), number of fires (b) and average fire size (c) in the former Yugoslav Republic of Macedonia from 2007 to 2016.



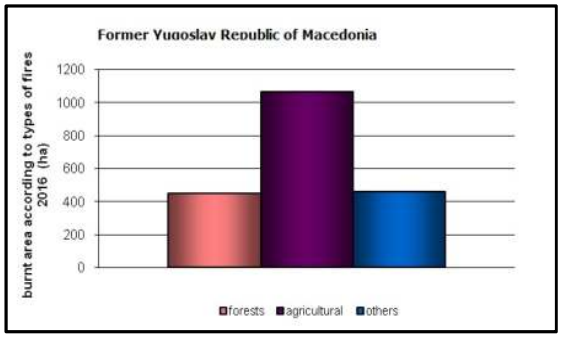


Figure 15. Number of fires (a) and burnt area (b) according to the type of fires in 2016.

(Source: Protection and rescue Directorate, Sector for analysis and research, the former Yugoslav Republic of Macedonia).

1.2.9 Germany

Fire occurrence and affected surfaces

In 2016 a total of 608 forest fires were reported in Germany, corresponding to a burnt area of 283 ha (85.5 ha in deciduous forests and 197.5 ha in coniferous forests). This is a little over half the amounts recorded in 2015.

As usual the most affected province (Land) in 2016 was Brandenburg whose burnt area was greater than that recorded over the rest of the country put together (Table 7, Figure 16). Three Länder (Bremen, Hamburg and Schleswig-Holstein) did not record any fires.

Table 7. Burnt area in total and by forest type, and total number of fires, Federal Republic of Germany, 2016.

	Burnt area (ha)			*Number of fires*
	Coniferous forest	*Broadleaved forest*	*Total*	
Baden-Württemberg	2.8	0.3	3.2	28
Bayern	54.6	5.5	60.1	55
Berlin	1.3	0.0	1.3	4
Brandenburg	86.3	71.1	157.4	248
Bremen	0.0	0.0	0.0	0
Hamburg	0.0	0.0	0.0	0
Hessen	2.0	0.1	2.1	37
Mecklenburg-Vorpommern	7.7	0.0	7.7	25
Niedersachsen	2.2	1.5	3.7	33
Nordrhein-Westfalen	2.9	0.2	3.1	21
Rheinland-Pfalz	1.7	0.7	2.4	19
Saarland	0.0	4.0	4.0	3
Sachsen	5.0	0.4	5.4	52
Sachsen-Anhalt	29.2	1.6	30.8	69
Schleswig-Holstein	0.0	0.0	0.0	0
Thüringen	1.8	0.2	2.0	14
Germany	**197.5**	**85.5**	**283.0**	**608**

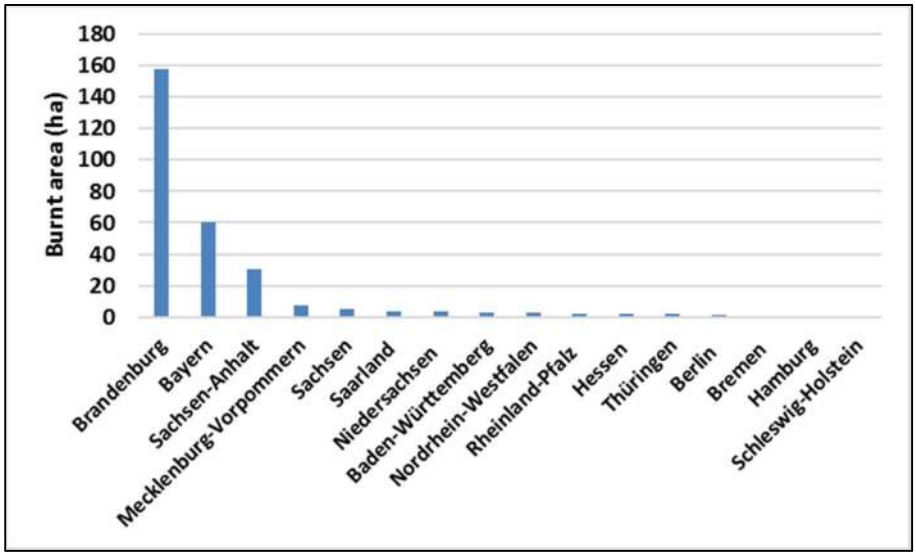


Figure 16. Burnt area in Germany in 2016 by Land.

In 2016 there were two peaks in the season: one in May and one in September. There were also 5 fires at the end of the season, in December (Figure 17).

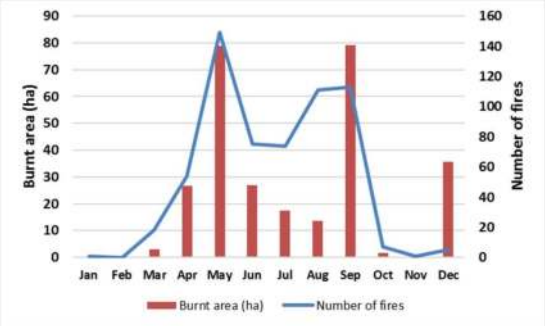


Figure 17. Number of fires and burnt area by month in Germany in 2016

The trend of the burnt areas, number of fires and average fire size in Germany for the years 1991-2016 are shown in Figure 19.

Fire causes and impacts

The main causes of forest fires during 2016 are shown in Figure 18. Within the category of negligence fires, the majority (89) were caused by the general public (campers, visitors, children etc.).

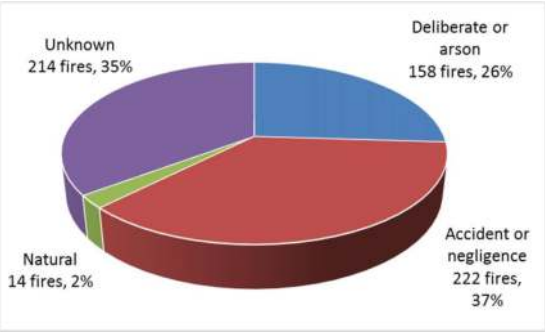


Figure 18. Causes of forest fires in 2016.

The economic damage caused by forest fires in 2016 is estimated to be around 0.6 million Euro, lower than the long term average from 1991 to 2016, which is 1.8 million Euro. The cost per hectare burnt is estimated at just over 2000 Euro/hectare. In 2016, approximately 1.96 million Euro were spent on prevention and control measures.

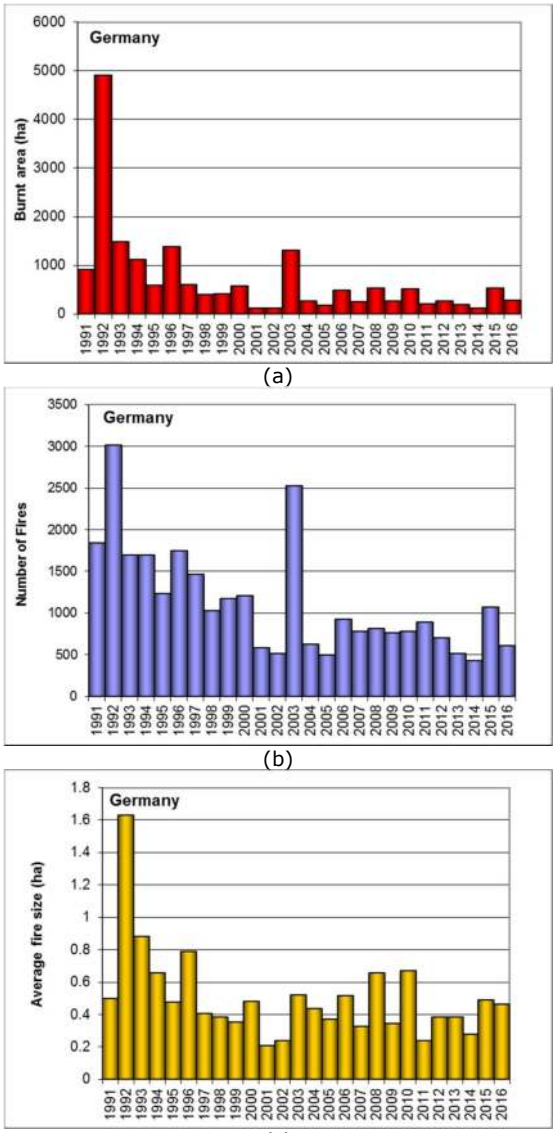


Figure 19. Burnt areas (a), number of fires (b) and average fire size (c) in Germany from 1991 to 2016.

(*Source: Federal Agency for Agriculture and Food, Germany*).

1.2.10 Greece

Fire danger in the 2016 fire season

The fire season in 2016 was characterized by high temperatures and low precipitation levels except for a short period in June and in September.

Early-summer wet weather conditions at the end of June, gave rise to two major flood incidents. The first one (25-26/6) took place in the Peloponnese (Southern Greece) and the Ionian Islands, and the second one (28/6) in the central mainland, accompanied by hail.

During 6-9 September 2016 a cut-off upper low located southwest of the country affected mainly the western part of Greece and caused severe thunderstorms with heavy rainfalls, floods, landslides and locally tornados.

Moreover, extremely warm weather conditions in June (18-21/6) with maximum air temperatures above 39 degrees Celsius in most parts of the country, influenced the eastern parts of mainland.

Fire occurrence and affected surfaces

Greece experienced increased levels of fire activity during the fire season with three major fire bursts on the islands of Thassos, Chios and Evia with a total burnt area of approximately 12 630 hectares.

During 2016, a total number of 777 fires were recorded with an affected burnt area of 26 539.5 hectares, 25 288.9 of which were on wooded forest land and 1 250.6 on non-wooded forest land. There were 8 major fires with burnt area greater than 500 hectares. The majority of fires (557) resulted in less than 1 hectare of burnt area.

The compiled data below have been provided by the local Forest Services. These numbers are still provisional and are likely to rise when compilation of fires is complete. However, the number of the recorded forest fires refers to the majority of the fire incidents for 2016 and there is no large deviation expected.

2016, in comparison with the previous year, exhibited a significant rise in the number of fires (777 compared to 510 forest fires) and a much larger total burnt area of forest land (26 539.5 hectares compared to 7 095.75 hectares). The number of fires and the burnt areas are shown in the following Table 8.

Table 8. Number of fires and burned area in 2016 by regional forest administration.

FOREST ADMINISTRATION AUTHORITIES	*Number of fires*						*Burned area (ha)*		
	Total	*<1 ha*	*1-5 ha*	*5-100 ha*	*100-500 ha*	*>500 ha*	*Total*	*Wooded*	*Non wooded*
Macedonia-Thrace	161	97	40	19	1	4	13467.5	13399.3	68.2
Epirus & Western Macedonia	70	48	13	8	1	0	428.7	175.4	253.2
Thessaly and Central Greece	213	149	24	1	8	1	5,443.7	4,552.2	891.5
Peloponnese, Western Greece & Ionian	187	148	29	6	4	0	909.2	894.1	15.1
Attica	5	3	0	1	1	0	482.1	482.1	-
Crete	116	98	9	7	2	0	978.5	961.8	16.8
Aegean	25	14	5	2	1	3	4829.8	4824.0	5.8
TOTAL	**777**	**557**	**120**	**74**	**18**	**8**	**26539.5**	**25288.9**	**1250.6**

**Counts not complete*

Firefighting means and information campaigns

In 2016 the Fire Brigade personnel consisted of 13 993 people, 8 723 of whom were permanent personnel of the Fire Brigade dealing also with structural fires, 3 950 were personnel employed with a five years contract and 1 320 were seasonal personnel, hired for forest fire suppression activities. A further 1 547 volunteer fire fighters were also involved.

The Fire Brigade of Greece has in its possession about 1 830 engines, which are involved in both structural and forest fire suppressions. A few more small engines, owned by Municipalities in high risk areas, were occasionally used in some incidents. In some cases, volunteers also assisted by any means (supplying trucks with water etc.) during the suppression efforts.

The aerial means used during the 2016 campaign are indicated in Table 9.

Table 9. Aerial means participating in the 2016 campaign,

STATE OWNED MEANS			
AIRCRAFT	*LARGE*	CL-215	9
		CL-415	4
	SMALL	PEZETEL	17
HELICOPTERS		CHINOOK	2
		BK 117 CL	3
		AS 332 L1 SUPER PUMA	2
		TOTAL	**37**
HIRED MEANS			
HELICOPTERS		H/P SIKORSKY 64	3
		H/P KA-32	7
		TOTAL	**10**

Fire Causes

In many cases, the ignition source for fires is associated with traditional agricultural burning practices, although the fire causes for the majority of fire incidents remained unknown.

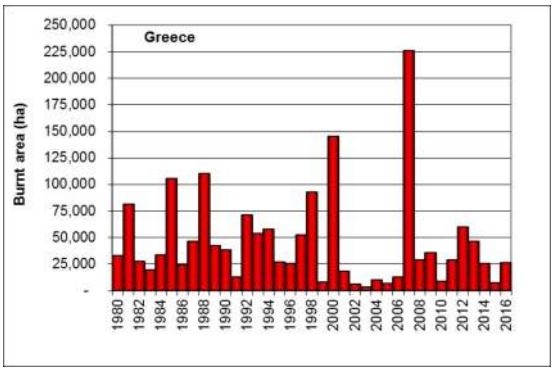
Operations of mutual assistance

During the fire campaign, the international mechanism was not activated.

Injuries and loss of human lives

During the fire campaign of 2016, we had two human life losses (1 fire fighter, 1 citizen) and sixteen injuries (13 fire fighters and 3 citizens).

The yearly trends in terms of numbers of fires and burnt areas in Greece since 1980 are shown in Figure 20.



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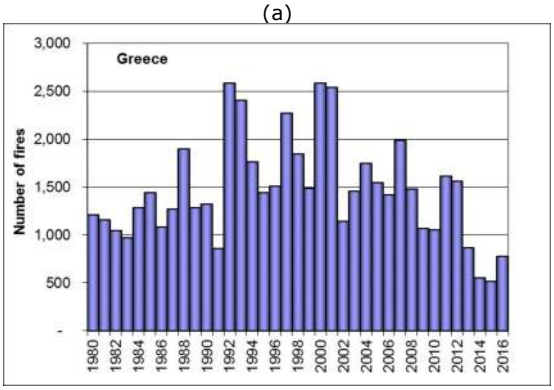

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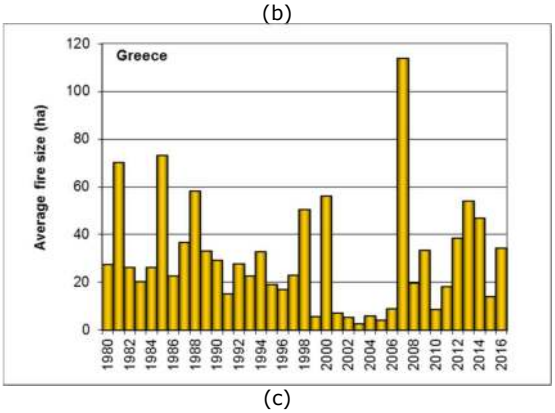

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Figure 20. Burnt areas (a), number of fires (b) and average fire size (c) in Greece from 1980 to 2016.

(Source: Directorate General for the Development and the Protection of Forests and the Rural Environment, Greece).

1.2.11 Hungary

Fire danger in the 2016 fire season

FWI derived data and values were reported throughout the whole fire season by the Forestry Directorate (FD). FD has been using JRC's data service to monitor the daily fire danger situation.

Fire danger was low at beginning of the 2016 fire season. Compared to previous years precipitation was more abundant than usual. The start of agricultural activities was delayed to the end of March due to cold and wet conditions. Spring was characterised by low average seasonal temperature with high rainfall levels and a reduced level of agricultural burning activity. The cumulative fire count shows the tendencies experienced in latest years that one of most dangerous forest fire periods starts in mid-March every year (Figure 21).

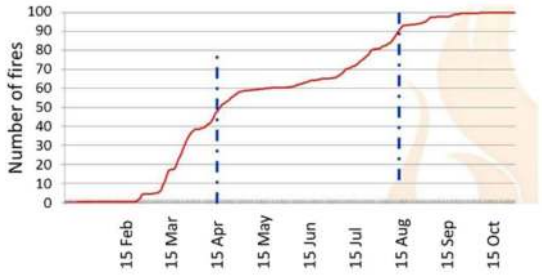


Figure 21. Cumulative fire counts in 2016.

Despite an uneven distribution of precipitation over the summer months, the average precipitation was higher than the mean annual trend. Due to a moderate level of fire danger there were only some short days when the FWI values reached the "extreme" level in summer. A fire ban was ordered in sandy areas in the pine forest stands of the Great Hungarian Plain for a short time (only 8 days).

Fire occurrence and affected surfaces

Forest fire data are collected in close cooperation with the disaster management authority. Data collected on the spot by fire fighters are uploaded to the database weekly, and if needed it can be done day-to-day. Forest fire data are prepared and analysed with an automated GIS method and checked on the spot by the forest authority.

The gathered fire data are processed and evaluated by size, date, cause, duration of fires, and they are then compared with traditions in forest management processes and the behaviour of visitors and hikers in the forest land area. Data from 2011 are shown in Table 10.

Table 10. Number of fires and burnt areas.

Year	*Total number of wildfires*	*Forest fires*		*Other land types*
		Number	*Burned area (ha)*	*Number*
2011	8436	2021	8055	6415
2012	21581	2657	13978	18924
2013	4602	761	1955	3841
2014	5783	1042	4454	4741
2015	5318	1069	4730	4249
2016	**2677**	**452**	**974**	**2225**

A total of 974 hectares were affected by 452 forest fires in Hungary in 2016. Compared with 1 069 fire events in 2015 and 2 657 fire events in 2012, this shows a positive trend over several years. The reasons can be found in climate extremities and active communication on forest fires in our FIRELIFE project. We have been focusing on direct communication with those target groups which can be involved more deeply through personal contact.

Figure 22 represents the tendencies experienced in recent years that there are two most dangerous forest fire periods during the year.

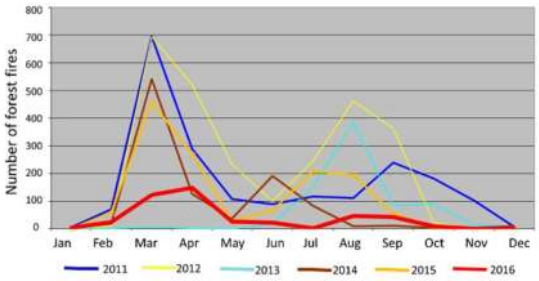


Figure 22. Number of fires per month in Hungary 2011-2016.

"Traditional" grassland use includes burning methods in early spring, which can accidentally spread to nearby forest. These fires usually burn between February and April, after snow-break. Although burning has lost its importance by these days, it prevails as a traditional early spring grassland management method. Negligently lit and unattended grassland fires may spread into forest lands nearby. Vegetation is not green yet in this period of the year, and in addition a great amount of dry leaves and dry herbs is located on the ground, which can easily burn.

Spring vegetation fires usually burn with low or medium intensity in broadleaf forests, juvenile growths, shrubs and grasslands. Fire totally or partially consumes forests and causes serious harm. 40% of spring fires burn in northern areas (Borsod-Abaúj-Zemplén County, Heves County, Nógrád County) which indicates these areas as high forest fire

danger zones. In these areas not only traditional grassland management methods, but other social-economic factors add to forest fire danger. Unlike spring fires, summer fires usually burn in the Great Hungarian Plain.

All of the forest fires were surface fires in the 2016 fire season, when surface litter and other dead vegetal parts and smaller shrubs burnt down. There was no large fire. The average rate of fires smaller than 1 hectare is almost 50%. Small fires are usually low intensity surface fires where dry grass and small twigs are burning. The average total burnt area was 2.2 hectares in 2016, which is smaller than in previous years. In 2016 there was only one fire event when more than 50 hectares were burnt.

Studying the statistics we can see that a total of 218 hectares of forest were burned or affected by fire during 2016. In addition, more than 489 hectares of grass vegetation and 267 hectares of bush vegetation were destroyed in forest fires.

Table 11. Fires by forest type.

Forest type	Total burnt area (ha)
Forested land	218
Other wooded land	267
Other land	489
Total	974

The yearly trends in terms of number of fires and burnt area during the last 18 years in Hungary are shown in Figure 24 below.

Fire Causes

99 % of forest fires are human induced (negligence or arson). Most fires are induced by negligence (adults and infants) and only a small proportion of fires are caused by arsonists. Typical forest fire causes are the incorrectly extinguished fires of hikers, illicit agricultural fires, discarded cigarette butts and sometimes slash burning.

Firefighting means

Fires were usually extinguished in less than an hour after the alarm. The fire service arrived at the fire in 30 minutes on average. Small fires are extinguished within half an hour.

Injuries and loss of human lives

There were no casualties among fire fighters and civilian people during firefighting in 2016. Fire service equipment was not heavily damaged. No death or personal injury occurred during firefighting last year.

Operations of mutual assistance

Neither Fire Service nor Forest Authority served mutual assistance last year.

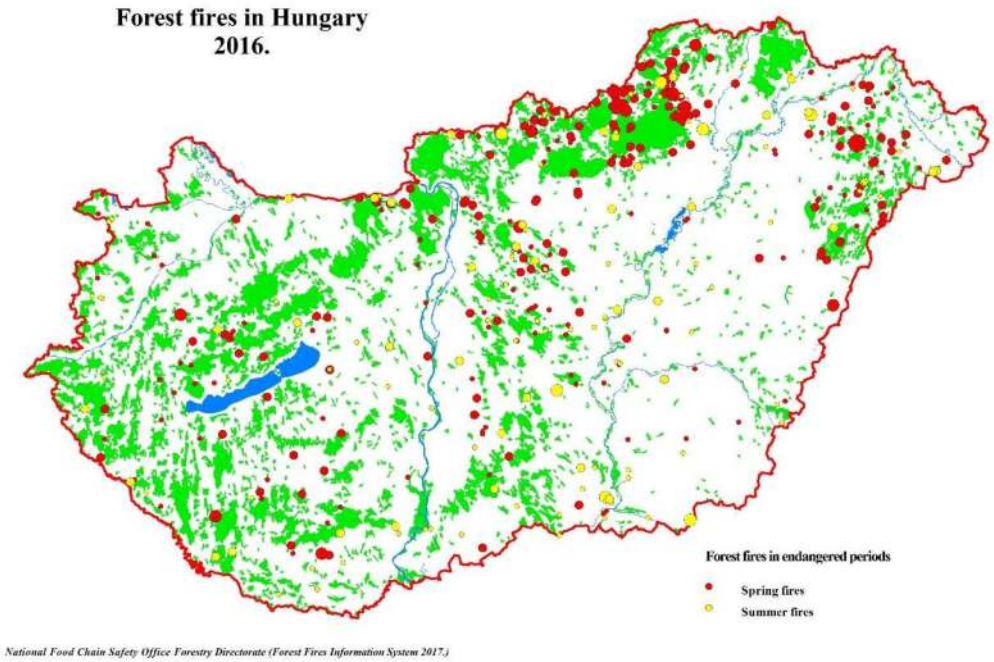
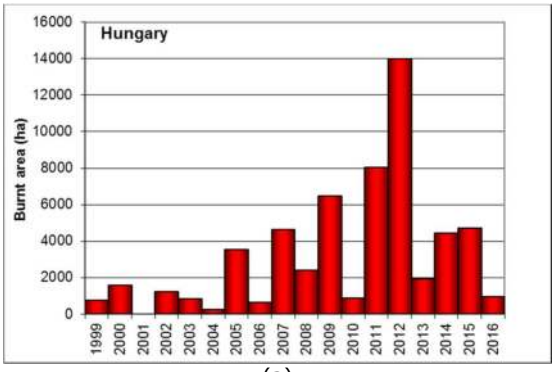


Figure 23. Locations of forest fires in Hungary in 2016.



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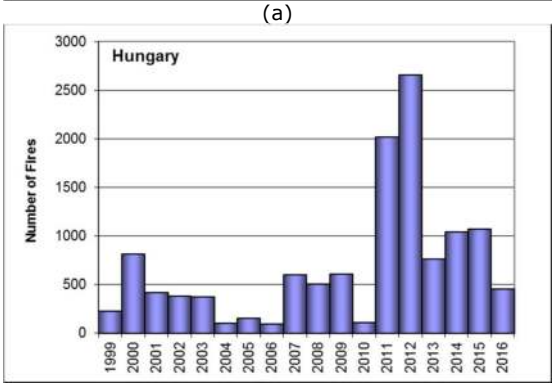

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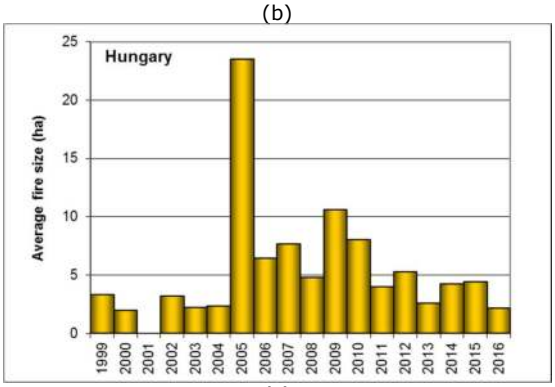

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Figure 24. Burnt areas (a), number of fires (b) and average fire size (c) in Hungary from 1999 to 2016.

Fire prevention activities and fire information campaigns

There is a cooperation agreement between the Fire Service and the Forest Authority. The National Fire Prevention Committee established by the government has been monitoring all fire prevention activities.

Forest fire prevention activities are implemented by the forest authority in the frame of a FIRELIFE project. Our project (duration 2014-2018) started in 2014 which was the first one in Hungary, and won the support of the LIFE "information and communication" programme.

The project aims to enhance effective, proactive and continuous forest fire prevention activity in Hungary. As 99% of forest fires are human caused in our country, targeted and timely communication can effectively cut the number of forest fires. The active communication on forest fires attracts greater media which can significantly help to reach the aims of the project.

The key goal of the project is to disseminate useful and adequate information to the public on forest fire prevention. Our strategy includes two main fields: communication campaigns using PR and marketing tools and training.

Every one of the communication campaigns helped to reach our goals through 2016:

- Our participation in countrywide and regional information events with a FIRELIFE adventure course, reaching the target groups of children, wider public, farmers, hobby gardeners and smokers;
- Contact with the media through workshops, press releases, with the help of publishing articles in the relevant offline media in order to reach the people in the country and also at a regional level;
- Direct communication with those target groups which can be involved more deeply through personal contact, for example farmstead owners and hikers;
- Online information transfer and campaigns with the help of our website, our FB profile and through the FB profile of NÉBIH;
- The printing services and outsourcing of outdoor tables were realized in 2016. 1930 tables were completed in different sizes and types. Most of them were allocated to national parks, zoos, state forestry, private forest owners and farmers;
- 112 000 pieces information (A1 placards, A5/LA4 leaflets, publications) were produced in 2016. This quantity was dealt out to specified target groups. In 2017, reinstatement will be required;
- Two publications were made for the target group of children: 15 000 storybooks and 11 500 sticker booklets, which were sent for students and kindergarten children;
- Building professional and mutually beneficial cooperation with professional organizations and enterprises, through which we can reach our target group: Forestry and Hunting Associations, National Directorate General for Disaster Management, Educational Research Institute, Decathlon Hungary, STIHL Group, Hungarian Scout Association.

FIRELIFE project website: www.erdotuz.hu.

(Source: National Food Chain Safety Office; Forestry Directorate)

1.2.12 Ireland

Introduction

The Forest Service of the Department of Agriculture, Food and Marine (DAFM) is the agency responsible for forest Protection in Ireland.

2016 saw a reduction in levels of fire activity over 2015, primarily due to more moist prevailing weather conditions. Four Condition Orange Fire Warnings were issued to the forest sector by DAFM Between March and May 2016. These warnings are available on-line at:

www.teagasc.ie/forestry,
www.agriculture.gov.ie/forestservice/firemanagement

Fire incidence levels

During 2016, the area of open land affected by fire is thought to be in the region of 5 000 ha based on MODIS/EFFIS detections and burned area assessments coupled with anecdotal evidence from local Fire Services; however the actual figure cannot be determined at this point.

Arising from this fire activity, up to 250 ha of forest land are estimated to have been affected by fire, mainly commercial forest holdings adjacent to fire prone open upland areas.

Total losses	Forest	Non-Forest land
2016	250 ha	5000 ha (estimated)

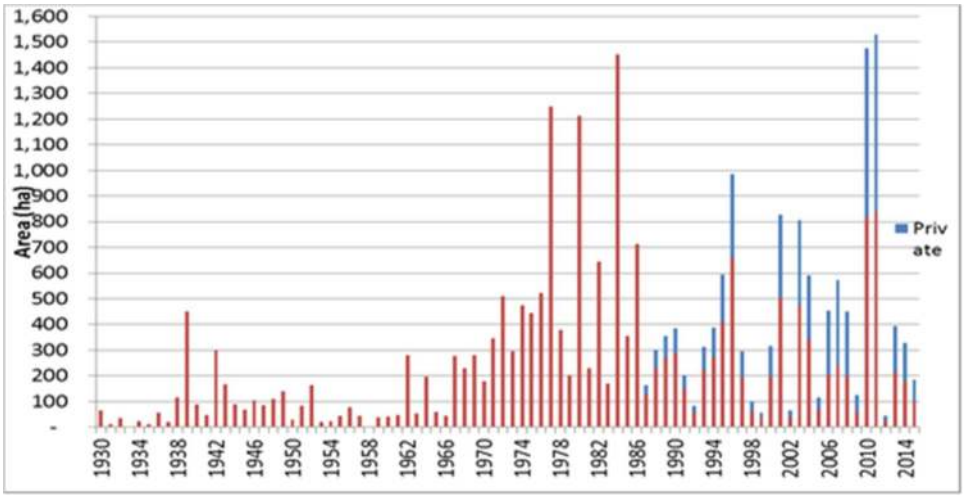


Figure 25. Historic fire damage in forests in Ireland between 1930-2015.

Figure 26 Left: Typical upland fuel mix; Right: Typical low level spring grass fire (*Photo credits: Forest Service, DAFM*)

Fire prevention activities

Following from previous years, Forest Fire prevention activities by DAFM Forest Service and partner agencies continued throughout 2016, with a major element of European cooperation involved at various points.

The DAFM Forest Service Fire Danger warning system was developed further and was operational by early March 2016. A baseline Condition Yellow warning was issued in March and four additional Condition Orange warnings were issued between April and May.

Further development of locally led fire management groups took place in Co. Cork, via the West Cork Wildfire Cooperative, in an area subject to high levels of fire activity. The activities of this group are focussed on improved communications and cooperation between private landowners who utilise fire

for land management purposes, and state agencies responsible for protection of resources and communities. A number of demonstration activities took place under the aegis of this group during 2016.

Policy development

A fire damage assessment and reporting seminar and workshop was held jointly by Irish and Northern Irish Authorities in March 2016 and attended by forestry, land management and conservation professionals from both jurisdictions. This seminar focussed on development of common approached to fire damage assessment and reporting on both sides of the border towards improved assessment of damage extent and severity.

A number of Irish Fire Officers attended a wildfire planning and strategy workshop in Belfast in September. One Irish fire specialist attended an aerial fire detection and monitoring Exchange of Experts event in Tuln, Austria, hosted by the Austrian Fire Service.

All of the above events are focussed on an improved evidence gathering in relation to wildfire as an issue on both sides of the border on the island of Ireland. A number of other events also took place aimed at improving cross border cooperation and development on wildfire issues.

Fire Detection

In addition to the EFFIS system, Irish Authorities continued evaluation of the South African AFIS (Advanced Fire Information System) and other available products for visualisation and analysis of fire detection data. A trial of volunteer fire patrols utilising Civil Defence resources also took place during April 2016.

Prescribed Fire Development

Prescribed burning during the permitted January-February period in 2016 was severely hampered due to prevailing storms and wet weather. The permitted open season for burning in Ireland is from September 1st to February 28th, and as a consequence early spring burning is generally not possible due to meteorological limitations.

A number of demonstration prescribed burns took place in SW Ireland in November, 2016, one of which was carried out under the supervision of the KERRYLIFE project, a LIFE funded initiative. Other operations took place aimed at demonstrating safe burning techniques at agricultural users.

A mechanised vegetation management demonstration, arranged by Teagasc (Agricultural Advisory Service) also took place in Wicklow Mountains National Park in September 2016 aimed at demonstrating alternative methods of fuels treatment and vegetation management.

Injuries and loss of human lives

There were no injuries, deaths or structural losses reported as a consequence of wildfire in 2016.

Two fires during April required the use of Helicopter support for fire suppression and this was provided by Coillte Teoranta, the Irish State Forestry Board, using contract resources.

Figure 27. Irish Fire crew dealing with grass fire. (*Photo credits: Forest Service, DAFM*)

(Source: Forest Service, Department of Agriculture, Food and the Marine, Ireland).

1.2.13 Italy

Fire occurrence and affected surfaces

According to information produced by the *Corpo Forestale dello Stato* at the end of 2016, there were a total of 4 793 fires in Italy, which burned a total of 47 926 ha. The greatest number of fires occurred in Calabria, but the largest burnt area occurred in Sicily. Sardinia had a relatively low number of fires, but they were large (average fire size nearly 42 ha), making it the second most affected region in terms of burnt area (Figure 28).

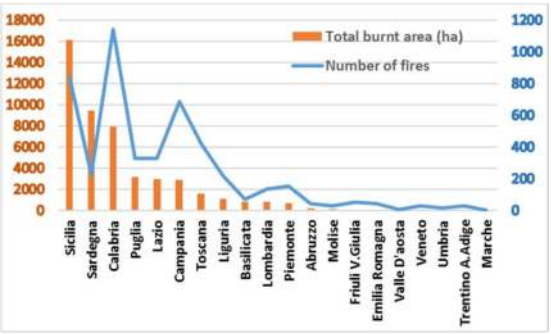


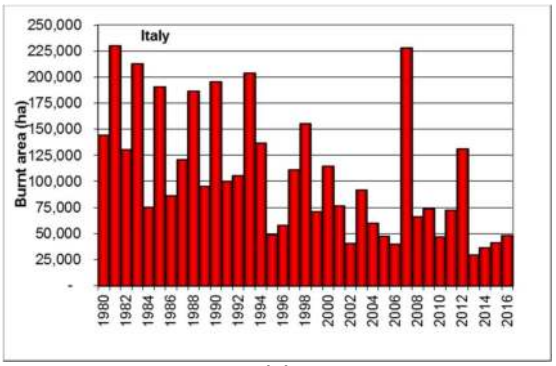
Figure 28. Number of fires and burnt area by region in 2016.

Table 12. Number of fires and burnt area in Italy by region in 2016.

Year 2016	Num. fires	Burnt area (ha)			
		Forest	Non-forest	Total	Av. fire size
PIEMONTE	151	369	318	686	5
VALLE D'AOSTA	6	14	1	15	3
LOMBARDIA	136	212	579	791	6
TRENTINO - A.ADIGE	30	9	0	9	0
VENETO	29	8	5	13	1
FRIULI V.GIULIA	50	41	7	48	1
LIGURIA	217	1013	94	1107	5
EMILIA ROMAGNA	43	28	16	44	1
TOSCANA	421	547	1037	1584	4
UMBRIA	17	3	7	10	1
MARCHE	3	2	0	2	1
LAZIO	326	2007	968	2974	9
ABRUZZO	42	137	54	191	5
MOLISE	30	41	106	147	5
CAMPANIA	688	2219	689	2908	4
PUGLIA	329	1356	1776	3132	10
BASILICATA	69	317	499	816	12
CALABRIA	**1140**	5476	2457	7933	7
SICILIA	841	5252	10850	**16102**	19
SARDEGNA	225	2396	7019	9415	**42**
TOTAL	**4793**	**21444**	**26482**	**47926**	**10**

NORTH	**662**	**1694**	**1020**	**2713**	**4**
CENTRE	**839**	**2735**	**2172**	**4908**	**6**
SUD+ISOLE	**3292**	**17015**	**23290**	**40306**	**12**
ITALIA	**4793**	**21444**	**26482**	**47926**	**10**

The yearly trends in terms of numbers of fires and burnt areas in Italy since 1980 are shown in Figure 29.



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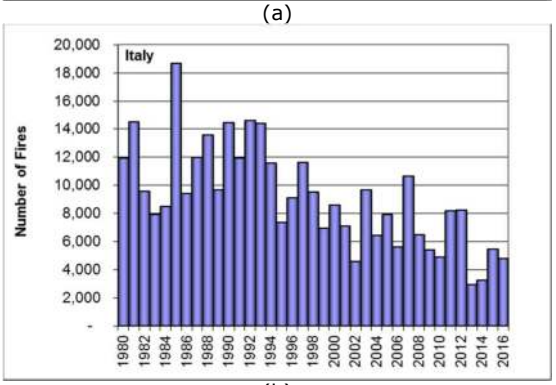

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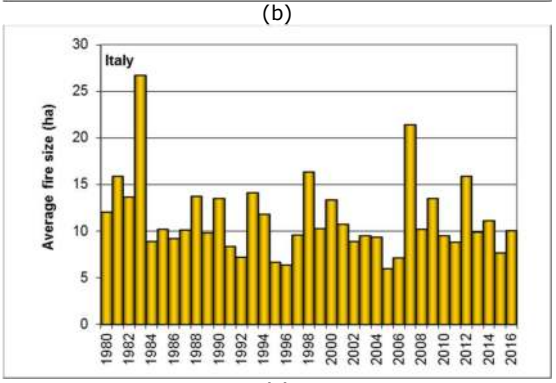


(c)

Figure 29. Burnt areas (a), number of fires (b) and average fire size (c) in Italy from 1980 to 2016.

(*Source: figures from Corpo Forestale 2016*).

1.2.14 Latvia

Fire danger in the 2016 fire season

In 2016 the forest flammable period was set from the second of May and continued until September 12.

Fire occurrence and affected surfaces

In total, 704 forest fires were discovered and extinguished in 2016 during which 467 hectares were burnt. Of these, 311 hectares of forest, 118 hectares of young stands and 105 hectares of other wooded land were affected.

Table 13 shows the distribution of numbers of fires and burnt areas by month during the fire season, and Figure 30 shows the locations of the fires in 2016.

The highest number of forest fires in 2016 was still in the vicinity of two of Latvia´s biggest cities – Riga and Daugavpils (302 fires, 243.99 hectares affected area, and 115 fires, 35.51 hectares).

Table 13. Number of fires and burnt areas by month.

Month	Number of forest fires	Burnt area (ha)
January	4	0.02
February	1	0.003
March	26	66.17
April	126	111.62
May	257	152.8
June	138	126.64
July	29	3.17
August	11	1.03
September	26	4.77
October	21	0.3
November	1	0.0006
December	1	0.001
Total	**641**	**466.53**

The yearly trends in terms of number of fires and burnt area during the last 24 years in Latvia are shown in Figure 31.

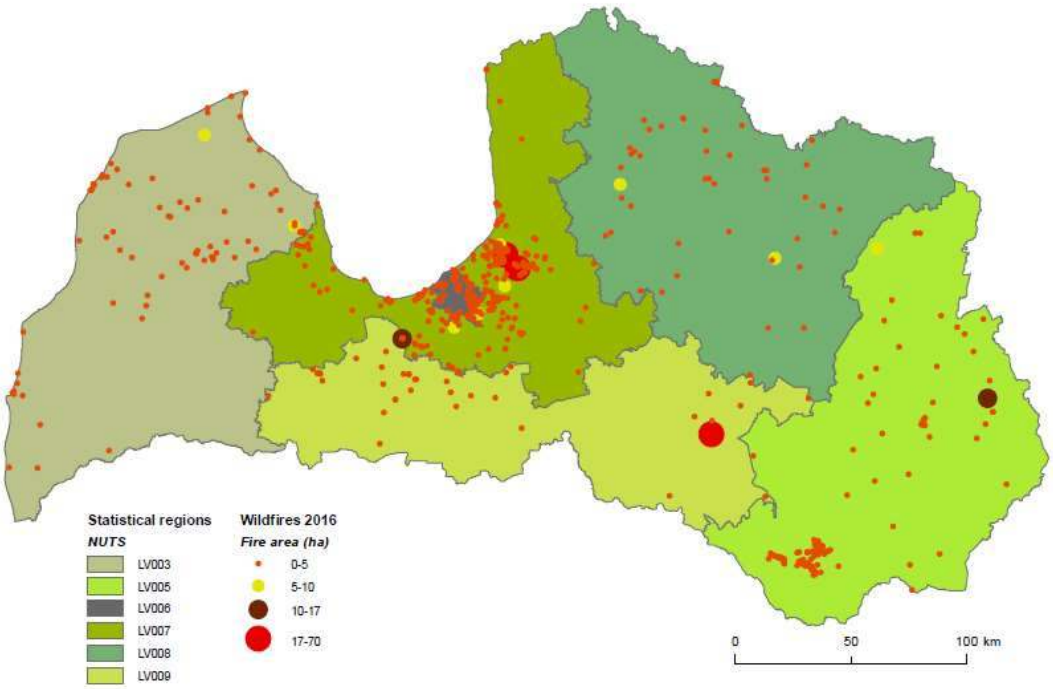
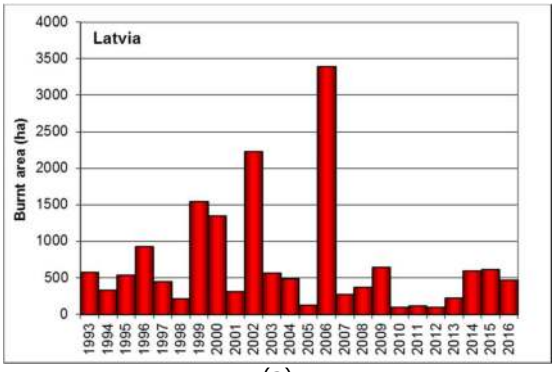


Figure 30. Map of forest fire locations in Latvia in 2016.



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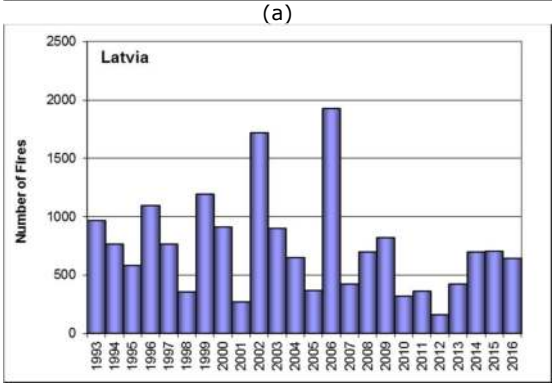

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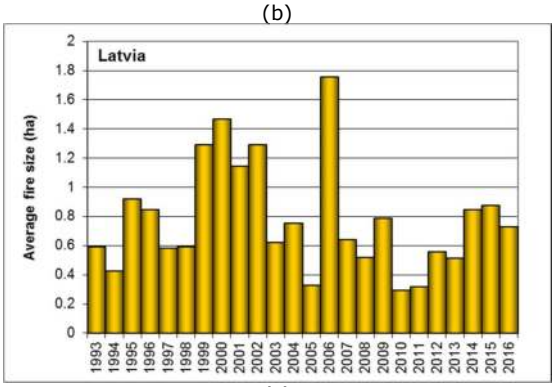


(c)

Figure 31. Burnt areas (a), number of fires (b) and average fire size (c) in Latvia from 1993 to 2016.

Preventive measures

Under the acts of law, fire prevention measures are imposed on forest owners (managers). In 2016 joint stock Company "Latvian state forests" spent 93 018 Euro on fire preventive measures, and Ltd. Company "Riga city forest" which manages forests belonging to Riga municipality spent 3 204 Euro (Table 14).

Table 14: Expenditure on fire prevention measures in Latvia in 2016.

Title	*Costs, EUR*
Latvian State forest	
Creating new fire breaks, 11 km	309
Existing fire break cultivation, 3672km	84178
Water point, warning sign renovation	8531
Total	**93018**
Riga City Forest	
Creating new fire breaks, 0 km	2174
Existing fire break cultivation, 558km	
Fire-fighting	1030
Total	**3204**

New equipment

In 2016 the State forest service bought 1 new Mercedes Benz Unimog U4000 forest fire truck. The fire trucks were equipped in Lithuania, by company JSC "Iskada", and Latvian company LLC "Unimotors Latvia". At the moment each of the State Forest service heads of forestry (10) have 16 new Mercedes Benz Unimog U4000 fire trucks, and 14 new Toyota Hilux forest fire pick-ups, equipped with "Fireco" water pump.

(Source: State Forest Service, Environmental and Forest Protection Division, Latvia).

1.2.15 Lithuania

Fire danger in the 2016 fire season

Forest fires during the year 2016 in Lithuania settled at a low level. The amount of wildfires and the total burnt area was low. The first fire in 2016 was recorded in January, the last one in November. A heat wave in Lithuania occurred in August. The number of fires was influenced substantially by the weather conditions in spring and summer.

Fire occurrence and affected surfaces

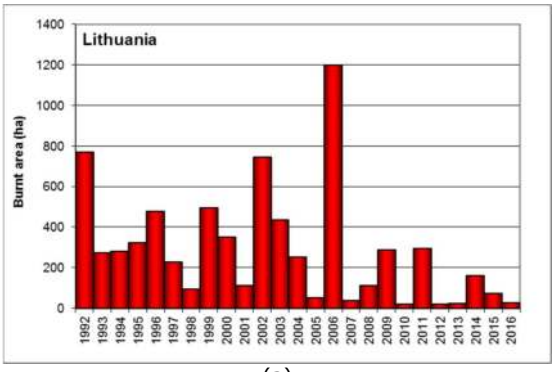
In 2016, according to the data of the Directorate General of State Forests, 98 forest fires occurred and damaged 25.95 ha of forest. Only 2 forest fires were bigger than 1 ha. The highest number of forest fires occurred in June (40% of fires and 63% of burnt area). The total damage was estimated to be 20 251 million euro. The yearly trends in terms of number of fires and burnt area during the last 26 years in Lithuania are shown in Figure 32 below.

Fire prevention activities

The Directorate General of State Forests under the Ministry of Environment organizes the establishment of the uniform system of state fire prevention protection measures. Annual contracts between the Lithuanian Hydro meteorological Service and Directorate General of State Forests are signed concerning calculations of complex forest fire figures and pronouncements of classes of fire rates in each territory of the state forest enterprise. A Forest Fire Danger Map is updated daily (at 12 a.m.) from April to September and can be found at the site http://www.meteo.lt/lt/web/guest/misku-gaisringumo-klases-prognozes.

Every year state forest enterprises, together with the Fire and Rescue Services and Armed Forces, organize educational training in the forest in order to check how organizations are able to organize forest fire extinction, manage difficult situations, control the actions, collaborate with each other and keep the connection. In order to sustain the system of general state fire protection measures, state forest enterprises budgeted 1 819 thousand EUR from their own funds in 2016, and 13.4 thousand km of firebreaks were mineralized.

Automatic early warning systems for forest fire prevention "FireWatch" are used in 25 state forest enterprises having forests with high fire risk (total 24 central stands and 84 detectors). Forest fire detection systems help to detect forest fire focus coordinates with better precision, so that fire brigades can arrive at the fire faster, and extinguish the fire more efficiently.



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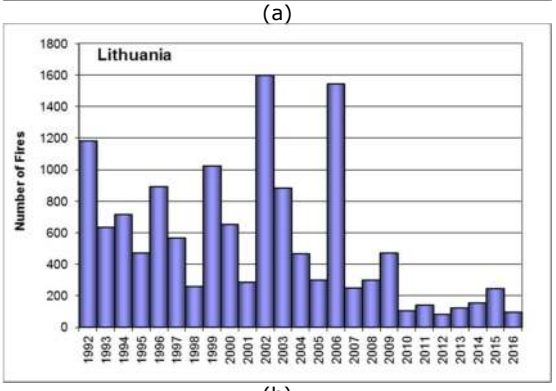

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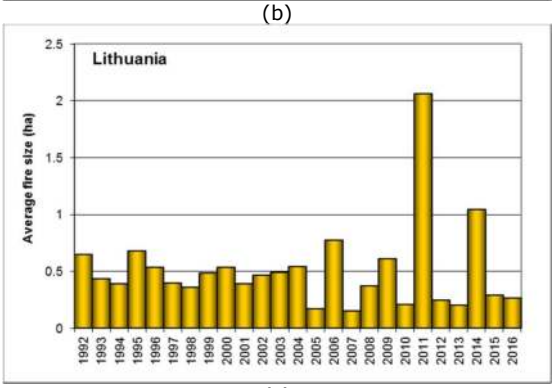


(c)

Figure 32. Burnt areas (a), number of fires (b) and average fire size (c) in Lithuania from 1992 to 2016.

Operations of mutual assistance and loss of human lives

No operations of mutual assistance were taken and no casualties were reported in Lithuania during the fire season of 2016.

(Source: Directorate General of State Forests of Lithuania, Department of Nature Protection and Forest, Ministry of Environment of Lithuania).

1.2.16 Norway

Fire danger in the 2016 fire season

In Norway we are using the WBKZ fire index. The fire season is normally from March to September. The fire danger in Norway varies from north to south since the country is 1750 km long and there may be a high forest fire index in one area and little or no fire risk in other areas at the same time.

Normally the fire season starts in the south-west in March-April. In the western part it is mainly brush-fires. In the southern part it is pines on poor soil that dries up quickly which is most common. The largest areas with forest are in the eastern part of Norway.

The average temperature for the whole country in 2016 was 1.5°C above the normal and precipitation was close to normal. There were dry periods in April, May and in the beginning of July. There are large variations depending where the measurements are made.

Fire prevention activities

The municipalities are responsible for the Fire Services in Norway and the Fire Service is responsible for prevention and action regarding forest fires. Some activities are assigned to Governmental Authorities.

The Fire Services are responsible for the following activities:

a. Monitoring the forest by air (plane);

b. Information campaigns;

c. Prohibit fire dangerous activity in periods with high Fire Index.

The Governmental Authorities are responsible for the following activities:

a. Provide information on the forest fire index through the internet (The Norwegian Meteorological Institute);

b. Provide information through television (Forecast) when the forest fire index is high (The Norwegian Meteorological Institute);

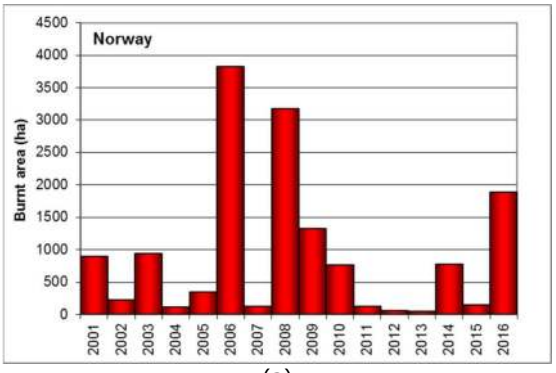
c. General prohibition on lighting fires in the forest or wildland in the period from 15 April to 15 September, regulated by law. (Directorate for Civil Protection).

Fire occurrence and affected surfaces

In 2016 there were 345 forest fires recorded in Norway; 198 ha of productive forest and 1 686 ha of other wooded land (wildland). There were 829 fires recorded in brushes and grass (non-forest).

This is an increase from previous years. The reason for this is mainly a new reporting system where we have reported too low values in previous years.

The trends regarding both the number of fires and burnt areas from 2000-2016 are shown in Figure 33.



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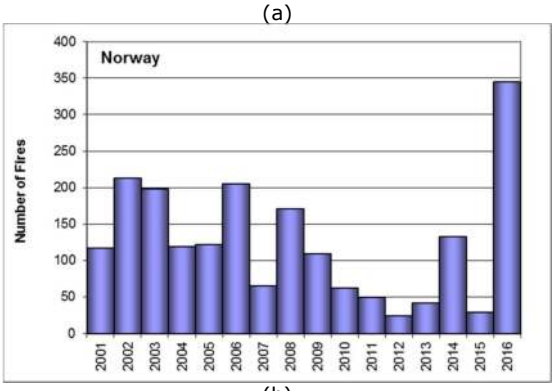

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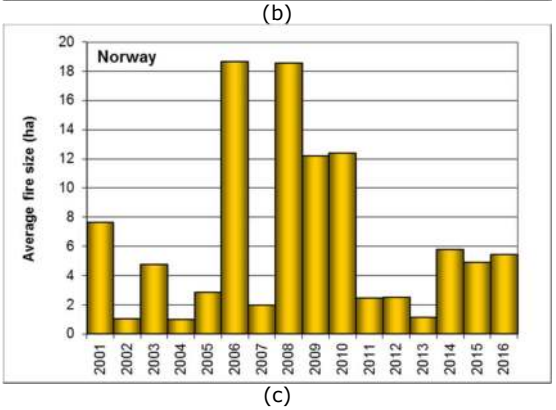

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Figure 33. Burnt areas (a), number of fires (b) and average fire size (c) in Norway from 2001 to 2016.

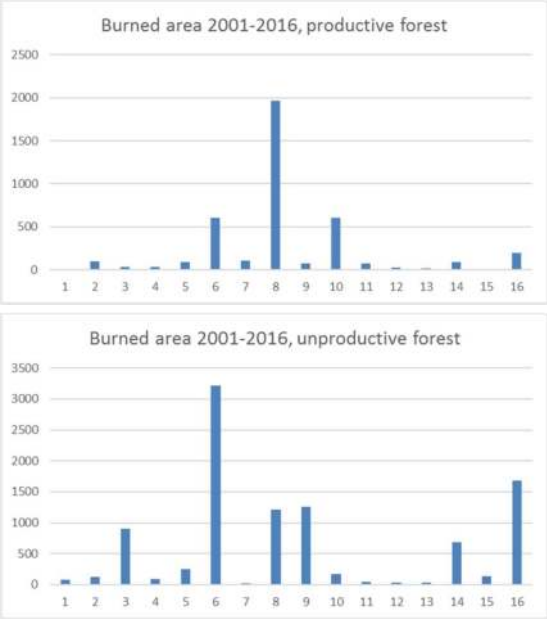


Figure 34. Burnt area of productive/unproductive forest in Norway 2001-2016.

Firefighting means and information campaigns

The Directorate for Civil Protection and Emergency Planning has an agreement with a private helicopter company. The helicopter is a Bell 214 with a 3000 litres bucket, and the company can provide more helicopters if needed. This helicopter is available for Fire Services in the period from 15 April to 15 September (24/7).

In 2016, the helicopter(s) were used in 18 fires with around 24 hours in the air. The total use of helicopters came to 82 hours flying time (including exercises, etc.).

The Directorate for Civil Protection has established an expert team that supports the local fire chief officer when they have large forest fires and when the helicopter is used.

The Norwegian fire service consists of 4 000 full-time and 8 000 part-time firefighters where the fire department is an all-risk service. For those municipalities that have significant forest fire risk, there are groups established only for fighting forest fires. These groups are managed by the fire services.

Loss of human lives

No human lives were lost in fires related to Forest Fires in 2016.

Operations of mutual assistance

None.

(Source: Directorate for Civil Protection (DSB), Norway).

Photo credit: Dag Botnen, Norway.

Photo credits: Dag Botnen, Norway.

1.2.17 Poland

Fire danger in the 2016 fire season

The weather conditions had influence on the forest fire danger risk trend and the occurrence of fires in 2016. They were generally less favourable to the occurrence of fires than in the previous year. The diagrams (Figure 35 - Figure 39) show the variations of air temperatures, precipitation, pine (*Pinus sylvestris* L.) litter moisture, relative air humidity and the national degree of forest fire danger risk (NDFFDR) in the 2016 fire season. They also present the number of fire outbreaks.

The mean monthly air temperatures were higher by about 0.6°C than the long-term mean values in the entire country (2001-2010) reaching 16.7°C at 9 a.m. and 21.7°C at 1 p.m.

They were almost the same as in the year 2015, when they reached 16.5°C and 21.6°C. April was the coolest month (very close to April of the previous year) when the mean monthly air temperature reached 9.2°C at 9 a.m. and 14.0°C at 1 p.m. In May air temperatures were higher (by about 8°C) and reached 17.2 and 21.7°C in the two observation terms.

June was the warmest month, because the mean monthly air temperatures increased and reached 20.5°C at 9 a.m. and 24.5ºC at 1 p.m. July temperatures were a little lower, reaching 20.2°C and 24.0°C. In August the air temperature decreased, and reached 18.3ºC at 9 a.m. and 23.2ºC at 1 p.m.

A further decrease of air temperature took place in September, and the mean monthly value reached 14.7ºC at 9 a.m. and 22.5ºC at 1 p.m.

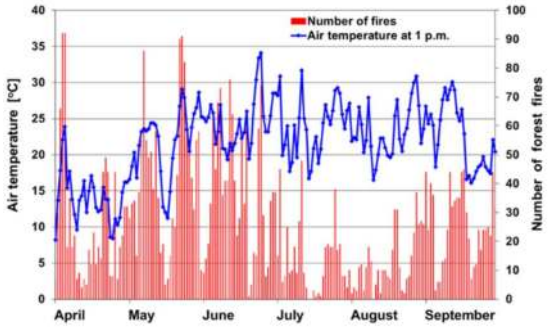


Figure 35. Air temperatures and numbers of forest fires in fire season 2016.

The average precipitation level in the fire season was 1.7 mm and was 1.0 mm lower in comparison to the period 2001-2010. It was a little higher (about 0.2 mm) than the average of the year 2015, which was characterized by the lowest average monthly rainfall in the last 16 years. The average daily precipitation in April was almost the same level as the years 2013-2015 for this month and reached 1.3 mm. In May it rained a little less, and the monthly value was about 0.1 mm lower, but this was decidedly lower than the long-term mean value amounting to 3 mm.

In June the average monthly precipitation increased almost twice, reaching 2.3 mm daily. July was characterised with the greatest rainfall in the analysed term and reached 2.9 mm. It was higher than the average of recent years (2013-2015), but about 0.4 lower in comparison to the long-term mean value. The highest rainfall, not only for the this month, but also for the 2016 fire season was on 15th of July (17.2 mm daily).

August was more rainy than the year before (0.7 mm), because the average daily rainfall was three times greater (2.1 mm). September turned out the month with the least rainfall in the 2016 fire season. The average daily rainfall reached 0.7 mm and was the lowest in the last 16 years.

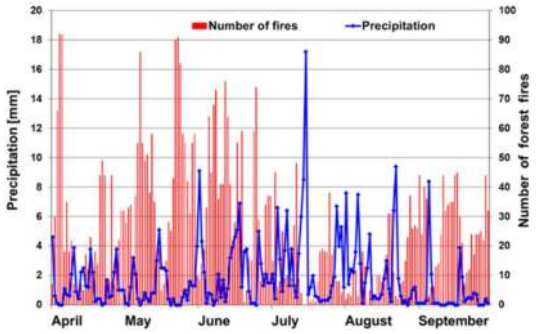


Figure 36. Precipitation and numbers of forest fires in fire season 2016.

Mean pine (*Pinus sylvestris* L.) litter moisture values (the reference fuel type in Poland's condition) for the fire season were close to the long-term mean and to the mean for 2015. They reached 29.9% at 9 a.m. and 24.1% at 1 p.m.

Mean litter moisture in the fire season 2016 with tight limits 24.7-33.9% were noted at 9 a.m. and 19.6-28.1% at 1 p.m. A security level in respect of fire is pine litter moisture exceeding 30%. The lowest mean litter moisture values in both of the observation times were in May (24.7% and 19.6%) and September (25% and 19.7%), and the highest in July (33.9% and 28.1%) and August (33.9% and 27.5%).

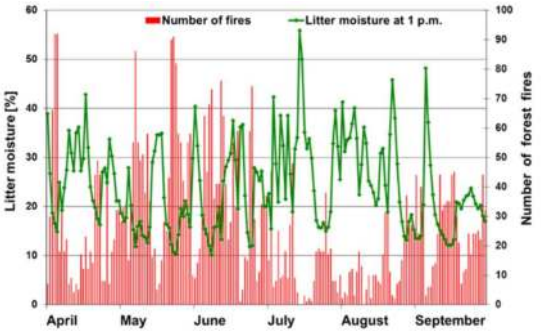


Figure 37. Litter moisture and numbers of forest fires in fire season 2016.

The mean relative air humidity for the fire season 2016 was similar to long-term values (2001-2010) and reached 75.9% at 9 a.m. and 54.9% at 1 p.m. This is also not far from the average values for the fire seasons in 2012-2015. In April relative air humidity reached 76% at 9 a.m. and 54% at 1 p.m. The lowest mean relative air humidity values in 2016 were in May and June, at 9 a.m. within the range 67.9-67.8% and at 1 p.m. from 49.8 to 52%. In the following months relative air humidity increased and reached values from 76.8% in July at 9 a.m., 81% in August, to 85.9% in September, the highest level in the season. However at 1 p.m. the reverse tendency was observed, because relative air humidity decreased from 60.3% in July, to 59% in August and to 53.7% in September.

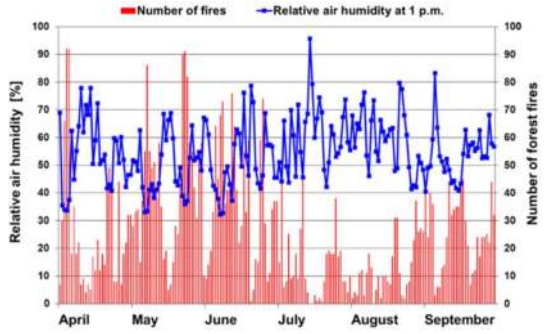


Figure 38. Relative air humidity and numbers of forest fires in fire season 2016.

The 2016 fire season was characterized by low forest fire risk, in comparison to the last fire season and the long-term mean value. In the year 2016 the method of calculating the forest fire risk was changed, and direct comparison of the present results with those given from previous years is not fully authorized. The average national degree of forest fire danger (NDFFDR) in 2016 was low and reached 0.8 at 9 a.m. and 1.2 at 1 p.m. The highest values of NDFFDR (from 1.2 to 1.4) were noted in May and June, and the lowest in July and August (from 0.6 to 0.9).

The share of occurrence in the third level of forest fire danger for the fire season was also low and reached 1.5% at 9 a.m. and 12.5% at 1 p.m. on average. The greatest share of occurrence in the third level of forest fire danger was at 1 p.m. in June (19%), May (19%) and September (17.3%).

As a comparison, in 2015 the average share of occurrence in the third level of forest fire danger for the fire season reached 34%, and the highest share was in August, i.e. 67%.

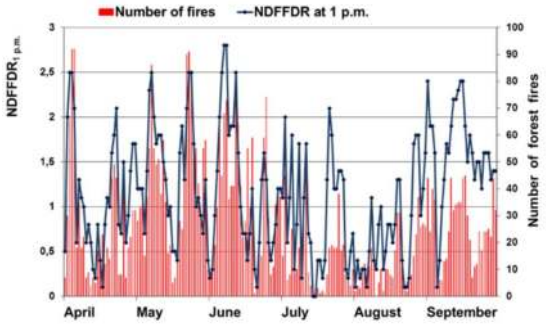


Figure 39. The National Degree of Forest Fire Danger Risk and numbers of forest fires in fire season 2016.

Fire occurrence and affected surfaces

In 2016 in Poland, a total of 5 286 fires broke out (3 545 forest and 1 741 other non-wooded natural land), over 6 971 less than in 2015 (12 257 fires), with a surface area of 1 451 ha (862 forest and 589 ha other non-wooded natural land), over 4 059 ha less than in 2015 (5 510 ha) - Table 15 and Figure 42.

The greatest proportion of fires occurred in May (24.7%; i.e. 1 304) - Figure 40. This was followed by June (21%), April (14.8%) and September (14.6%). The lowest number of fires in the fire season (April - September) occurred in August (7.4%) and July (8%). 90.6% of fires occurred in the fire season.

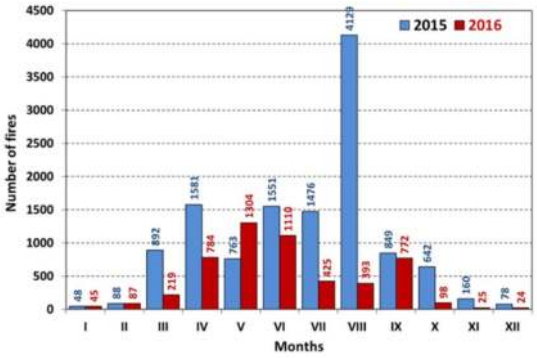


Figure 40. Distribution of number of forest fires by months in 2015 and 2016 in Poland.

The largest number of fires in 2016, similar to last year, occurred in Mazowieckie Province (25.4; i.e. 1 344 fires).

The lowest number of forest fires occurred in Opolskie Province (85), Małopolskie Province (97), and Warmińsko-Mazurskie Province (114).

The largest burnt forest areas were recorded in:

- Mazowieckie Province (306 ha),
- Podlaskie Province (230 ha),
- Śląskie Province (138 ha).

The smallest area was in Opolskie Province (13 ha) and Małopolskie Province (27 ha). These data are illustrated in Figure 43 - Figure 45.

Small forest fires; i.e. with a surface area of less than 1 ha, represented 95.97% of all the forest fires in 2016 (Figure 41), with the burnt area amounting to 43.42%.

Fires with a surface area of between 1 ha and 10 ha represented 36.95% of the burnt area, with their number representing only 3.9%.

In addition there were 6 large fires which represented 9.3% of the burnt area, and 1 very large fire represented 10.34% of the total burnt area.

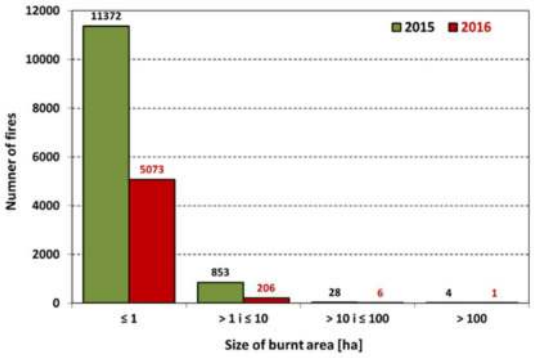


Figure 41. Distribution of the number of forest fires by size of burnt area in the years 2015 and 2016 in Poland.

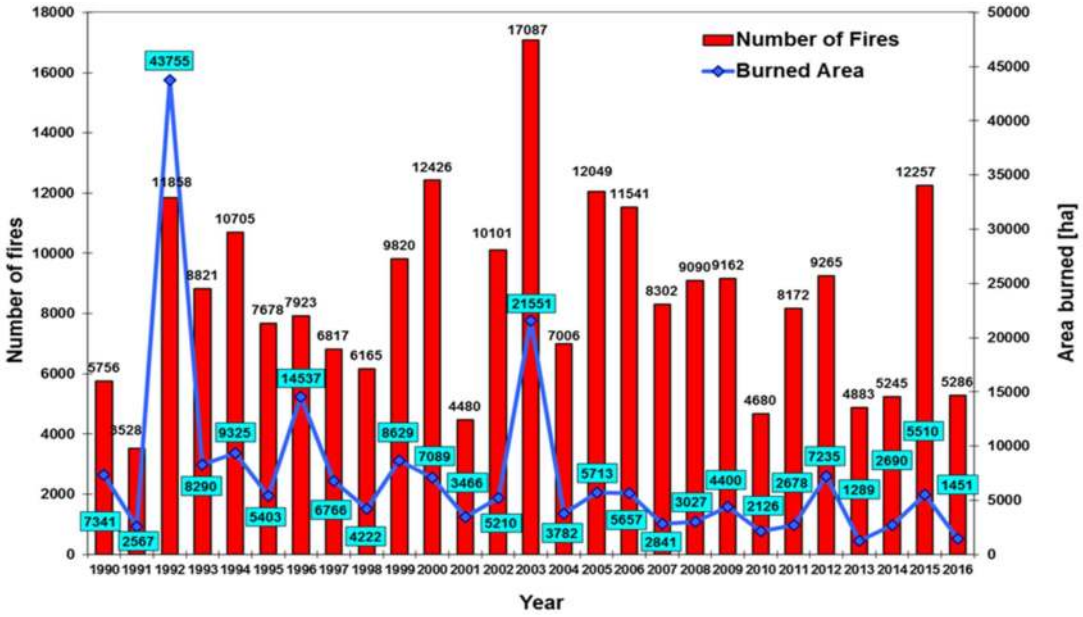


Figure 42. Total number of fires on high forest and area burned in Poland in the period 1990-2016.

Table 15. Forest fires in Poland in the period 2007-2016.

Year	Number of fires			Burnt area (ha)		
	Forest	Non wooded	Total	Forest	Non wooded	Total
2007	5 086	3 216	8 302	1 642.64	1 198.24	2 840.88
2008	5 568	3 522	9 090	1 810.74	1 216.39	3 027.13
2009	5 633	3 529	9 162	2 524.58	1 875.90	4 400.48
2010	2 975	1 705	4 680	1 358.26	767.98	2 126.24
2011	5 126	3 046	8 172	1 526.11	1 151.66	2 677.77
2012	5 752	3 513	9 265	4 781.65	2 453.62	7 235.27
2013	3 168	1 715	4 883	810.42	478.12	1 288.54
2014	3 603	1 642	5 245	1 956.90	733.55	2 690.45
2015	8 292	3 965	12 257	3 765.87	1 744.03	5 509.90
2016	**3 545**	**1 741**	**5 286**	**862.37**	**588.68**	**1 451.05**

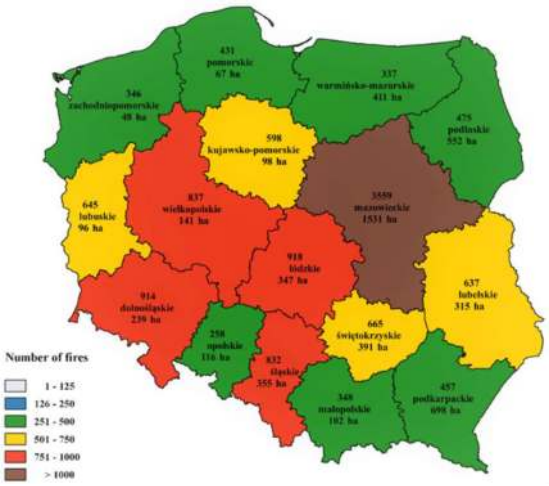


Figure 43. Number of forest fires and burned areas by provinces of Poland in 2015.

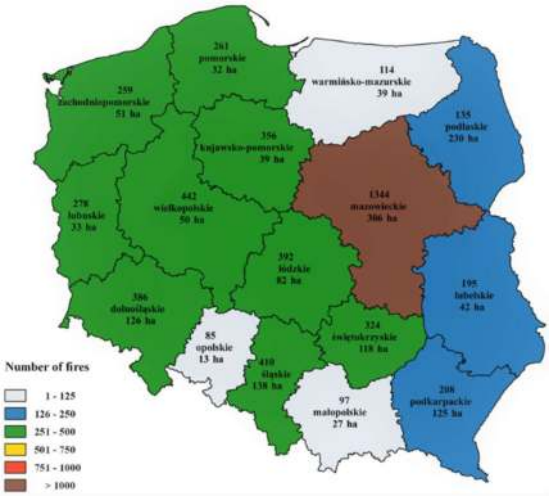


Figure 44. Number of forest fires and burned areas by provinces (NUTS2) in 2016.

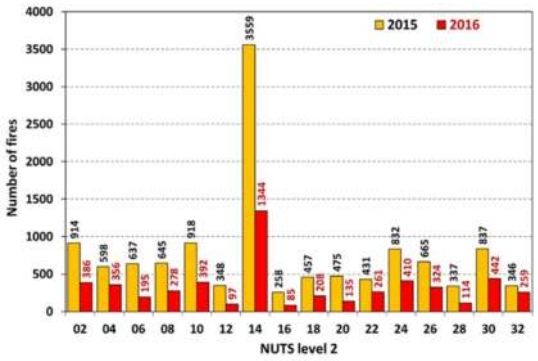


Figure 45. Distribution of the number of forest fires by province (NUTS2) in 2015 and 2016 in Poland.

The burnt area, number of fires and average fire size for the years 1990-2016 are shown in Figure 46.

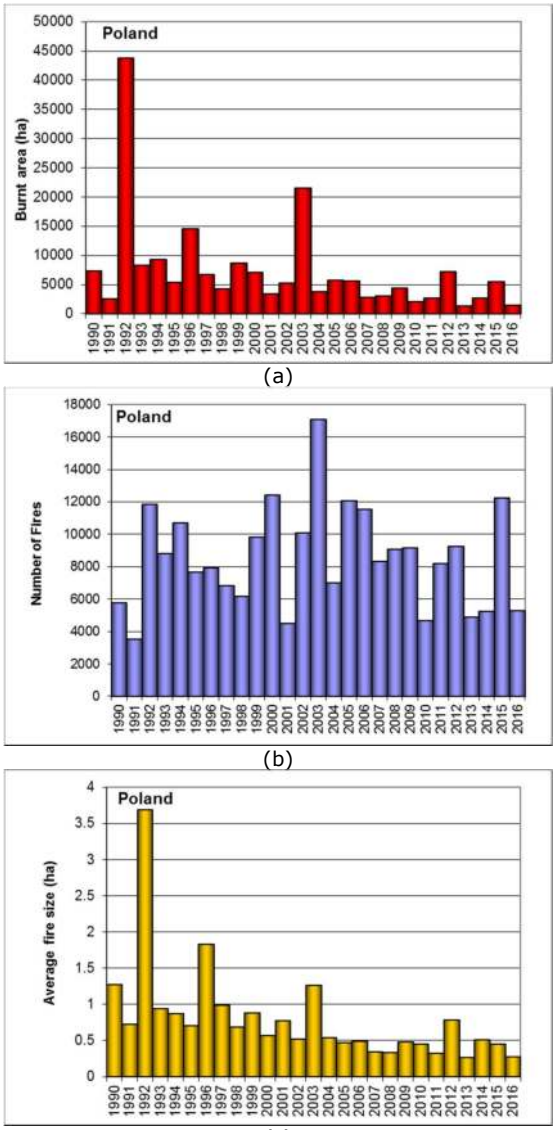


Figure 46. Burnt areas (a), number of fires (b) and average fire size (c) in Poland from 1990 to 2016.

Fire causes

Human activity was the main cause of forest fires; specifically arson represented almost half of the fires (43.09%), followed by negligence (28.64%) and accident (7.89%), whereas unknown causes accounted for 19.32% (Figure 47).

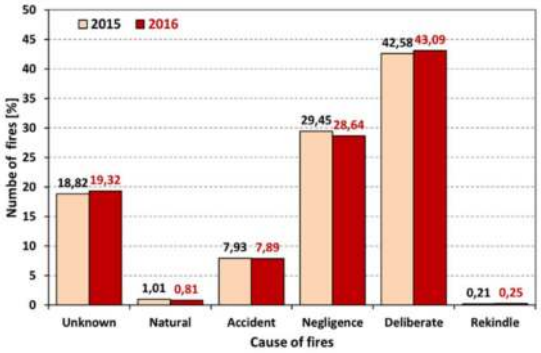


Figure 47. Distribution of the number of forest fires by causes in 2015 and 2016 in Poland.

Firefighting means and information campaigns

The State Forests Holding (State Forests NFH) had at its disposal equipment, consisting of:

- 32 fire suppression airplanes and 1 helicopter,
- 361 patrol and fire suppression vehicles,
- 9 medium and heavy vehicles,
- 257 portable pumps.

These means were used to extinguish 5% of all the fires in the areas managed by the State Forests NFH, whereas the other fires were suppressed by units of the State Fire Service and voluntary fire brigades.

In 2016, as part of the information and promotion activities, the following measures in the State Forests NFH were taken:

- more than 11 thousand lectures in schools and youth camps,
- 239 competitions devoted to the forest fire protection were organized,
- more than one thousand communications were provided in the mass media on fire danger and the principles of safe behaviour in forests,
- more than 108 thousand posters, information leaflets and calendars related to forest fires were disseminated,
- about 4 thousand information boards were erected.

Fire prevention activities

In forest areas managed by the State Forests NFH, works were carried out to prevent the conditions for fire outbreaks and to reduce their spread, by repairing 4 355.32 km of fuel breaks and building 35.92 km of new fuel breaks; in addition, forests were cleaned over a surface area of 21.9 thousand ha, by reducing the quantity of inflammable biomass.

The observation system of the State Forests NFH consisted of:

- 666 fire protection lookout points, including 257 (38.59%) equipped with a system of TV cameras;
- 7 patrol airplanes and 1 helicopter;
- 361 ground patrols.

The effectiveness rate of fire detection by fire protection lookout points was 32%, airplanes detected 1% of fires and civilians notified of 60%. The other 7% of fires were detected by fire protection patrols.

The communication and alarm network in the State Forests NFH consisted of: 6 826 radio-telephones, including 1 203 base sets, 2 473 mobile sets and 3 150 hand held sets, as well as 96 converters to the frequency band used by the State Fire Service.

Water supply for fire suppression purposes was provided by 11 830 water supply points, including about 4.5 thousand natural points and over 2.5 thousand artificial ones. Moreover, water was supplied by more than 4.8 thousand hydrants located in the vicinity of forests.

In 2016, the fire protection costs incurred by the State Forests NFH amounted to 82.4 million PLN.

Information on Poland's National Forest Fire Information System can be found on: *http://bazapozarow.ibles.pl/ibl_ppoz/faces/index.jsp*.
Poland's Forest Fire Danger Map, which is updated daily from March to October (at 9 a.m. and at 1 p.m.), is shown on *http://bazapozarow.ibles.pl/zagrozenie/*

(Source: Forest Research Institute, Forest Fire Protection Department, Poland).

1.2.18 Portugal

Fire danger in the 2016 fire season

In 2016 the burnt area was 161 522.5 ha. The burnt area represents 210% of the average of the previous decennium which was 76 782.11 ha. Regarding forest fires, there was in 2016 a total of 13 261 fires which represents a decrease of 31% when compared to the average of fires in the last decennium and a decrease of 15% compared with 2015.

In Região Autónoma da Madeira, there was a total of 54 forest fires (78% < 1ha and 22% >=1ha), responsible for the burning of 6 270 hectares (4 003 ha wooded land and 2 267 ha shrubland).

According to the information provided by the Portuguese Sea and Atmosphere Institute (IPMA), the meteorological daily severity index (DSR), derived from the Fire Weather Index, shows the evolution of the fire risk in an operation perspective for the year 2016 (Figure 48).

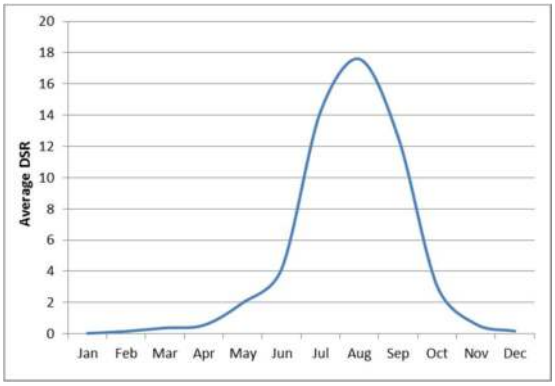


Figure 48. DSR variation in 2016.

Table 16. Forest fires in Portugal (monthly distribution).

Month	*Number of Fires*	*Burnt Area (ha)*		
		Wooded land	*Shrub land*	*Total*
January	8	0.01	0.03	0.04
February	72	6.4	49.03	55.43
March	252	55.75	206.16	261.91
April	311	107.95	199.08	307.03
May	372	173.89	436.58	610.47
June	651	205.66	203.56	409.22
July	2857	3347.68	3148.01	6495.69
August	4642	61782.27	54006.28	115788.55
September	2527	11207.92	21728.84	32936.76
October	1091	554.55	3044.62	3599.17
November	245	20.15	468.19	488.34
December	233	39.57	530.32	569.89
TOTAL	**13261**	**77501.8**	**84020.7**	**161522.5**

Fire occurrence and affected surfaces

In 2016 Portugal registered a total of 13.261 forest fires (79% < 1ha; 21% >= 1ha), responsible for the burning of 161 522.50ha (Figure 49). *Pinus pinaster* and *Eucalyptus globulus* plantations were the forest cover most affected by fires.

Only 13% of the occurrences (1 666) were reported between January and June; they burned about 1 644.1 ha (1% of the total burned area), as seen in Table 16;

About 10 026 forest fires (76% total forest fires) occurred in the summer period (July-September), which consumed approximately 155 221 ha (96% of the total burnt area).

In 2016, the most critical month was August, with 4 642 forest fires (35% total forest fires) and 115 788.55ha (71.7%of the total burnt area).

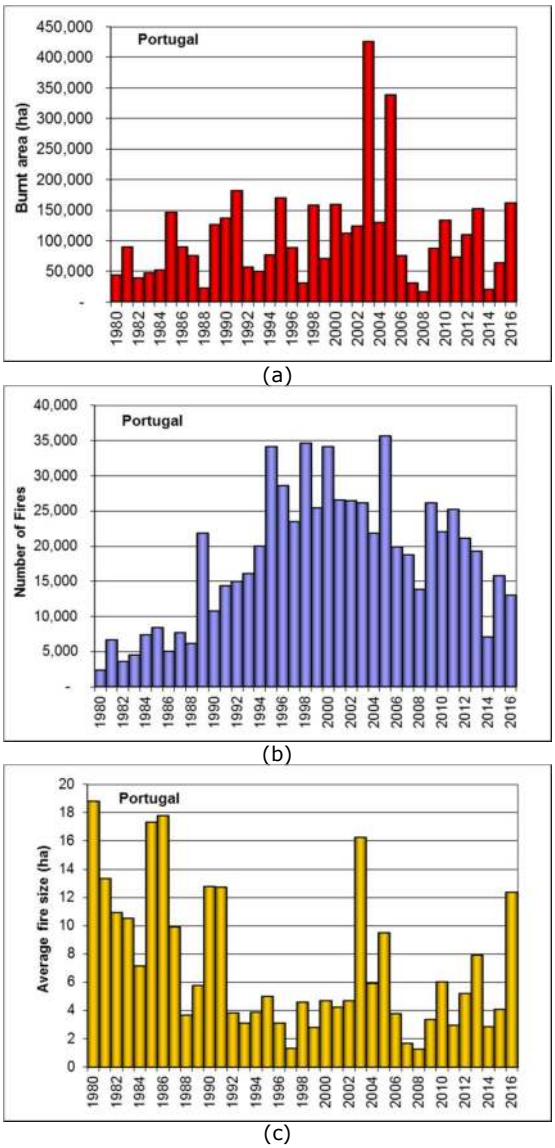
Figure 49. Burned areas in 2016, provisory data (Portugal).

Source: EFFIS/JRC, 2016

Table 17. Number of fires and burned area in Portugal (NUTS2 - 2016).

NUTS 2 Region	Number of fires			Burnt area (ha)		
	≥ 1ha	< 1ha	Total	Shrub land	Wooded Land	Total
Norte	2078	6798	8876	49061.03	66577.86	115638.89
Centro	407	1686	2093	20233.64	13318.79	33552.43
Lisboa	239	1641	1880	3671.71	1071.82	4743.53
Alentejo	78	158	236	1768.10	85.31	1853.41
Algarve	16	160	176	2767.32	2966.92	5734.24
TOTAL	**2818**	**10443**	**13261**	**77501.80**	**84020.70**	**161522.50**
Região Autónoma da Madeira	12	42	54	2267	4003	6270

The analysis of the yearly trends in the number of fires and burnt areas in Portugal is shown in Figure 50.



(a)

(b)

(c)

Figure 50. Burnt areas (a), number of fires (b) and average fire size (c) in Portugal 1980-2016.

Fire occurrence prevailed mostly in the urban districts, such as Porto (Northern region), Braga (Northern region), Viana do Castelo (Northern Region) and Viseu (Central region) which registered 58% of the total number of fires (mainly very small fires). The Northern and Central regions of Portugal were the most affected by forest fires (149 191 32ha: 92% of the total), Table 17. In these regions are concentrated the main area of Eucalyptus and Pine stands and mountainous areas.

Portugal registered 201 large fires (>=100 ha), which corresponded to 85% of the total burned area.

There were 51 fires larger than 500 ha, which burned 104 546.24 ha. The largest fire of 2016 occurred in Aveiro district, burning 21 909 ha on 8th August.

Fire causes

Of 13 261 occurrences registered in 2016, the National Guard proceeded with the investigation of causes for 10 389 forest fires (78%), of which 3 621 were of unknown origin (Figure 51).

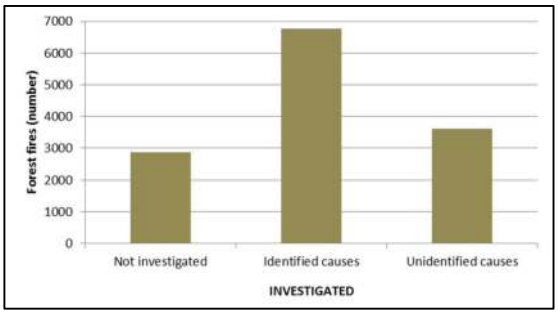


Figure 51. Criminal forest fires 2016 investigation.

Amongst those fires with determined cause, intentional acts corresponded to 34% and accidents or negligence were present in the ignition of 45% of the total number of fires (Figure 52). The use of fire for renewal of shrub pastures in mountain grazing areas, still has a strong impact on the burnt areas.

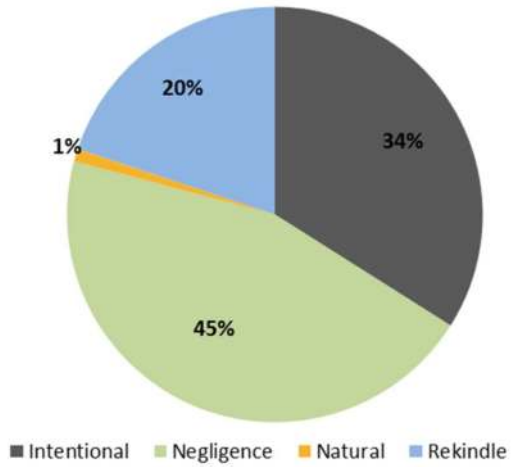


Figure 52. Main causes of forest fires in 2016

Firefighting means

In order to cope with forest fires and to define an integrated fire-fighting strategy, the Portuguese National Authority for Civil Protection (ANPC), as is customary, established an Operational Directive for the forest fire season of 2016, with the following main purposes:

- Define a unique structure for Direction, Command and Control, and a Special Structure to Fight Forest Fires (DECIF);
- Regulate institutional coordination and the cooperation and involvement of the organizations belonging to the Portuguese Integrated System for Relief Operations (SIOPS).
- Regulate institutional coordination and the cooperation of other organizations and institutions engaged/or to be involved in operations of forest fire prevention;
- Fulfillment of the strategic objectives set by the Government in this matter.

The Operational Directive applies to all organizations and institutions which play a role in this field and is used as a base to elaborate both district and municipal emergency plans. It is also used as a reference to elaborate all directives, plans and orders that are applied to organizations involved in the Special Structure to Fight Forest Fires (DECIF).

The Directive defines an operational concept based on the following principles:

- Dissuasive surveillance;
- Timely detection of forest fires;
- Immediate Dispatch of initial means of attack;
- Fire Domain in its early stages;
- Continuous recovery of the Initial Attack Capability (IAC);
- Fast Reinforcement of Operations Theatres (OT);
- Limitation of the catastrophic development of forest fires;
- Permanent consolidation of extinction;
- Unity of command;
- Unified public information management.

Under the scope of the Operational Directive, the distribution of the available means for surveillance, detection and fire-fighting operations, was made into engagement phases during 2016. The number of means allocated in each phase depended, amongst other factors, on the forest fire hazard and territory vulnerability expected for a given period. For example, during the most critical period, Charlie Phase (1JUL-30SEP), there were 9 708 human resources, 2 043 vehicles and 49 aircraft (fixed and rotary wing) available.

Moreover, in order to improve and assure the firefighting operations outside the critical period, it was decided to make terrestrial and aerial means permanently available during the Alfa and Echo phases.

In Table 18, a resume of all the fire-fighting resources distributed by engagement phases can be seen:

Table 18. Fire-fighting means available per phase

Phases	Elements	Vehicles	Aerial Means
Alfa (< 15MAY)	Means available on demand		2 - 5
Bravo (15MAY-30JUN)	6 570	1 504	32
Charlie (1JUL-30SEP)	9 708	2 043	47
Delta (1OCT-31OCT)	5 517	1 293	22
Echo (> 31OCT)	Means available on demand		2 - 5

With respect to the aerial means they were of the following types:

- 36 Helis for initial attack;
- 3 Heavy Helibombers for enlarged attack;
- 8 Amphibious aircrafts for enlarged attack.

All means were provided by both public and private entities/organizations (around 11) such as the National Authority for Civil Protection (ANPC), Fire Fighting Corps, National Guard (GNR), Forest and Environmental Conservation Institute (ICNF), Police (PSP), The Armed forces and a Forest Producers Associations (AFOCELCA).

Forest fires planning

The Institute for Nature Conservation and Forests (ICNF) kept its efforts in the forest fire planning at the local, municipal and regional (district) levels.

The municipal planning objective is pursued by the municipal forest technical offices, based on the municipal plans for forest fire prevention (5 years planning) and the municipal operational plans, which are part of the previous plans and were updated on an yearly basis.

The municipal forest technical offices provided technical support to the municipal commission for forest protection. By the end of 2016 there were 267 municipal forest technical offices established and 188 municipal plans for forest fire prevention approved.

The regional level planning (for the entire Mainland) is assured by 18 Regional Forest Plans updated before each summer in cooperation with municipalities and district commands for relief operations, at the district level.

Forest fuels management

Forest fuels management is one of the key-actions in the forest fire prevention domain. A total area of 20 776 ha was managed, of which 1 214 ha were with prescribed burning.

Water points

During 2016, 564 water points were renovated.

Forest roads

In 2016, 6 755 kilometres of forest roads were managed.

Policy measures

In 2016, the publishing of *Portaria* [Ministerial Order] n.º 167/2016, established the period between 1st July and 30th September, as the critical fire season, when preventive measures are implemented.

Bilateral Commission on Forest Fires Prevention and Suppression (Portugal/ Spain).

There was no follow-up progress in the Commission work.

Changes made to DECIF in 2016

Safety on Forest fire Operations Pocket Guide
A pocket guide was produced on safety in forest fire operations including vehicle driving, operational leadership, common operations risks, the LACES Checklist, the 18 danger situations and the 10 safety standard and other Safety, safety procedures on aerial firefighting operations and on the use of bulldozers on firefighting operations.

New aerial firefighting operations manual
A new edition of the aerial firefighting operations was produced. This revision carries out a complete revision to the operational procedures of employment of the aerial means in civil protection operations, becoming an exclusive manual for the use of aerial means wildfire fighting. With regard to the previous manual, a number of important chapters have been added, including the minimum requirements for Aircraft Centres (CMA), air traffic control procedures under the Operations Management System (SGO) and safety recommendations and measures in collaboration with the Office of Prevention and Investigation of Accidents with Aircraft (GPIAA), the National Commando of Relief Operations (CNOS) and the Flight Operation Directors (DOV) of the aerial means rental companies.

Loss of human lives in the 2016 fire campaign.

There was no loss of human lives during the 2016 fire season. Some fire fighting vehicles were destroyed after being caught by forest fires.

Operations of mutual assistance

Considering the strong increase of fires in the period between the 5th and 15th of August, Portugal was forced to activate some bilateral protocols of mutual assistance with Spain and Morocco, and also with the Russian Federation asking for amphibious aerial support. The Spanish support was provided by 2 CL415 airplanes between 7th and 13th of August with 19 missions and 57:01 flight hours. The Morocco support was also provided by 2 CL415 airplanes between 11th and 18th of August with 21 missions and 70:02 flight hours. The Russian Federation support was provided by 3 Beriev Be200, from 13th of August until 09th September with 27 flight missions and 78:39 flight hours. In the peak of the fire blaze Portugal also activated the EUCP Mechanism and received support from the Buffer IT Module composed of one CL415 airplane that was detached to the country, between 11th and 18th of August, and performed 10 aerial missions and 38:22 flight hours.

(Sources: Ministry of Agriculture, Rural Development and Fisheries - National Forest Authority and National Authority for Civil Protection, Portugal)

1.2.19 Romania

Meteorological characteristics of Romania during 2016

In 2016, the mean annual national temperature (9.9°C) was +0.7°C higher than the standard climatological normal (1981–2010). Positive deviations of the mean monthly temperature against the normal standard climate of each month, were recorded in 7 months, ranging between 0.2°C (August) to 5.7°C (February). Exceptions were January, May, October, November and December when the mean monthly national temperature ranked below the standard climatological normal (Figure 53).

The annual precipitation amount in Romania (791.5 mm) was 25% higher than the standard climate normal (1981–2010). Deviations were positive in almost all the months, ranking from 6% in August, to 138% in October, whereas negative deviations were in September (10%), July (63%) and December (63%) (Figure 54).

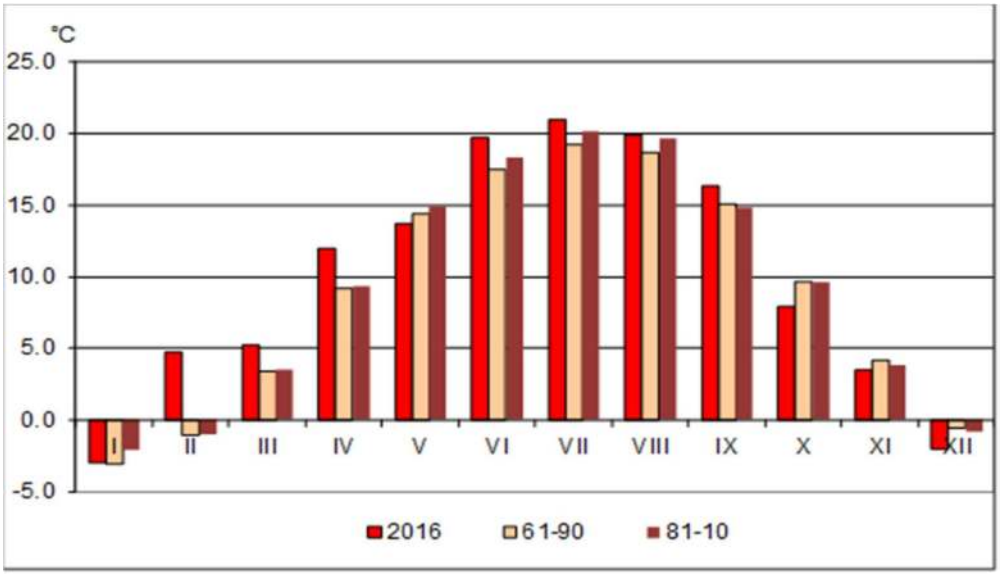


Figure 53. Mean monthly temperature over Romania in 2016 compared to the climatological normals (old normal: 1961–1990; new normal: 1981–2010).

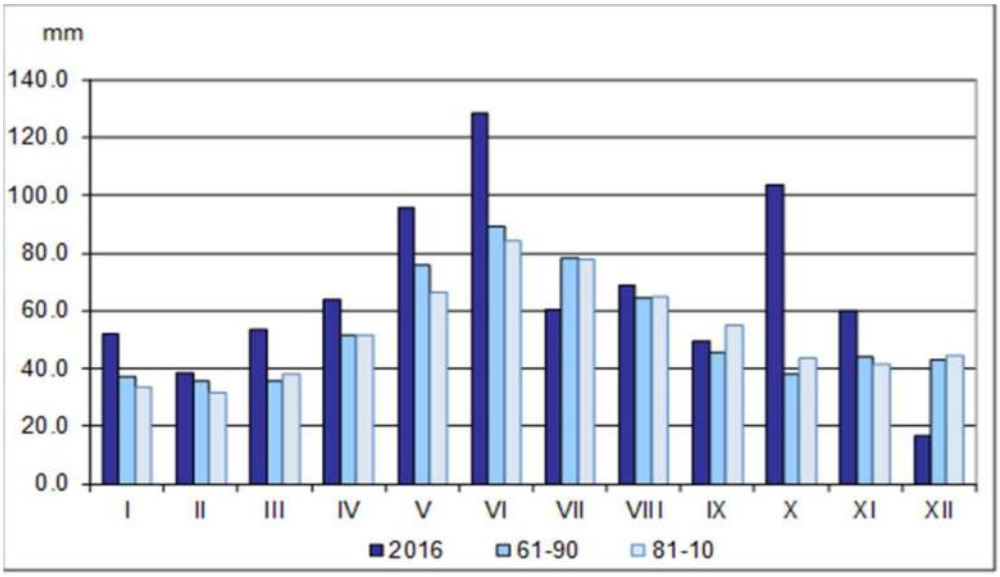


Figure 54. Monthly average precipitation recorded during 2016, compared to the climatological normals (old normal: 1961–1990; new normal: 1981–2010).

Fire occurrence and affected surfaces

In 2016, at national level, 174 forest vegetation fires were recorded, affecting 675.36 ha, of which:

- 172 fires occurred on 672.01 ha in the national forest;
- 2 fires occurred on 3.35 ha in forest vegetation, located on land outside the forest;

As a result of the fires, an estimated damage of 13.2 thousand Euro occurred, burning 26.5 thousand seedlings of plantations and natural regenerations plus a quantity of 210 cubic meters of standing or under operation timber.

In this regard, a comparison situation for the affected area and number of registered forest fires during the period 1986 – 2016, is presented in the charts below.

In 2016, no important forest fires were recorded.

The periods with a high number of fires occurred in spring (there were 40 fires which burned 179 ha in the period between March 31 and April 7, from which in 10 fires occurred on April 6) and also in summer (in the period between July 31 and August 8 there were 28 fires affecting 137 ha) with the principal cause being fire propagation from pastures and farming land.

For the forest vegetation fires produced in 2016, the following classification is presented:

Table 19. Causes of forest fires.

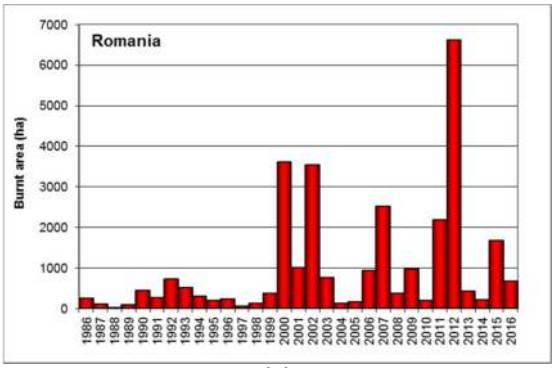
Cause of fire	EFFIS code	Number of fires	Burnt area (ha)
Unknown	100	49	186.28
Lightning	210	1	0.01
Agricultural burnings	412	115	474.51
Waste management	413	1	5.2
Cigarettes	422	6	9.13
Deliberate, unknown motivation	500	1	0.2
Children	522	1	0.03

Table 20. Nature of the affected property.

Property type	Number of fires	Burnt area (ha)
State public property	124	479.49
Communities public property	21	85.06
Private property	29	110.81

Table 21. Type of fire.

Fire type	Number of fires	Burnt area (ha)
Litter fires	170	641.71
Canopy fires	1	10
Mixed fires (litter, canopy)	3	23.65



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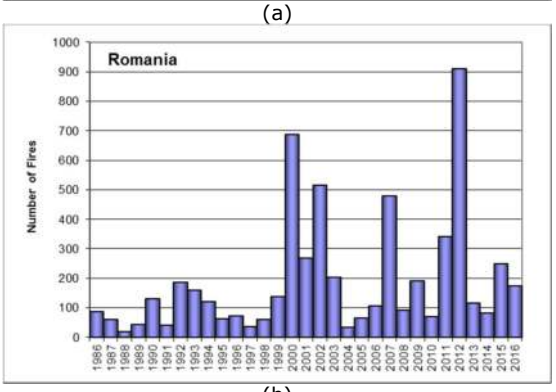

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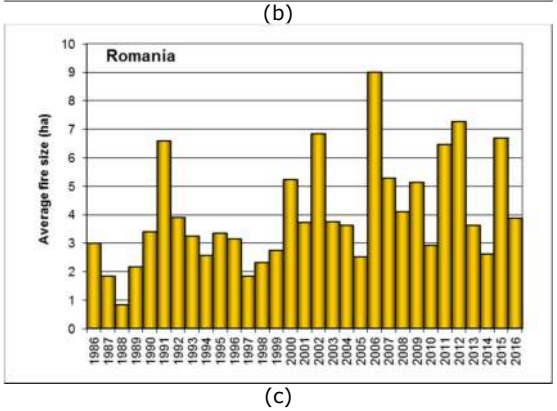


(c)

Figure 55. Burnt area (a), number of fires (b) and average fire size (c) in Romania from 1986 to 2016.

Firefighting means

Fire fighting actions involved a total of 3 222 people, of which:

- Forest rangers - 767 people;
- Military and civilian fire-fighters – 1 051 people;
- Policemen and gendarmes - 132 people;
- Citizens – 1 272 persons.

(Source: National Meteorological Institute, Ministry of Waters and Forests, Romania).

1.2.20 Russian Federation

Fire occurrence and affected surfaces

The fire season on started January 3 in Irkutskaya oblast, Siberian Federal District.

There were 10 089 forest fires in total in the Russian Federation in 2016. The area burned is 2 419 254 ha in protected territories, including 1 941 818 ha covered by forest.

86% of the total area burned was observed in 6 regions of the Far East and Siberia, but the most critical situations were in :

- Irkutskaya oblast (Siberian Federal District) 1 173 fires (624 372 ha);
- Amurskaya oblast (Far East Federal District) 258 fires (815 348 ha).

In six regions of the Russian Federation an Emergency Situation at regional level was declared in connection with extreme forest fires. There were 62 interregional transfers of teams of firefighters organised, including 2 200 professionals.

Fire prevention activities

In the framework of General plans of suppression of forest fires, there are four levels of fire management system in the territories of the regions of Russian Federation (Local, Regional, Interregional and Federal).

In addition, twenty-one regions of Siberia and the Far East signed an agreement on cooperation in the field of fire management.

The most important activities on fire prevention and preparation included:

- Construction of roads for forest protection needs: 4 569 km;
- Reconstruction and maintenance of forest roads for fire-prevention appointment: over 9 497 km;
- Construction of the fire-prevention mineralized lines, barriers: over 196 804 km;
- Care of the fire-prevention mineralized strips, barriers: over 623 931 km;
- Prescribed burning : 690 516 ha.

In addition, several public events with the local population on forest fire prevention were organized using mass media and Internet sites.

Fire causes

Carelessness was the cause of 44% of total fires compared with 58% in 2010-2015.

Lightning caused 22% of the total number compared with 16% in 2010-2015.

Agriculture burning was the cause of 9% of fires compared with 7% in 2010-2015.

23% of fire causes were unknown (most likely that most of them were also caused out of carelessness), compared with 17% in 2010-2015 (Figure 56).

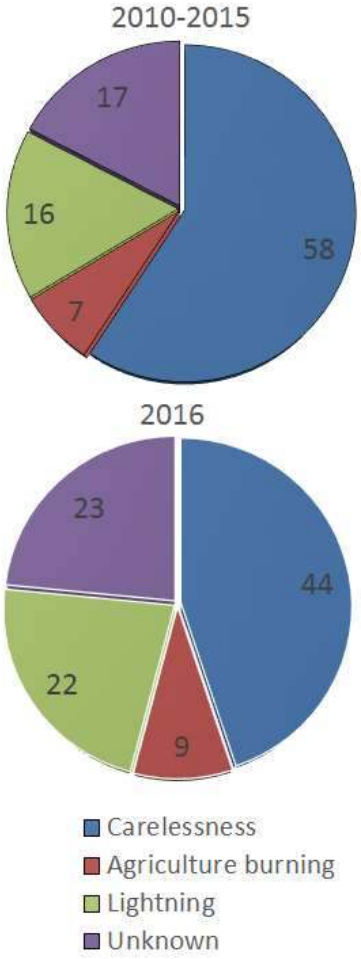


Figure 56. Forest fire causes.

(Source: Aerial Forest Fire Centre, Russian Federation).

1.2.21 Slovakia

Fire danger in the 2016 fire season

Forest fire during the year 2016 in Slovakia settled at a low level. The number of wildfires was very low and the total burnt area was almost the same as the long term average. The number of fires was influenced substantially by the weather conditions in spring and summer.

Fire occurrence and affected surfaces

A total number of 136 forest fires was reported in Slovakia in 2016, corresponding to a total burnt area of 174.88 ha. The average burned forest area per fire was 1.3 ha.

Figure 59 presents danger level of forest areas and sub-areas for forest fires, and Figure 58 shows the pattern of fire occurrence and burnt area by month during the year. The burnt areas, number of fires and average fire size for the years 1999-2016 are shown in Figure 60.

Fire causes

Forest fire causes in 2016 are shown in Figure 57
Figure 57, and causes for the years 2006–2016 are presented in Table 22.

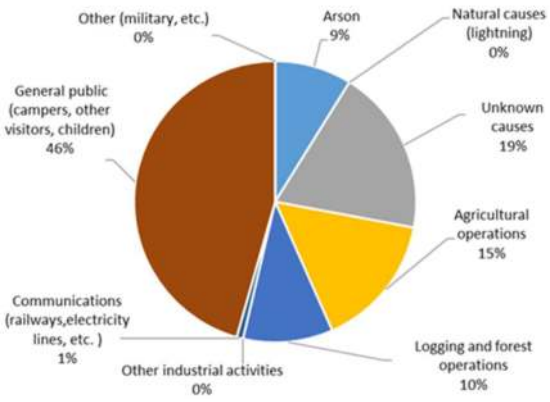


Figure 57. Causes of forest fires in 2016.

Table 22 Fire causes in Slovak Republic in 2005 – 2016 (number of forest fires).

	Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	**2016**
Basic information	Total fires	237	463	182	347	123	303	517	233	153	242	**136**
Known causes (Human)	Arson	8	11	7	18	6	8	42	33	26	23	**12**
	Negligence (see also B below)	201	416	154	286	94	244	409	177	112	167	**98**
Known causes (Natural)	Lightning	3	6	1	3	2	1	8	4	2	12	**0**
Unknown	Unknown	25	26	20	40	21	50	58	19	13	40	**26**
B: Supplementary information: Total negligence	Agricultural operations	22	110	25	51	25	59	135	26	24	26	**21**
	Logging/forest operations	10	23	19	52	25	21	56	15	18	21	**14**
	Other industrial activities	3	2	20	12	5	0	1	7	1	5	**0**
	Communications (railways, electricity lines, etc.)	2	3	3	7	2	1	7	3	1	2	**1**
	General public (campers, other visitors, children)	163	278	81	161	66	222	208	125	67	110	**62**
	Other (military, etc.)	1	0	6	3	0	0	2	1	1	3	**0**

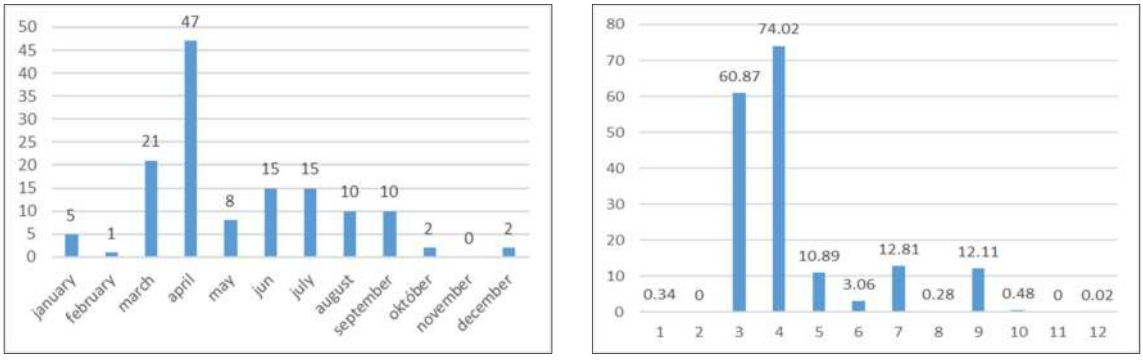


Figure 58. Fire frequency (left) and burnt area (right) by month in 2016.

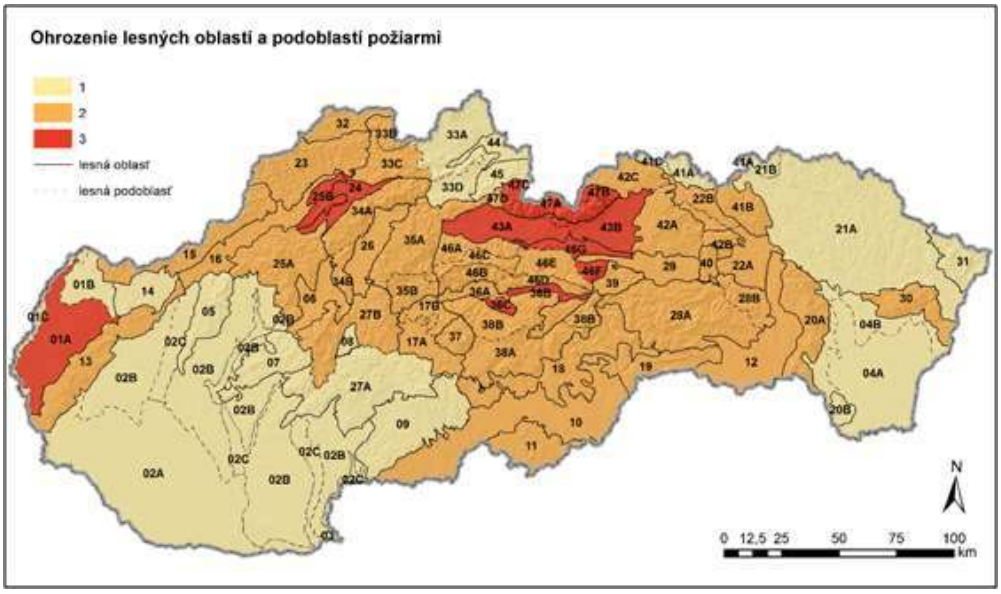
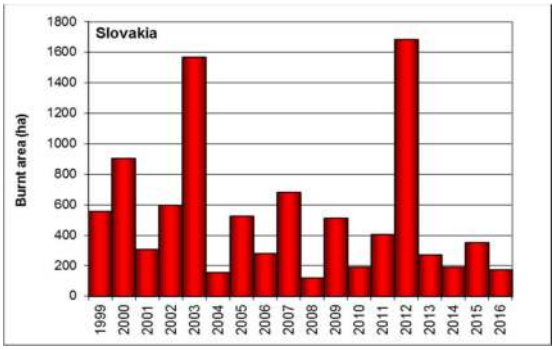


Figure 59. Fire danger level for forest areas and sub-areas of forests.



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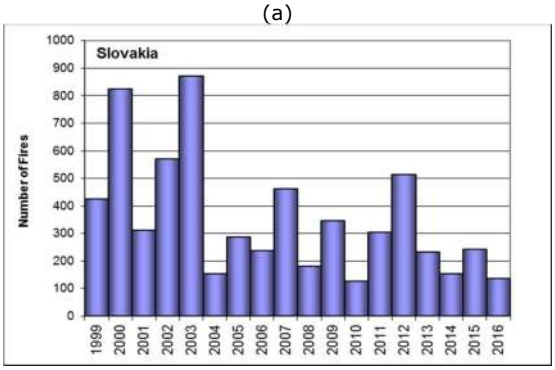

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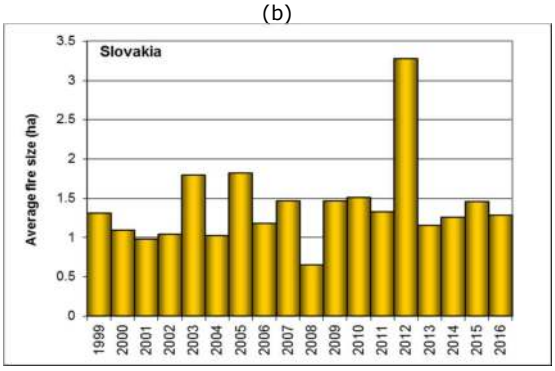


(c)

Figure 60. Burnt areas (a), number of fires (b) and average fire size (c) in Slovakia from 1999 to 2016.

Fire prevention activities

- Provide information on the forest fire index through the internet page of the Slovak Hydrometeorological institute;
- Provide information through television when the forest fire index is high;
- Information campaigns;
- Prohibit fire dangerous activities in period with high Fire index;
- Use of a stationary camera system for the early detection of forest fires.

Injuries and loss of human lives

One injury was reported in Slovakia during the fire season of 2016.

(Processed: National Forest Centre - Forest Research Institute Zvolen, Slovakia; Source: Institute for Fires and Expertise of the Ministry of Interior of the Slovak Republic).

1.2.22 Slovenia

In 2016, according to the data of the Forest Service, 90 forest fires were reported, with a total burnt area of 525.69 ha, of which 236.57 ha were in forest land (Table 23). The number of fires is similar to that reported in 2015, but the burnt area is around 8 times the 2015 total. There were 18 fires over 1 ha during the year as well as one over 100 ha, and the average fire size was 5.8 ha. Figure 61 shows the trends in terms of number of fires and burnt area during the last 13 years in Slovenia.

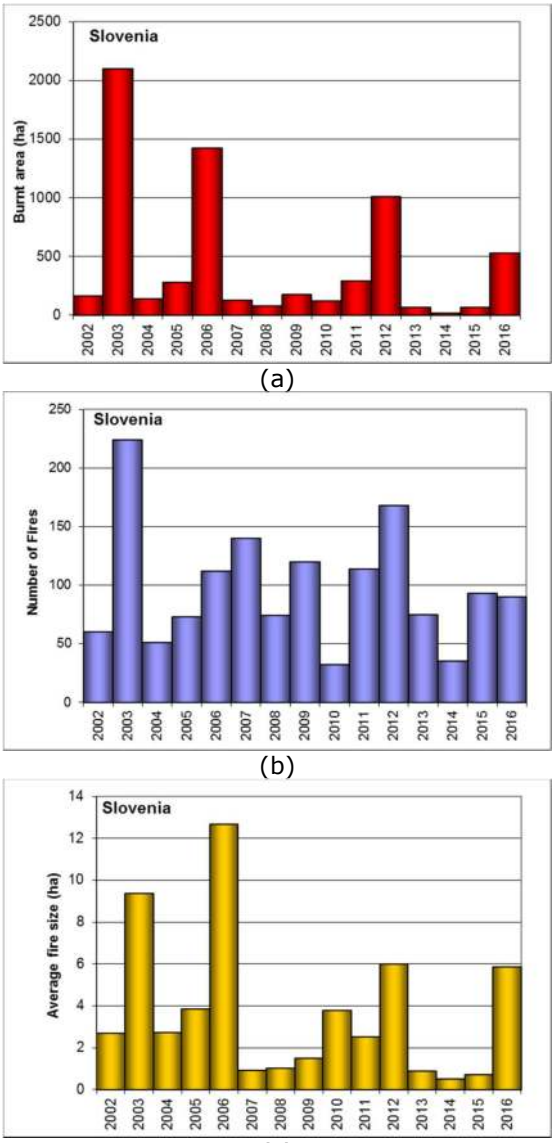
Table 23. Number of fires and burnt area in Slovenia in 2016

Number of fires	< 1 ha	71
	>= 1 ha	18
	>= 100 ha	1
	>= 500 ha	0
	Total	**90**
Burnt area	Woodland	236.57
	Bushes	0.84
	Non woodland	288.29
	Total	**525.69**

As was the case in previous years, the worst affected region was Sežana, in which 69% of the fires (93% of burnt area) occurred (Table 24).

In 2016, half of the fires (45) were of unknown origin. Of the rest, 7 were reported as natural causes, 3 were deliberately started and the remaining 35 were reported as accidental or negligent.

(Source: Ministry of Agriculture, Forestry and Food, Slovenia).



(a)

(b)

(c)

Figure 61. Burnt areas (a), number of fires (b) and average fire size (c) in Slovenia from 2002 to 2016.

Table 24. Number of fires and burnt area by forest management unit in Slovenia in 2016.

	Number of fires				**Burnt area (ha)**			
Region	**<1 ha**	**≥1 ha**	**≥100 ha**	**Total**	**Forest**	**Scrub**	**Non wooded**	**Total**
Tolmin	2	3	0	5	11.32	0.83	1.98	14.13
Bled	0	0	0	0	0	0	0	0
Kranj	1	0	0	1	0.01	0	0	0.01
Ljubljana	9	0	0	9	0.63	0.01	0.30	0.94
Postojna	0	0	0	0	0	0	0	0
Kočevje	0	0	0	0	0	0	0	0
Novo mesto	2	0	0	2	0.01	0	0	0.01
Brežice	0	1	0	1	3.28	0	0.60	3.88
Celje	2	0	0	2	0.19	0	0	0.19
Nazarje	0	0	0	0	0	0	0	0
Slovenj Gradec	2	0	0	2	0.07	0	0.07	0.14
Maribor	4	1	0	5	1.64	0	0	1.64
Murska Sobota	0	0	0	0	0	0	0	0
Sežana	49	13	1	63	219.42	0	285.33	504.75
Total	**71**	**18**	**1**	**90**	**236.57**	**0.84**	**288.28**	**525.69**

1.2.23 Spain

Climatic report for the year 2016

Temperatures

2016 was a very warm year in Spain, with an average temperature of 15.8°C, which is 0.7°C above normal (reference period 1981-2010). It was the sixth warmest year since the start of the series in 1965 and the fifth warmest of the 21st century Figure 62).

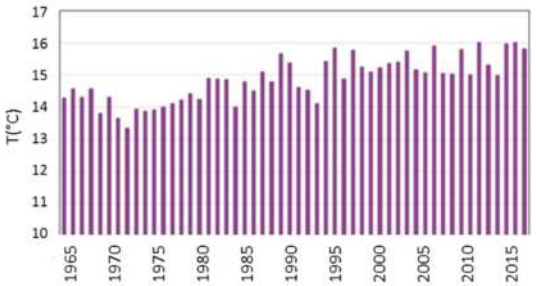


Figure 62. Average annual temperatures in Spain since 1965.

The year began with the warmest January since the beginning of the series in 1965. Monthly temperatures exceeded the average values by more than 2°C in much of Spain, reaching 3°C in the eastern third of the interior and western Castilla y León and Castilla-La Mancha. The month of February was warm, with a mean temperature across Spain that was 0.8°C above the average.

Spring, on the other hand was cold, with temperatures 0.5°C lower than the average of the season. March was the second coldest observed in the XXI century, with an average temperature 1.3°C below normal for the month and negative anomalies of more than 2°C in many interior areas of the peninsula. In April, the average temperature was around normal, while in May it was 0.2°C lower than normal.

The summer was the third warmest since 1965, with an average temperature 1.2°C above the average of this season. June had an average temperature anomaly of 0.7°C, while July and August were both very warm, with anomalies exceeding 1.5°C and 1.3°C, respectively.

Autumn was also very warm, with mean temperatures 0.9°C above the average of this season. Average temperatures were 1.4°C above the norm in September and 1.5°C in October. November, on the other hand, was cooler, with a mean temperature 0.1°C below the average for 1981-2010.

Finally, the month of December was warm, with a mean temperature across Spain of 0.6°C higher than the average for this month.

Extreme temperature episodes.

During 2016, there was an episode of abnormally high temperatures at the beginning of September, which mainly affected the peninsular area and the Balearic Islands, and was at maximum intensity between 3-7 September. In that period, the maximum absolute values for September were exceeded in 36 main observatories, and exceeded the previous maximum value by more than 3°C in several stations. In numerous observatories the highest temperature for the whole summer season was recorded during this episode, including 45.4°C recorded at Cordoba Airport on 6 September, 44.8°C from Seville Airport and 44.6°C in Murcia, both on 5 September. In many observatories in the southern half of the Iberian Peninsula, as well as in some stations in Galicia, maximum temperatures were above 40°C during this period.

Also of note is an episode of low temperatures observed between 15-20 February when an influx of polar air affected all of Spain including the Canary Islands. The lowest temperatures were registered on 17 February, including a reading of -11.3°C in Puerto de Navacerrada observatory, -9.8°C in Teruel, -9.3°C in Molina de Aragón, -8.2°C in Burgos Airport and -8C in Soria. A second cold episode occurred in the last two days of December when -11.0C was recorded in Molina de Aragón on the 30th, -8.2°C in Burgos Airport and -7.3°C in Valladolid Airport, both on the 31st.

Precipitation

2016 was a wet year in the whole of Spain. The average precipitation in Spain was around 682 mm, 5% above the normal value according to the reference period 1981-2010 (Figure 63). This small positive anomaly is mainly due to the fact that in the first five months of the year the cumulative precipitation exceeded the normal value by more than 40%, whereas after May it was dry until November.

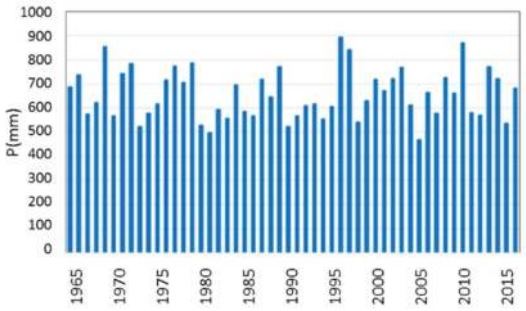


Figure 63. Average precipitation across Spain since 1965.

During 2016, rainfall exceeded normal values in much of the peninsula, and also in the south of Mallorca, the eastern Canaries and north-east Tenerife (Figure 64).

January and February were very wet, with precipitation exceeding the average by 41% in January and 66% in February. January was very humid in much of the northwest quarter of the peninsular and in several interior parts of the peninsula. In large areas of the centre of Castile and Leon, rainfall was triple the normal value. On the contrary, it was a dry month in the Balearics, the Canaries and the Mediterranean regions. February was also very humid and high rainfall affected all regions except parts of Valencia, Murcia and Almeria where rainfall failed to reach 25% of the normal value.

The whole of spring was very wet and average precipitation over Spain was 34% above the normal value of the trimester, with April being the wettest month. In extensive areas, rainfall was more than 50% above normal, and in parts of Huelva and Seville, as well as in Extremadura and Madrid, values three times normal were reached.

The summer trimester of June-August was very dry, with mean precipitation in Spain of about half the normal value and the month of August being the driest.

The autumn trimester (September-November) was dry on the whole, beginning with a very dry September with precipitation on average 46% below normal, followed by a somewhat less dry month of October, and ending with a wet month in November with precipitation 33% above the average.

December was all dry, but with rainfall very unevenly distributed both spatially and temporally. Values were three times greater than normal in an extensive area from Valencia to Almeria: however, on the contrary, rainfall was less than 75% of normal values in much of the peninsula and the Canary Islands.

Heavy rainfall episodes

Notable high rainfall values were recorded between 16-22 December in a large area of the southeast peninsula from Valencia to Almeria and the islands of Ibiza and Mallorca. In some points to the north of Mallorca more than 450 mm fell, with more than 350 mm recorded in the southeast of Valencia. In many stations, maximum monthly precipitation exceeded the maximum values of the series, both in terms of the monthly total for December and in terms of maximum daily precipitation in that month.

Other important episodes included: one in mid-February affecting mainly Galicia, regions of Cantabria and some elevated zones in the mountains; another occurring over 5-9 of May that affected much of Spain and registered over 120 mm of rain in parts of the west peninsula; and one from 24-28 November that affected to the southwest peninsula and parts of the Valencia and Murcia.

Values of daily maximum precipitation recorded in main observatories include:

- 12th February: 136 mm in Vigo-airport
- 27th November: 130 mm in Valencia

18th December: 112 mm in Alcantarilla (Murcia), 109 mm in Murcia and 103 mm in Palma de Mallorca-airport.

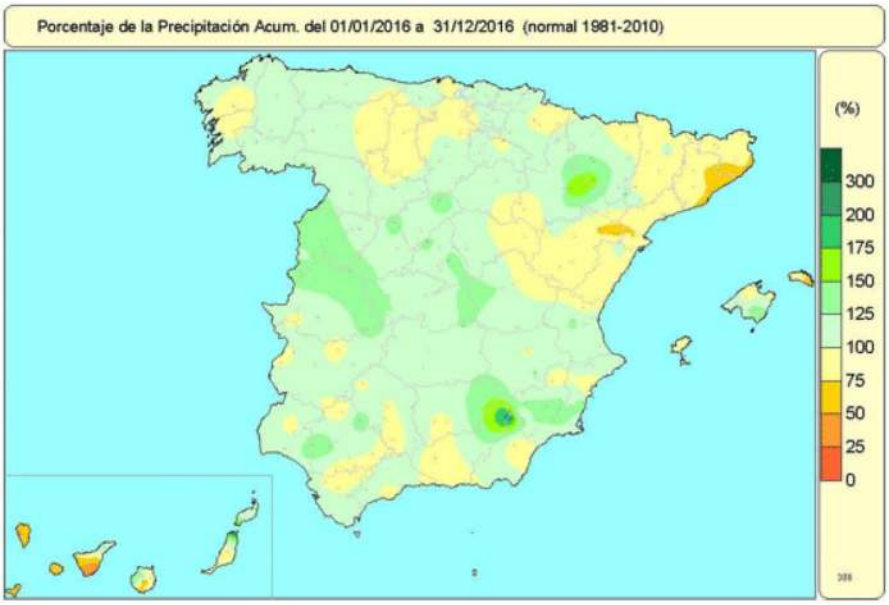


Figure 64. Accumulated rainfall in 2016 as a percentage of the 1981-2010 average.

Number of fires and affected surfaces

The provisional statistics for 2016 are compiled with the information sent by the autonomous communities on a weekly basis during the summer campaign and monthly for the rest of the year.

The total number of fires decreased by 32% compared with the average of the last decade, with a 25% reduction in the number of small fires (area ≤1 ha) and 47% in larger fires (area >1 ha) respectively. This year had the lowest number of fires in the last decade.

Table 25. Number of fires in 2016 compared with 10 year average.

	Average 2006-2015	*2016*
Number of fires <1ha	8662	6479
Number of fires ≥1ha	4464	2338
Total	**13126**	**8817**

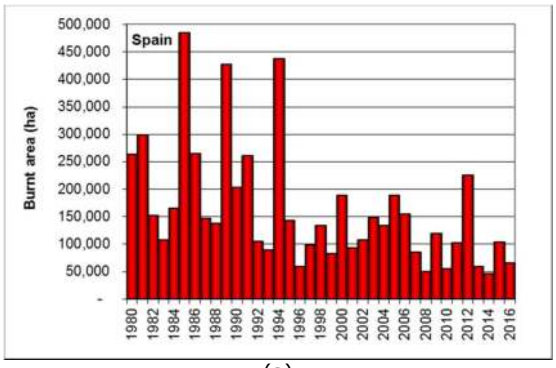
There is a decrease of 37% in the burnt wooded area and 34% in forest area compared to the average. The year 2016 occupies the fifth place of the decade in affected area.

Table 26. Burnt area in 2016 compared with the 10 year average.

	Average 2006-2015	*2016*
Burnt area other wooded land (ha)	32 102.6	23 173.92
Burnt area forest (ha)	100 957.54	65 816.69

The distribution of the total number of fires by geographical area is shown in Figure 66 below. It shows that Northwest region (Galicia, Asturias, Cantabria, Basque Country, León and Zamora) suffers the largest number of fires, with 44% of the annual total. It is followed by the Interior region (other non-coastal communities, except León and Zamora), with 33.68%, the Mediterranean area and finally the Canary Islands. Regarding burnt forest area the Northwest region represents 49.71% of the total, followed by the Inner region, the Mediterranean region and, with much lower values, the Canary Islands.

The yearly trends in terms of numbers of fires and burnt areas during the last 37 years in Spain are shown in Figure 65. As can be seen in Figure 65, the number of fires for the year 2016 is similar to those for the years 2014 and 2013, which are among the lowest in the decade.



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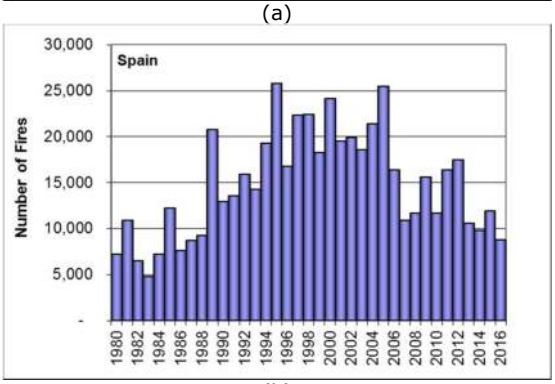

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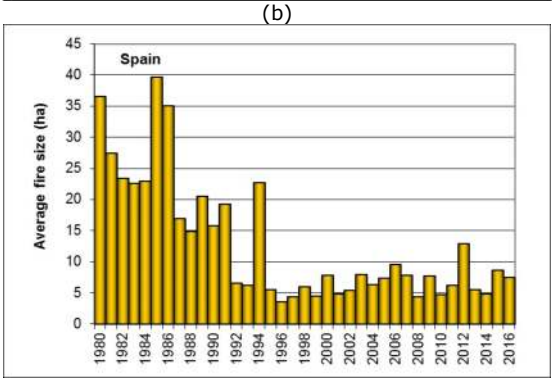
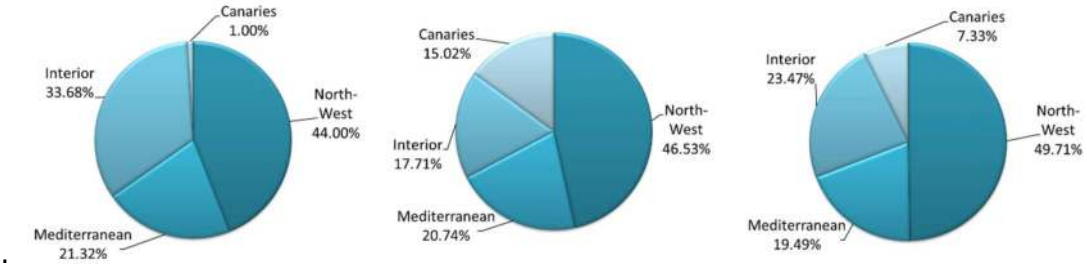


(c)

Figure 65. Burnt areas (a), number of fires (b) and average fire size (c) in Spain for the last 37 years.



(a) (b) (c)

Figure 66 (a) Number of fires; (b) burnt area of other wooded land (ha); (c) burnt area of forests (ha) in 2016 by geographic region.

Large fires

According to the provisional statistics compiled by the relevant departments in the Autonomous Regions, 22 large forest fires (GIF) took place in 2016, a category which includes fires in excess of 500 hectares affected. All the GIFs except one occurred during the summer. These 22 fires represent 49.43% of the burnt area and 0.24% of the total number of fires. The Interior region was the most affected by large fires, with 45% of the fires and 44% of the burnt area occurring there. Table 27 gives the location, date and burnt area of the large fires.

Table 27. Large fires in 2016.

Province	*Municipality of origin*	*Start date*	*Burnt area ha*
Valencia	Chella/Bolbaite	15/06	1535.7
Valencia	Carcaixent	16/06	2210.7
Albacete	Liétor	30/06	871.0
Cáceres	Cáceres	23/07	1394.5
Castellón	Artana	25/07	1534.5
Tenerife	El Paso (La Palma)	03/08	4793.6
A Coruña	Santiago de Compostela	10/08	825.2
A Coruña	Porto do Son (Caamaño)	10/08	730.0
A Coruña	Porto do Son (Xuño)	10/08	870.0
Pontevedra	Arbo	10/08	1992.1
Cáceres	Jerte	18/08	1053.7
Navarra	Tafalla/Pueyo	25/08	1455.0
Sevilla	Castillo de la Guardas	28/08	1224.9
Alicante	Poble Nou de Benitatxel	04/09	689.3
Ourense	Muiños	05/09	747.0
Ourense	Oímbra	06/09	1363.3
Ourense	Entrimo	06/09	2999.5
Ourense	Cualedro	12/09	1588.4
León	Fabero	12/09	2620.9
León	Encinedo	12/09	810.6
Salamanca	Olmedo de Camaces	24/09	656.4
Lleida	La Guingueta d'Aneu	03/11	567.7
Total burnt area			**32 534**

Prevention measures

Training in fire management

During 2016 the Ministry of Agriculture, Fisheries, Food and Environment (MAPAMA) carried out the following training courses:

- Forest Fires General Statistics (EGIFWeb) Implementation Course.
- Course on prescribed Fire with theoretical and practical sessions.
- Course on the Incident Command System ICS 200-300.
- Higher Course on Safety and Investigation of Accidents in Forest Fires.
- 2 courses on emotional intelligence and stress management in forest fire emergencies.

Integral Prevention Teams (*Equipos de Prevención Integral*: EPRIF)

In 2016 the EPRIFs were operational from January 18 until May 30 and resumed work from November 2 to December 23, completing a maximum of 6 months of work at the end of the year.

During this period, the EPRIFs worked mainly on training activities and meetings with various groups, including ranchers, farmers, hunters and local administrations, in order to reconcile interests and raise awareness of forest fire prevention.

Among the actions carried out during the first part of 2016 was the treatment of 1 065 hectares with 180 controlled burns. This helps to reduce the risk of forest fires by reducing forest fuel and creating discontinuities in the vegetation, while also achieving other objectives such as improving pastures, favouring the habitat of various species or improving accessibility in the forest. A total of 877 plots were prepared for burning, although the weather conditions did not allow all of the work to be completed.

For performing controlled burns, the EPRIFs located in Huesca, Tabuyo (León), Cangas del Narcea (Asturias), Pola de Lena (Asturias) and Gredos (Ávila) received occasional support from the MAPAMA Preventive Work Brigades with bases close to the area of action.

Preventive Work Brigades (*Brigadas de Labores Preventivas*)

The MAPAMA Preventive Work Brigades acted, in collaboration with the autonomous administrations, from the beginning of the year until the beginning of the summer campaign. Once the summer campaign was over, preventive work was resumed, which ended in the middle of December, extending the work period to about 11 months.

During these two work periods, they carried out fire prevention work on more than 1 577 hectares of forest land, which included thinning, pruning and shrub removal.

In total, more than 400 workers distributed in the 10 Preventive Work Brigades carried out preventive forestry work. The BLPs also work from time to time in support of EPRIFs in the execution of prescribed burnings.

Human resources: Reinforcement Brigades against Forest Fire (*Brigadas de Refuerzo contra Incendios Forestales*: BRIF)

MAPAMA deploys five BRIF-i during the winter-spring campaign in the north and west of the Peninsula, and ten BRIFs during the summer campaign distributed throughout the national territory.

In the summer campaign the BRIF are composed of three teams each comprising 2 supervisors and 14 specialists under the command of 1 technician. For transport and support for fire extinction they have two

helicopters with 1 200 litre of capacity. In the Port of Pico (Ávila) a BRIF-B type brigade is available, which is smaller in size and similar to the brigades of the BRIF-i winter campaign, consisting of 7 specialists, 1 foreman and 1 technical staff equipped with a single 1 200 litre capacity helicopter.

Figure 67. BRIF Puerto el Pico carrying out direct attack on the fire in Navalosa (Ávila), June 30, 2016.

These highly specialized helicopter transport personnel units can operate anywhere in the country where needed. BRIF personnel receive continuous education and training that allows them to act in the most demanding situations and the most complicated fires. The mastery of all techniques of extinction, including backburning, is essential in its performance.

In the 2016 campaign, the BRIF worked for 1 877 hours in 293 fire interventions and extinguished a total front length of 225 645 metres. The BRIF with the highest activity during this campaign was that of Laza (Ourense) with a total 56 interventions combining the summer and winter campaigns.

Aerial means

The MAPAMA has an aerial means deployment managed from the Forest Fire Spanish Service, which covers the national forest area throughout the year. During the two periods of greatest occurrence of forest fires, winter and summer campaigns, the number of available means is strengthened.

Aerial means 2016			
	CCAA	MAGRAMA	TOTAL
Large capacity amphibious aircraft	0	18	18
Medium capacity amphibious aircraft	5	6	11
Cargo Aircraft	25	10	35
Transport and extinction helicopters	114	19	133
Large capacity helicopters	5	8	13
Medium capacity helicopters	22	0	22
Coordination aircraft	20	2	22
BK-117 Helicopters	0	4	4
Multipurpose Helicopters	0	0	0
TOTAL	**191**	**67**	**258**

During 2016, the MAPAMA air forces carried out a total of 1 569 interventions in forest fire suppression, in support of the means of the respective autonomous communities. In total they flew for 4 642 hours, making 21 667 discharges.

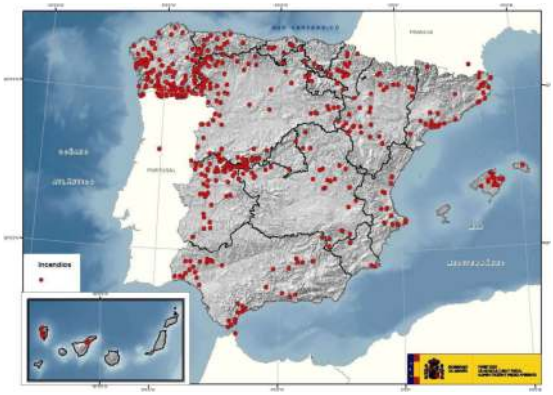


Figure 68. Location of air intervention actions made in 2016.

(Source: Ministry of Agriculture and Fisheries, Food and Environment; Forest Fire Spanish Service, Spain).

Figure 69. BRIF Laza working with helicopter support on the fire of Monterrei (Orense), July 19, 2016.
Photo credits: MAPAMA

1.2.24 Sweden

Fire danger in the 2016 fire season

The grass fire risk period started a little late in middle of March. The forest fire risk was low in general but in two periods in the beginning of the summer the risk level was high, and in those periods some of the largest forest fires of this season occurred. At the end of the summer there was rather high humidity and very small amounts of rainfall. The fire season of 2016 had more fires than the mean of the last 10 years. Most of the fires 2016 took place rather early, in May and June.

Fire occurrence and affected surfaces

During 2016 the number of fires recorded was 5 454, burning 715 ha of forest land, 247 ha of other wooded land and 326 ha of other land.

The monthly pattern of fire numbers and burnt areas in 2016 are shown below in Figure 70.

The burnt area, number of fires and average fire size for the years 1998-2014 are shown in Figure 72.

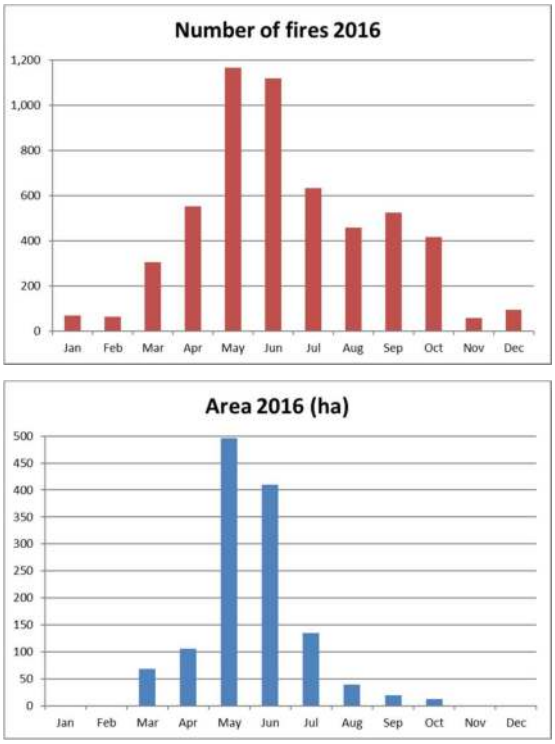


Figure 70. Total number of fires and burnt area (ha) by month in 2016.

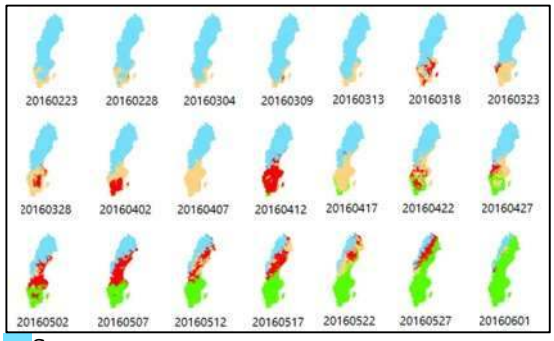


Figure 71. Maps of grass fire risk season 2016 shows rather short period of high risk.

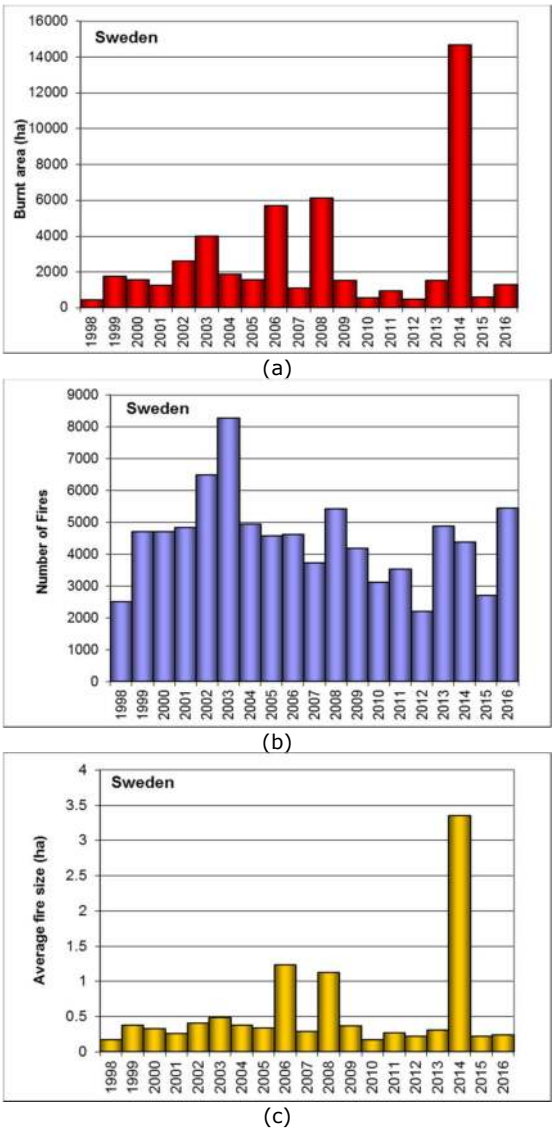


Figure 72. Burnt areas (a), number of fires (b) and average fire size (c) in Sweden from 1998 to 2016.

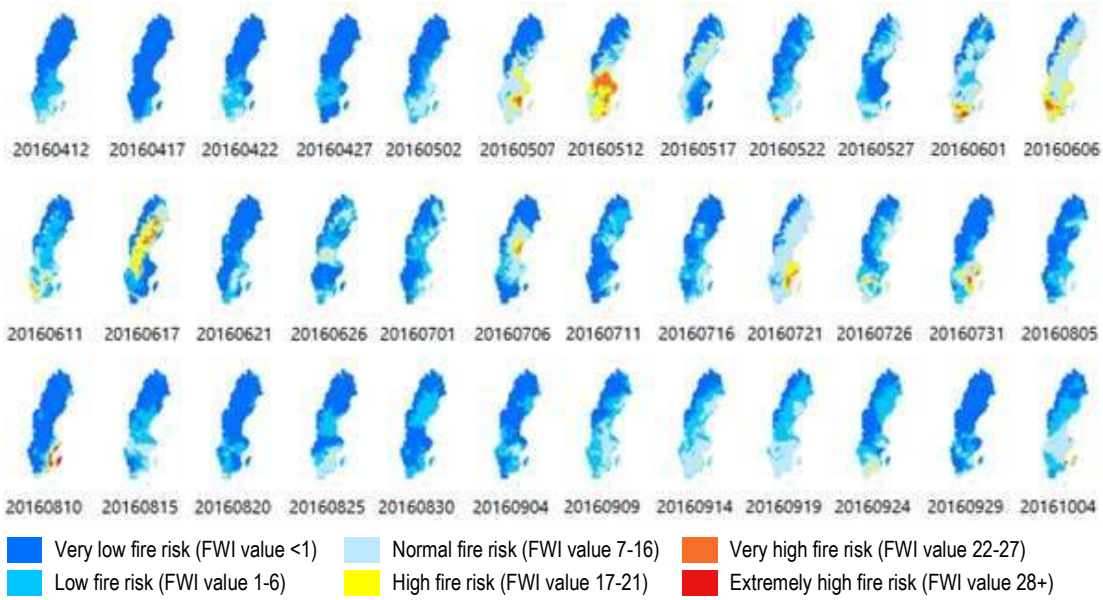


Figure 73. Maps of Forest fire risk shows the low fire risk season 2016 from the FWI-index (Swedish normalised index).

Above: Image from fire 10th of May 2016 caused by sparks from train brakes, burned area 35 ha.

Left: Image from fire 9th of May 2016 in south east Sweden, burned area 30 ha.

(*Photo credits: Leif Sandahl*)

(Source: Swedish Civil Contingencies Agency (MSB); Risk & Vulnerability Reduction Department, Natural Hazards & Critical Infrastructure Section, Sweden).

1.2.25 Switzerland

Weather conditions and state of the forests 2016

After a record breaking warm year 2015, 2016 was overall 0.7°C warmer than the mean temperatures (average 1981-2010) and has been one of the ten warmest years since the introduction of instrumental meteorological measurements in 1864 in Switzerland. Average precipitation was under the 1981-2010 average in most parts of the country.

Winter 2015/2016 was warm and sunny compared to the 1981-2010 average, and is probably the third or second warmest winter since instrumental measurements began. Snowfall was registered only from mid-January onwards in northern Alpine areas. Snowless winters imply high fire danger in Spring until the "greening phase" starts, especially at lower elevations and on southern exposed slopes. Snowfall occurred only in February in southern Switzerland.

At the beginning of March, the first significant snowfall - even at low elevation - occurred first in the South and then on the northern slopes of the Alps by mid-March.

From the end of the March through the last week of April, Switzerland experienced summer temperatures. As a consequence, vegetation started developing quickly. The last week of April, winter conditions with snow and significant frost spells occurred, damaging the developing vegetation. At the beginning of May, a strong Föhn-wind spell (dry southerly winds) lasted over 5 days on the northern Alpine slopes rising the temperatures again. The fuel available on forest grounds dried out rapidly. Alternating cool and wet, and mild and sunny conditions characterized the rest of May.

June was overall rainy and floods occurred in parts of the country after strong thunderstorms. In contrast, very high temperatures rising over 30°C for ten days characterized the beginning of July. Then, cool and wet air arrived leading to heavy precipitation and floods again in some regions.

The first half of August was rather cool and wet. High pressure systems characterised the second half of August and temperatures rose to over 30-33°C according to the regions. Such temperatures are very high for Swiss conditions. The hot episodes in July and August led to a rapid evapotranspiration and drying out of upper litter and humus layers on forest grounds, rising the fire risk locally, especially on south and wind exposed slopes.

The hot Summer conditions at the end of August continued throughout September with the exception of a rainy spell mid-September. This period was also very dry and led to tree mortality in some regions. September 2016 was the third warmest since the beginning of measurements. October was rather cool, with the exception of a strong Föhn event, and marked with snowfall down to 1000 masl. The first two weeks of November brought a lot of snow, especially in the Alps. On November 20th a 4 day long Föhn spell increased the temperatures that rose up to 20°C, leading to the melting of the snow in northern alpine areas. In the South, heavy precipitation occurred meanwhile.

December 2016 was the driest since the beginning of measurements in any region of the country. In some areas, it did not rain/snow at all and there was a lack of snow. The high pressure system led to fog situation at low elevations, where temperatures were freezing. As a consequence, at higher elevation, the forest soils were exposed to sunshine and dried out quickly, leading to high to very fire danger situations, over 1000masl and everywhere in the South.

Fire occurrence and affected surfaces

For 2016, fires from the Cantons of Jura, Grisons, Sankt-Gallen, Ticino, Uri and Valais were recorded in the database. A total of 63 forest fires were registered in 2016 (as reported by May 2017), burning 463 hectares, which corresponds to low occurrences in term of frequency, and average loss of forest surfaces compared to the yearly average since 1980. Average fire size was 7.35 ha.

44% of the fires happened during the winter season (November to April), when 98% of the burned surface occurred (Figure 74).

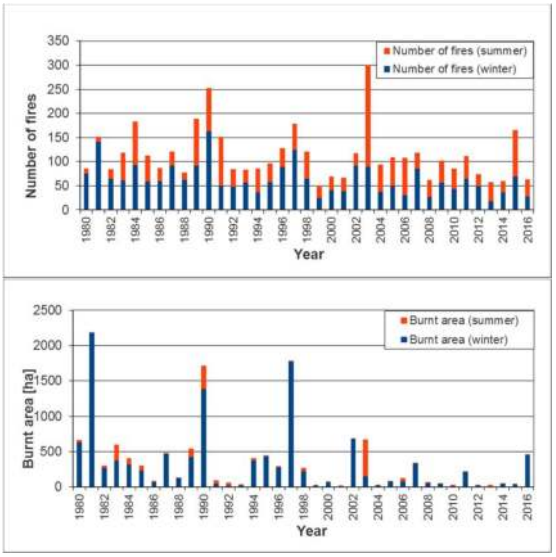
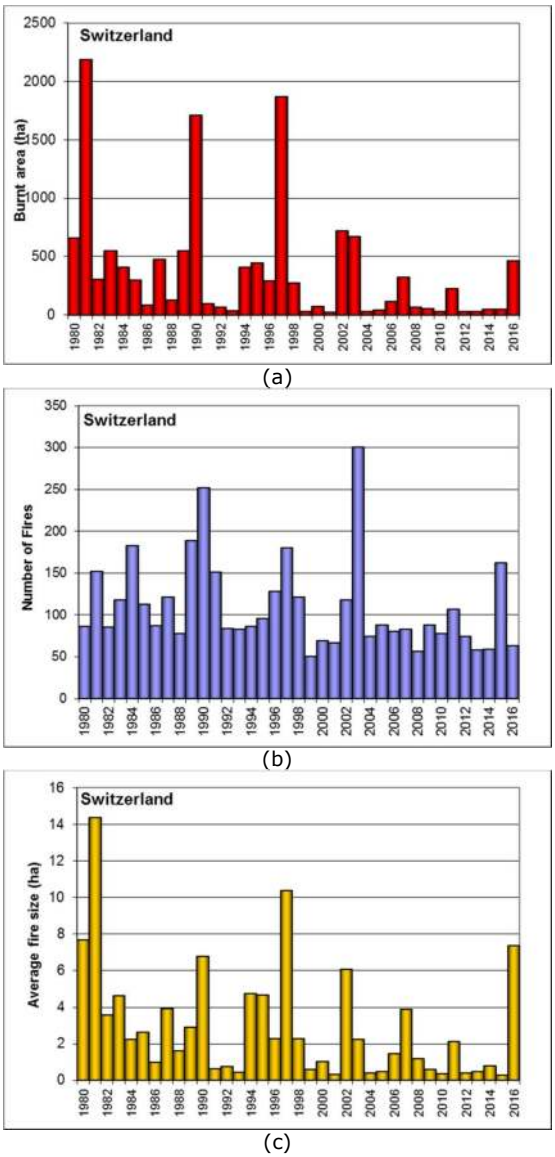


Figure 74. Summer versus winter fires in 2016.

The yearly trends in terms of number of fires and burnt area during the last 35 years in Switzerland are shown in Figure 75.



(a)

(b)

(c)

Figure 75. Burnt areas (a), number of fires (b) and average fire size (c) in Switzerland from 1980-2016.

Fire prevention activities

Prevention and information are in the focus of the federal forest fire prevention strategy in Switzerland. It is built on the close collaboration of the Cantons with the Confederation (Federal state). In accordance with the alternating weather conditions, 2016 was a special year for fire prevention. After a dry beginning, Switzerland did not experience as it should, a danger or fire peak by the end of Winter and the beginning of Spring. The critical situation at the end of the year can be related to recurrent dry condition building up as from August 2016.

Because of the mild and dry Winter conditions, absolute fire bans were decreed in the south of Switzerland (Ticino) at the beginning of January and lasting for two weeks. In the East of Switzerland, authorities issued a warning that care should be taken when lighting fires in the forest and in the proximity of the forest/in the open for the same period of time. No significant prevention measures were implemented to the month of August 2016.

The heatwave from mid-August 2016 onwards implied that local authorities rapidly implemented protective measures for forests. Authorities issued warnings that care should be taken when lighting fires in the forest and in the proximity of the forest/in the open all over the national territory with the exception of North and North-eastern Switzerland. At the beginning of September the first fire bans were implemented in western Switzerland (Vaud) and in the South and South-east as from the second week of September and lifted by mid-October, when fire danger dropped temporarily.

As from the beginning of December, the fire danger increased especially at higher elevation. The presence of fog at Midland-elevation luckily avoided direct solar irradiance on forest grounds and led to some humidity. As a consequence, most Cantons with forests over 1000 m.a.s.l. issued warnings that care should be taken when lighting fires in those forests and in their proximity. The first fire bans were decreed after two severe fires for Swiss conditions broke out in Ticino and Grisons. By then, the conditions had degraded rapidly due to stronger northern winds than had been expected, which was unusual so early in the winter season.

Information about fire danger and forest fires around the World and in Switzerland has been permanently present in the media again in 2016, raising awareness within the population. The national website www.forest-fire-danger.ch has again registered a high number of visits, indicating the need for such platforms for the population and the media.

Fire Causes

The main cause of fire in Switzerland remains negligence. No loss of life or major damages to buildings were reported in 2016.

(Sources: Federal Office for the Environment, MeteoSwiss, Swiss *Federal Research Institute WSL).*

1.2.26 Turkey

Fire occurrence and affected surfaces

According to data derived from the General Directorate of Forestry, Department of Forest Fire Combating, in 2016 the total burnt area was 9 156 hectares. The number of fires was 3 188 in the same year.

In Turkey, the coast line, which starts from Hatay and extends through the Mediterranean and Agean up to Istanbul, has the highest fire risk. In another words, approximately 57% (12.5 million ha) of Turkey's forest area is located in fire sensitive areas.

Forest fires mostly occur during the period of May-November, particularly in June, July and August. When we look at the number of forest fires, we see that July ranks the highest with 653 fires damaging 1 777 ha of forest. (See Table 29). 78% of the forest fires occurred during the fire season (between May and November) burning 8 338 hectares of forest.

Table 28 gives the forest fires statistics for Turkey 1990-2016. The yearly trends in terms of numbers of fires and burnt areas in Turkey since 1990 are shown in Figure 76.

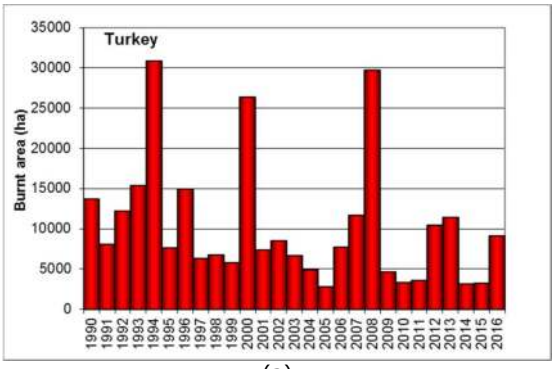
Table 28. Forest fires in Turkey 1990-2016.

Year	Fire Number	Burnt Area (ha)
1990	1750	13742
1991	1481	8081
1992	2117	12232
1993	2545	15393
1994	3239	30828
1995	1770	7676
1996	1645	14922
1997	1339	6317
1998	1932	6764
1999	2075	5804
2000	2353	26353
2001	2631	7394
2002	1471	8514
2003	2177	6644
2004	1762	4876
2005	1530	2821
2006	2227	7762
2007	2829	11664
2008	2135	29749
2009	1793	4679
2010	1861	3317
2011	1954	3612
2012	2450	10455
2013	3755	11456
2014	2149	3117
2015	2150	3219
2016	**3188**	**9156**

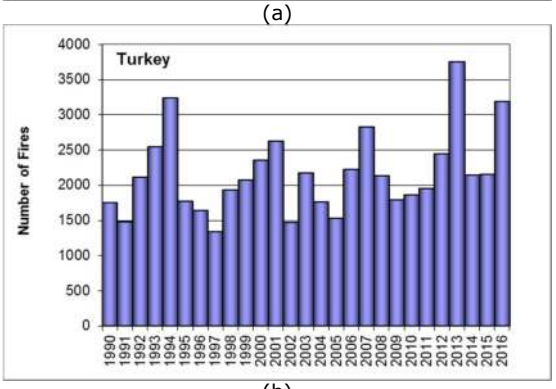
Fortunately, around 79.7% of the fire incidents were controlled before spreading. There were only two fires bigger than 500 hectares (totalling 1 837 ha) and there were six fires exceeding 200 hectares (totalling 1 845 hectares) as shown in Table 30.

Table 29. Monthly distribution of forest fires in Turkey 2016.

Month	Number Of Fires	Burnt Area (Ha)
Jan	49	49
Feb	60	56
Mar	79	193
Apr	212	486
May	105	77
Jun	297	2790
Jul	653	1777
Aug	604	2119
Sep	474	471
Oct	264	314
Nov	336	790
Dec	55	34
TOTAL	**3188**	**9156**



(a)



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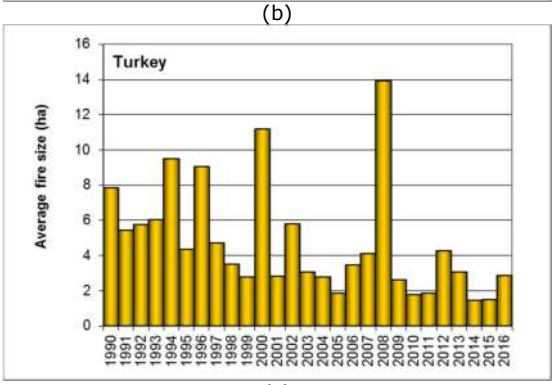


(c)

Figure 76. Burnt areas (a), number of fires (b) and average fire size (c) in Turkey from 1990 to 2016.

Table 30. Number of fires and burnt area in 2016 by forestry regions and fire size class.

Region	<1.0 Ha		1.1 - 5.0 Ha		5.1 - 20.0 Ha		20.1 - 50.0 Ha		50.1 - 200.0 Ha		200.1 - 500.0 Ha		> 500. Ha		TOTAL	
	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area
ADANA	166	33.8	10	21.4	5	43.2	2	78.8							183	177
AMASYA	80	41.2	33	79.4	6	65.2		0.0	2	203.7					121	390
ANKARA	105	34.8	15	35.6	3	19.2	1	25.0			1	299.3			125	414
ANTALYA	246	54.7	24	59.2	4	57.8	5	150.2					2	1837.3	281	2159
ARTVİN															0	0
BALIKESİR	49	12.6	13	28.5	3	32.0	5	132.6	2	163.3	1	231.9			73	601
BOLU	33	5.8	10	18.1	1	6.0									44	30
BURSA	51	16.9	20	50.9	7	71.7									78	139
ÇANAKKALE	41	18.1	15	36.9	5	55.0	1	45.2			1	350.0			63	505
DENİZLİ	67	23.7	11	23.3	6	69.6									84	117
ELAZIĞ	75	33.6	5	7.7											80	41
ERZURUM	2	0.6	5	13.0	1	15.5	1	40.0							9	69
ESKİŞEHİR	38	11.0	15	32.5	1	11.0			1	171.0					55	225
GİRESUN	22	10.5	13	34.3	3	25.2									38	70
ISPARTA	49	10.4	3	4.8	2	16.7									54	32
İSTANBUL	242	34.0	9	18.8	2	14.2	1	25.3							254	92
İZMİR	331	65.8	34	86.7	6	45.3	4	109.7			2	733.1			377	1041
K.MARAŞ	198	63.9	23	67.4	8	90.0	3	94.0							232	315
KASTAMONU	72	18.9	10	22.5											82	41
KAYSERİ	32	19.6	33	89.9	8	58.0	1	46.4							74	214
KONYA	34	15.0	10	21.4	2	23.4	1	25.0							47	85
KÜTAHYA	61	13.1	3	6.3	3	34.6					1	231.0			68	285
MERSİN	89	20.7	13	34.1	2	24.7	3	118.8							107	198
MUĞLA	328	60.1	32	76.6	7	83.1	5	199.2	1	62.0					373	481
SAKARYA	52	14.8	8	21.7	1	9.4									61	46
Ş.URFA	26	15.5	60	185.9	53	557.8	7	255.8	4	286.7					150	1302
TRABZON	12	8.4	12	27.2	3	24.1									27	60
ZONGULDAK	40	10.0	8	17.4											48	27
TOTAL	**2541**	**667**	**447**	**1121**	**142**	**1453**	**40**	**1346**	**10**	**887**	**6**	**1845**	**2**	**1837**	**3188**	**9156**
%	79.7	7.3	14.0	12.2	4.5	15.9	1.3	14.7	0.3	9.7	0.2	20.2	0.1	20.1		

Fire Causes

In Turkey, 78% of forest fires take place in forested areas up to 400 metre altitude.

These areas are:

- High populated areas
- Areas of high migration
- Areas where there are valuable lands
- Places with cadastral problems
- Tourism areas

Most of the fires in Turkey were caused by human activities (90% in total) The causes of forest fires in 2016 are shown in Figure 77.

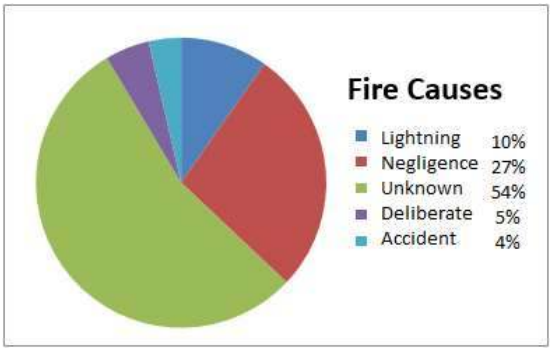


Figure 77. Main causes of forest fires in 2016.

Figure 78. Fire pool.

Firefighting means and information campaigns

Fire Management

Fire management in Turkey is carried out under responsibility of the General Directorate of Forestry (GDF). Duties are carried out by state forest enterprises functioning under regional directorates. Regardless of the high costs involved, all required activities are planned and implemented immediately. Fire management deals mainly with activities concerning early detection, prevention and control.

Early Fire Warning Systems

- So far, a total of 776 fire towers have been built to detect fire and report to firefighting teams. With 230 cameras at 115 points, the fires detected in our forests in the fire sensitive zone are reported to the fire management centres and the teams are sent.
- The system enables rapid detection of forest fire to visible range optical cameras (Fire management centres can also monitor the progress through these cameras).

Construction of Pools and Ponds

During 2016, for the purpose of shortening the periods of forest fire attack in forested areas where water sources are scarce, 3 041 fire pools and ponds were constructed and will continue to be constructed (Figure 78).

Firefighting Means

In addition to forest fires, the General Directorate of Forest has been intervening in agriculture fires for recent years, which is about 3 935 non-forest incidents in 2016.

In 2016, 3 000 technical staff, 5 000 forest preservation officers and 12 000 workers were involved in detection, communication and suppression efforts. Ground and air equipment used for firefighting in 2016 are presented in Table 9.

Table 31. Firefighting forces in Turkey in 2016.

Land Means		***Aerial Means***	
Bulldozer	186	Leased Helicopter	24
Grader	179	Amphibious Aircraft	5
Fire Truck	1010	Administrative helicopter	6
Water Tank	281		
First intervention vehicle	559		
Motorcyle	856		

Preventive measures

Fire sensitive Regional Forest Directorates

- Planting fire resistant species when rehabilitating burnt areas.
- Converting existing forest to fire resistant forest. (YARDOP Project: Rehabilitation of Burned Areas and the Establishment of Forest with Fire Resistant Species Projects).
- Creating differential elements (roads etc.) in order to stop probable fires from settlements and agriculture lands going towards forest.

Planting fire-resistant species along roadsides in order to hinder forest fires from turning into crown fire.

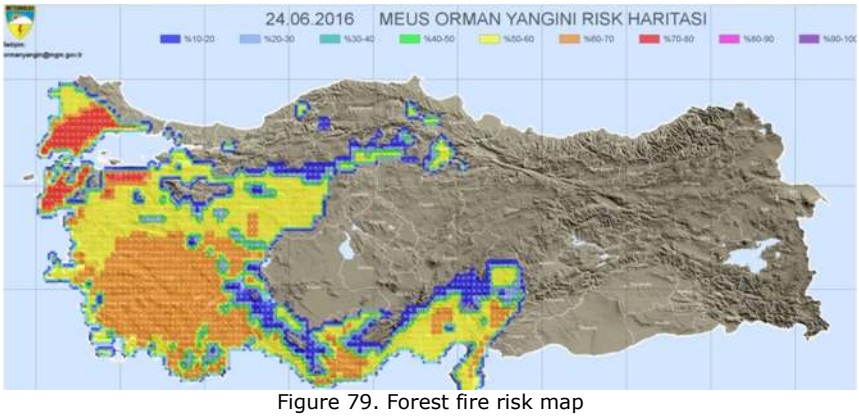


Figure 79. Forest fire risk map

Creation of fire risk map.

Weather factors such as wind, temperature, relative humidity are taken from meteorology to create fire risk maps. (Figure 79).

With the aid of fire risk maps, risk points and areas are determined and their coordinates submitted to mobile teams. Thus, in addition to monitoring the forest, teams are mobilized towards fire risk areas and points.

Education, Public awareness and information campaigns.

Several education/training and awareness raising campaigns have been carried out.

Training of Technical staff.

A Fire Expert Training Program has been put into effect for personnel who will take charge in forest fires. Subjects such as fire-fighting methods, application of fire-use, first aid etc., have been given to technical staff in this training program.

In 2012 the International Forest Fire Fighting School was opened in Antalya. The facilities provided training to forest fighting teams at national and international level.

Training of Technicians

Information has been given to technicians about the use and maintenance of tools used to combat forest fires, such as GPS, meteorological equipment, electronic hand tools and communication devices.

Training of Workers

Training has been given to Forest Fire Workers about fire-fighting methods, first-aid and other technical subjects.

Public awareness and information campaigns

Public awareness and information campaigns can be aggregated into 2 groups:

a) Awareness-raising activities for target groups.

- Activities for children and young people:

During 2016, conferences were held, plays were staged by Sincap Children's Theatre, and brochures, books and magazines on forest were distributed to schools and other places to raise awareness about environmental, social and economic issues, fire causes and how they can be avoided.

- Activities for forest villagers, hunters and shepherds:

In our country, there are 17 000 villages located beside or inside forest areas and 7 million people living in these areas. Forest villagers are causing forest fires by going about their agricultural activities. So, messages have been transmitted to them about the importance of human action in preventing fires.

b) Awareness-raising activities at national level.

- Activities for specific days and weeks. (World Forestry Day);
- Coordination meetings with local authorities;
- Cooperation with radio and television channels;
- Cooperation with media and voluntary organizations;
- Training of personnel working in travel agencies and tourist facilities in fire risk areas about forest fires and the preventative measures needed to be taken;
- Training of soldiers and local fire departments.

Operations of mutual assistance

In 2016 response to requests for assistance, Turkey sent three amphibious aircraft for forest fires in other countries.

(Source: Regional Forestry Directorate of Antalya, Turkey).

1.2.27 United Kingdom

Introduction

During 2016, the UK Government published its intention to merge responsibilities for managing the police and fire and rescue services in England. As a consequence, responsibility for the Fire and Rescue Service (FRS) has been transferred from the Department for Communities and Local Government (DCLG) to the Home Office. At present, this has resulted in an inability to gain and analyse wildfire statistics from Incident Recording System data for Great Britain, gathered at the time of firefighting by FRS staff. The UK report for 2016 is therefore based on qualitative information submitted by representatives from all four devolved UK countries.

In recent times, the UK has experienced periodic severe wildfire seasons which have tended to coincide with extended periods of warm and dry weather, and have sometimes been accompanied by high winds. Wildfires are often most prevalent in spring when there are dry fine fuels from dead vegetation after winter freezing and drying, and during hot summers. Increased rainfall before warm, dry periods can also cause rapid vegetation growth that can increase the risk of wildfires when the vegetation later dries. These conditions provide the ideal environment for the development and spread of large and destructive wildfires.

Fire danger in the 2016 season

Following on from a wet and notably mild winter, temperature and rainfall in spring 2016 were very close to the seasonal average. Mid-March brought two weeks of fine settled weather. A rather cool April, with some late snowfalls and frosts in some northern and eastern areas, was offset by a rather warm May. March was wet in the south and east, whereas May was rather dry for most areas. Summer 2016 began with a very cloudy and wet June over most of England and Wales. July and the first half of August were characterized by a changeable westerly Atlantic flow with a succession of fronts crossing the UK, although rainfall amounts were often small in the south. There was a short but marked heat-wave in the third week of July. The second half of August was more settled, and hot at times, particularly in East Anglia and the south-east.

As a consequence of the 2016 weather conditions, there were few wildfire events and very few categorised as major incidents compared to 2015. However, wildfires were recorded from most parts of the UK, and most started in natural or semi-natural vegetation rather than woodland or forest. Some trees were affected in a few places when the fire spread into woodland or forest but no significant losses were reported.

Fire prevention activities and information campaigns

Arson is considered to be responsible for a large majority of wildfires in the UK. In 2016, there were significant clusters of wildfires in specific locations, including the Falkirk and Boness areas in Scotland where 264 deliberate secondary fires were set in the region, and across Wales, notably on 20th April, the hottest day of the year to date. Following a very large number of arson-induced wildfires in Wales in 2015, the Wales Strategic Arson Reduction Board developed a new strategy that broadened the responsibility for arson reduction activity in Wales to a range of multi-agency partners. These include the Fire and Rescue Services, Police, Local Authorities, Natural Resources Wales, the Welsh Government and other partners.

The ‘Dawns Glaw’ initiative was launched during the year. It included media campaign messages, focus on farmers/landowners, and joint action to reduce the incidence of grass/wildfires (including forest fires). Engaging with young people through educational initiatives and youth programmes, together with highly visual patrols, was a central part of the programme. Close liaison between partners was facilitated through weekly multi-agency conference calls and intervention programs.

The Dawns Glaw initiative proved very successful with a 47% reduction in deliberately set grass fires reported in 2016 compared to 2015 (January - May). Most notably, there was a 75% reduction in April 2016 compared to April 2015.

During 2016, new guidance specifically on wildfires has been developed for Fire and Rescue Services operating throughout the whole of the UK. This guidance, developed under the auspices of the National Operational Guidance Programme (NOGP) provides a framework and details actions required when dealing with wildfire outbreaks. It is not designed to cover issues of risk reduction though it recognises the importance of developing wildfire risk management plans in consultation with relevant stakeholders.

The guidance is publicly available online at: https://fireandrescue-public.sharepoint.com/Pages/Guidance-Catalogue.aspx?guidanceid=165 .

Specific guidance for land owners and managers is being drafted to guide them when assessing the level of wildfire risk on their land. Once published, this guidance will be provided to Countryside Stewardship Scheme applicants. Countryside Stewardship is a Rural Development Programme for England (RDPE) grant scheme supported by EU funding. It will contribute around £900 million over six years to help farmers and woodland managers look after the environment.

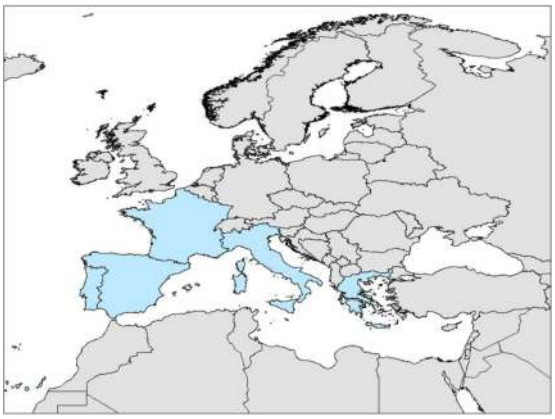
In addition, a wildfire scenario document has been created as part of the NOGP. This is a national template for a Standard Operating Procedure for UK Fire and Rescue Services for wildfires.

This is available at: https://fireandrescue-public.sharepoint.com/Pages/Scenario-Catalogue.aspx?scenario=236 .

A Wildfire Training Specification for UK Fire and Rescue Services is also being developed for the NOGP and will be published in 2017.

(Source: Forest Research, UK).

1.3 Comparison of Southern EU countries with longer time series (1980-2016)



The long time series of forest fire data available for these 5 large southern countries (Portugal, Spain, France, Italy, and Greece) justifies a separate analysis as has been the case in previous reports.

Figure 80a shows the total burnt area per year in the five large Southern Member States since 1980. The statistics vary considerably from one year to the next, which clearly indicates how much the burnt area depends on seasonal meteorological conditions.

The total burnt area in 2016 was 316 866 ha (Figure 80a), higher than the past three years although well below the peaks seen in the early 2000s. Much of this increase came from Portugal, whose burnt area total was nearly 100 000 ha more than the previous year. Spain had a better season than in 2015, France and Italy were broadly comparable, and Greece was worse (but from a very low 2015 total).

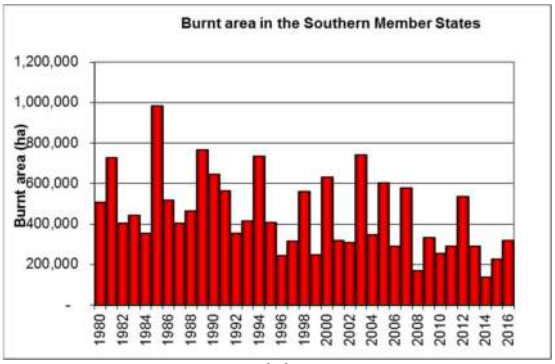
Figure 80b shows the yearly number of fires in the five southern Member States since 1980.

After the increasing trend during the 1990s, which was also partly due to the improvement in recording procedures, the number of fires was stable for around one decade, and in the last decade a decrease was observed. In 2016 the total number of fires was 31 751, below long term averages and slightly better than the previous year 2015 (see Table 32 and Annex 1 for details).

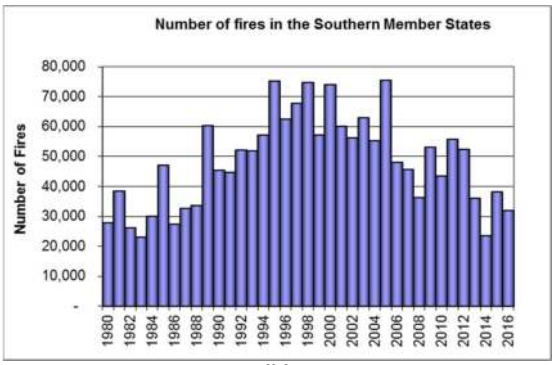
Figure 80c shows the yearly average fire size in the 5 countries since 1980. There is a clear difference in average fire size before and after 1990.

This is a similar trend to that observed in the number of fires and is also partly due to the same reasons (the additional fires that are recorded thanks to the improvements in the statistical systems are the smallest ones). However, it is also largely due to the improvements of the fire protection services of the countries.

In 2016 the average fire size was somewhat higher than the last 3 years and slightly above the average of the last 2 decades, largely as a result of the large fires in Portugal.



(a)



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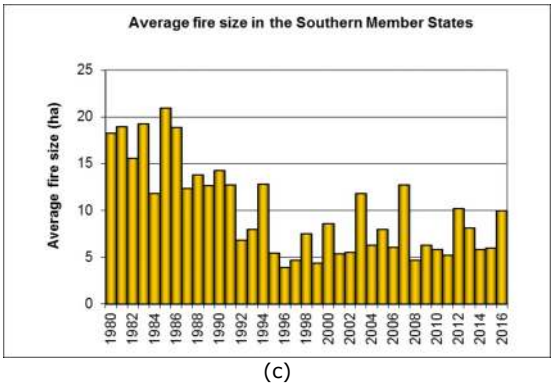


(c)

Figure 80. Burnt area (a) number of fires (b) and average fire size (c) in the five Southern Member States for the last 37 years.

Figure 81 compares the yearly averages of burnt areas, number of fires and average fire size for the periods 1980-89; 1990-1999, 2000-9 and 2010-2014 with the figures for 2014. It shows each of the 5 countries separately and also their total.

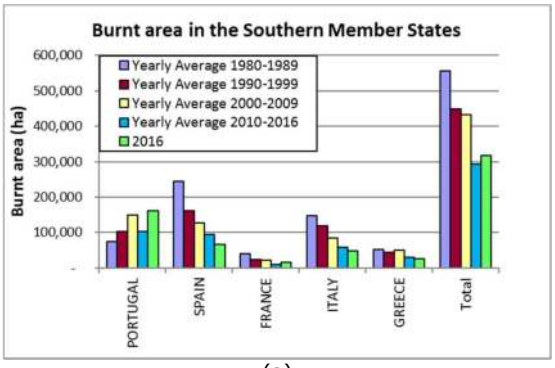
Table 32 gives a summary of the burnt areas and number of fires for the last 35 years, the average for the 1980s, the 1990s and the 2000s, and the average for the last 6 years, together with the figures for 2016 alone.

The total number of fires was lower than the averages for all previous decades. However, the burnt area in 2016 was slightly above the average of the last decade, although still well below the average of the previous decades. This is mostly as a result of the fire season in Portugal, which was relatively worse than that experienced by the other four countries (Figure 81b). This also had an effect on the average fire size, which is slightly higher than in the last few decades.

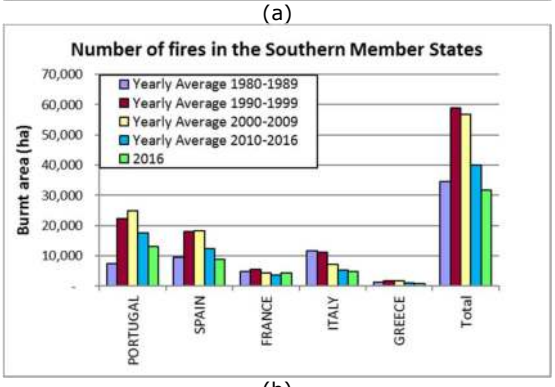
Figure 82 shows the contribution of each of the five Member States in terms of burnt areas and number of fires to the overall figures for all five countries in 2016.

Since the area of each country is different, and the area at risk within each country is also different, the comparisons among countries cannot be absolute. It should also be borne in mind that since 2009 the figures for numbers of fires in Greece are incomplete and are therefore an under-representation of the true figure, which also affects the figures for average fire size and leads to an inflated figure for average fire size in Greece.

In 2016 the relative proportions of the numbers of fires in the 5 countries was very similar to 2015, but this year Portugal had a much greater share of the burnt area: half the total (compared with 28% in 2015).



(a)



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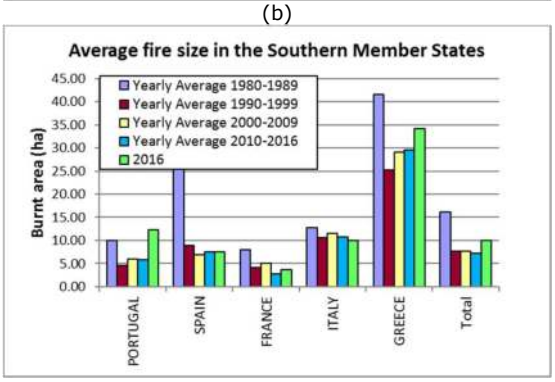
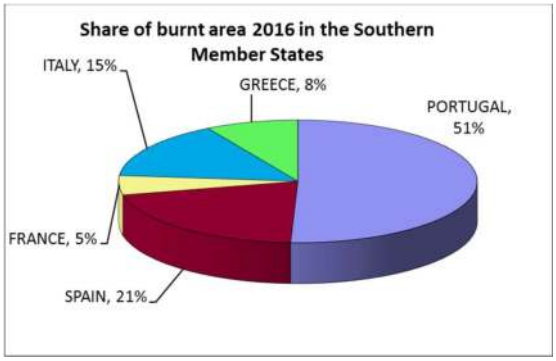
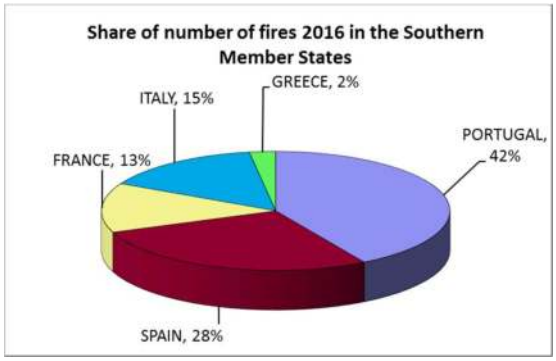


(c)

Figure 81. Burnt areas (a), number of fires (b) and average fire size (c) in the five Southern Member States in the year 2016 as compared with average values for previous decades.



(a)



(b)

Figure 82. Share of the total burnt area (a) and the total number of fires (b) in each of the Southern Member States for 2016.

Table 32. Number of fires and burnt area in the five Southern Member States in the last 36 years.

Number of fires	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE(*)	TOTAL
2016	**13 261**	**8 817**	**4 285**	**4 793**	**777**	**31 751**
% of total in 2016	42%	28%	13%	15%	2%	100%
Average 1980-1989	7 381	9 515	4 910	11 575	1 264	34 645
Average 1990-1999	22 250	18 152	5 538	11 164	1 748	58 851
Average 2000-2009	24 949	18 369	4 418	7 259	1 695	56 690
Average 2010-2016	17 699	12 397	3 686	5 392	989	40 164
Average 1980-2016	18 100	14 787	4 715	9 128	1 459	48 189
TOTAL (1980-2016)	669 698	547 135	174 462	337 722	53 983	1 783 000

Burnt areas (ha)	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
2016	**161 522**	**65 817**	**16 093**	**47 926**	**26 540**	**316 866**
% of total in 2016	51%	21%	5%	18%	8%	100%
Average 1980-1989	73 484	244 788	39 157	147 150	52 417	556 995
Average 1990-1999	102 203	161 319	22 735	118 573	44 108	448 938
Average 2000-2009	150 101	127 229	22 362	83 878	49 238	432 809
Average 2010-2016	102 255	93 968	9 968	57 713	29 170	293 074
Average 1980-2016	107 396	161 923	24 657	105 405	44 914	444 295
TOTAL (1980-2016)	3 973 670	5 991 140	912 309	3 899 998	1 661 816	16 438 933

(*) *Numbers of fires are provisional.*

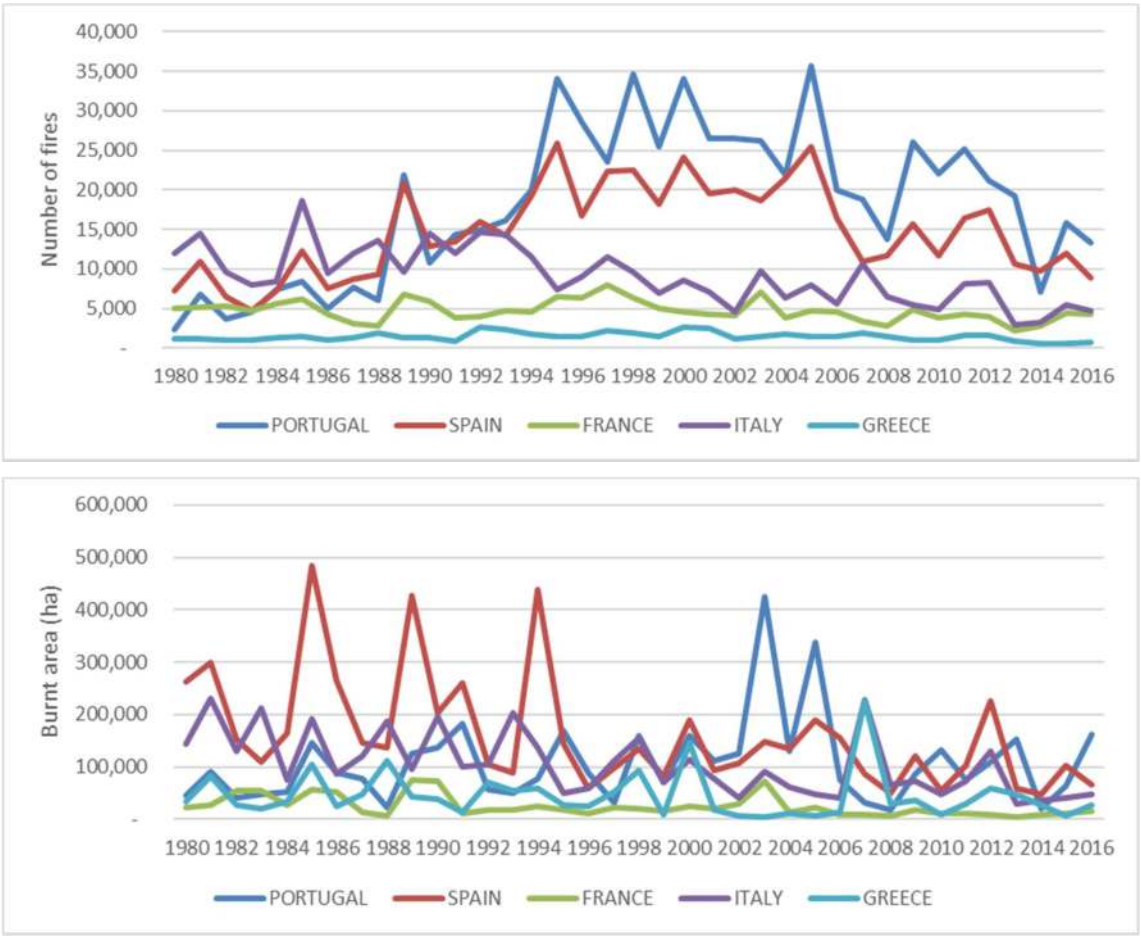
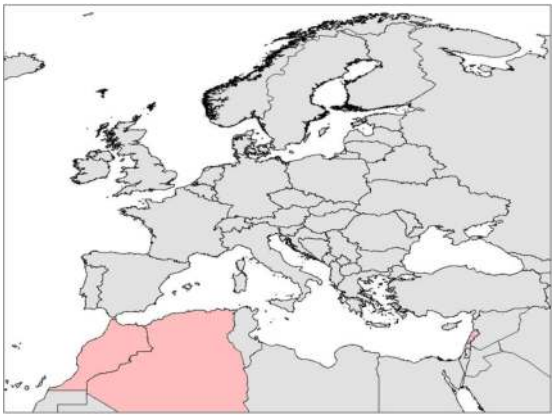


Figure 83. Time series showing the comparative number of fires and burnt area in the 5 large EU-Med countries.

1.4 Middle East and North Africa Countries



1.4.1 Algeria

Introduction

Studies carried out by a number of research centres on the risk of vegetation flammability in Mediterranean countries show that the risk of forest fires, although particularly dependent on climatic conditions, appears to undergo cyclical fluctuations.

From this perspective, the analysis of the forest fire, maquis and brush fires recorded in Algeria during the last three years shows that our country is going through a generally stable period in terms of burned areas. This situation is reflected in the statistics for the years 2014, 2015 and 2016.

However, the national plan for fire prevention and protection of forests, focusing especially on organization, the proper preparation of control campaigns and the rational management of the intervention means against fire, has contributed considerably to mitigating the scale of fires in recent years. This result is confirmed by the positive performance achieved by the different mechanisms deployed respectively for prevention, surveillance and active control.

Fire danger in the 2016 fire season

The fire season of 2016 was generally characterized by normal seasonal temperatures. Sirocco heat waves were recorded during the months of August and October. These incoming waves of hot air were the cause of a relatively high forest fire risk during these periods, and resulted in a significant number of fire starts causing considerable damage to the vegetation cover.

The average area burnt by fire in the 2016 season is about 5.8 ha, slightly higher than the previous year. Below is a diagram of the average areas burned by fires since 2012 (Figure 84).

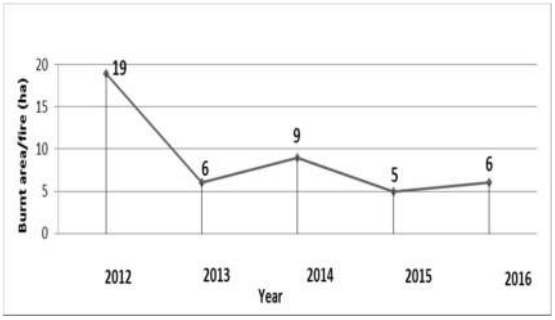


Figure 84. Average burnt area per fire for the last 5 years (ha/fire)

Fire occurrence and affected surfaces

The total area, forests, scrub and brush, damaged by fire during the 2016 season is estimated at 18 370 hectares, caused by a total of 3 150 fires. This is moderately higher than the amount recorded during the season of 2015.

The distribution of the total burned area by type of vegetation (Figure 85), shows that forests were slightly more affected by fire with 37% of the burned area, followed by scrub (33%) and maquis (30%) respectively.

The average fire size during the 2016 season is about 5.8 ha / fire, slightly higher than the previous year, which was around 5 ha / fire.

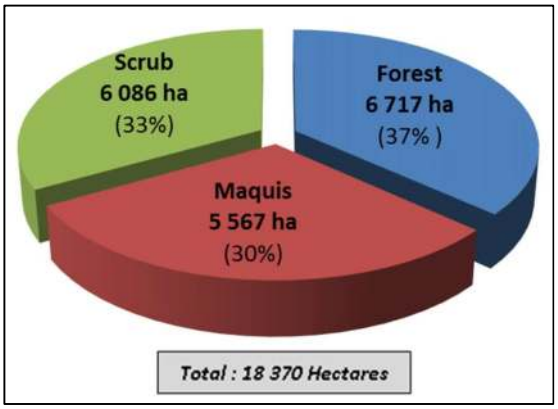


Figure 85. Burnt area classified by vegetation type.

A comparison of the area burned by region of the country (East-West-Centre) during the 2016 season (Figure 86) shows that the East region of the country, composed of 15 wilayas, is the most affected by fires with a total burnt area (forest/maquis/scrubland) of 6 644 ha, followed by the western region of the country, consisting of 12 wilayas, with a burnt area of 6 289 ha.

The Central region of the country with 13 wilayas had less burnt area compared to the other two regions, with a total of 5 417 ha.

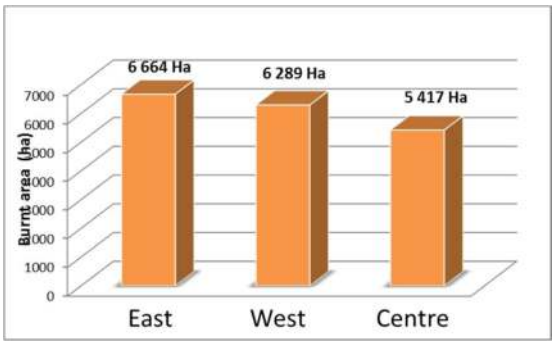


Figure 86. Burnt area of forests by region in 2016.

The monthly distribution of burnt area (Figure 87) shows that August was the most disastrous month in 2016 for forest fires, due to the observed heat waves associated with plant water stress. The total area burned in this month represents 31% of the total area affected by fire. The number of fires recorded in this month represents 44% of the total number of fires in the season.

A peculiarity of the 2016 season compared to previous years was the large area burnt in October, accounting for 27% of the total.

The other months, July (25%), September (12%) and June (4%) experienced fewer burnt areas, which were in the normal average range.

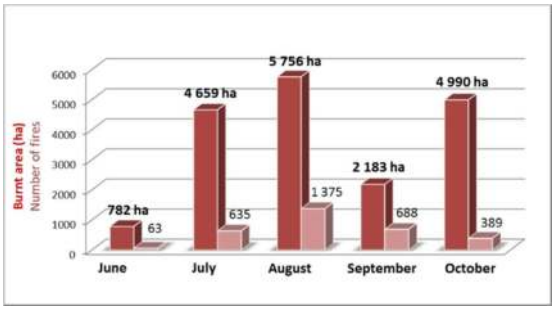


Figure 87. Number of fires and burnt area by month in 2016.

The distribution of area burned in 2016 according to forest species (Figure 88), shows that Aleppo Pine was the species most affected by fires since it is a very dominant species in the different regions, and is very vulnerable to fire risk. The cork oak also experienced significant losses in a number of fires.

Around 40 hectares were recorded each for Green Oak and Zeen Oak, and 18 hectares of cedars were burned during the season.

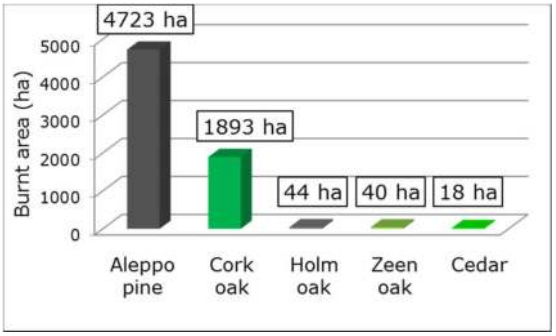


Figure 88. Burnt area by species in 2016.

The distribution of the 2 383 recorded fires by hour of the day (Figure 89) shows that most fires were reported during the time slot 12h-16h where weather conditions were very conducive to triggering fires.

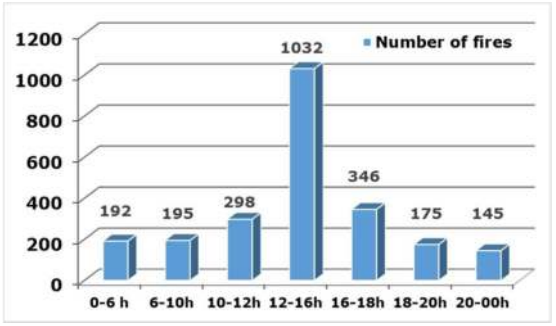


Figure 89. Number of fires by hour of the day in 2016.

During the 2016 season, not many large fires were recorded (Figure 90). About 78% of the fires burnt less than 5 hectares. Only 3 fires were recorded during the 2016 season where the fire covered areas greater than 500 ha.

This result also reflects the effectiveness of nearby teams that were deployed in sensitive areas to detect fire starts quickly and intervene as soon as possible.

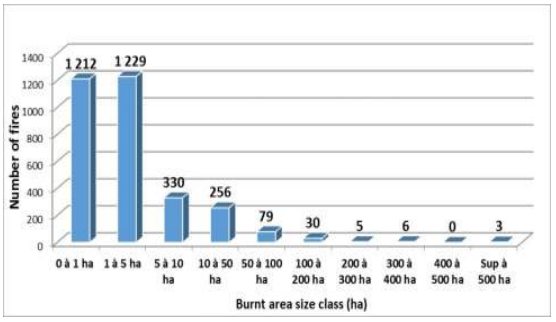


Figure 90. Number of fires by fire size (ha) in 2016.

It should also be noted that during the 2016 season, several national forest parks and nature reserves were affected by fires. Below (Figure 91) the losses caused:

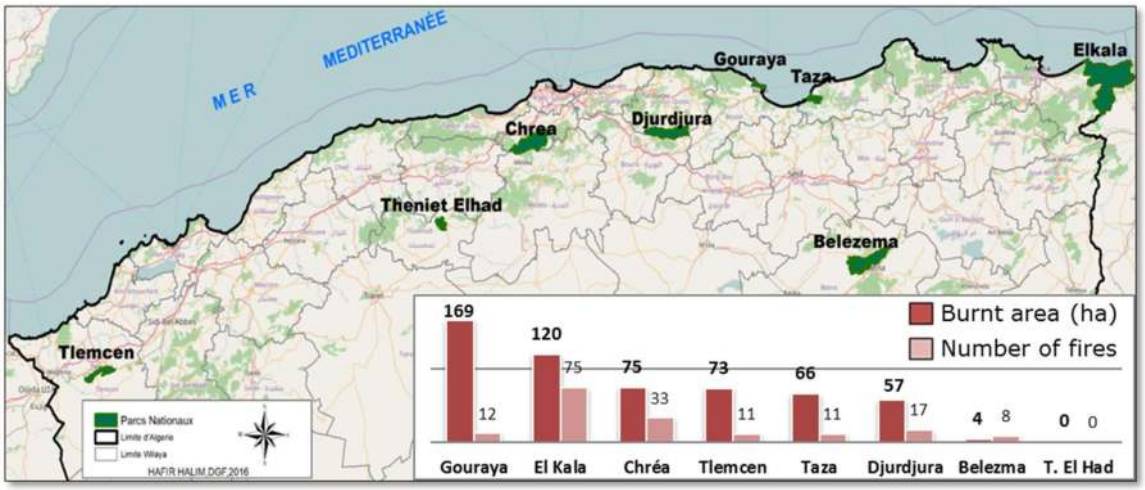


Figure 91. Fires in national parks in 2016.

Forest fire prevention

Preparations for the 2016 forest fire campaign focused on a number of components that can be summarized in the following actions:

Preventive actions

These include all the preventive work carried out by the sectors concerned, in accordance with the regulations in force, as well as raising awareness of citizens and residents on the risk of forest fire and the precautions to be observed.

Below, a quantitative report of the actions carried out:

Awareness raising activities	**Number**
Promotion of conferences and debates	257
Organisation of exhibitions and open days	285
Television broadcasts	58
Radio broadcasts	353
Sermons and religious lectures	422
Written articles	324
Organisation of local meetings	3 900
Distribution of plants	30 000
Distribution of posters and leaflets	28 240

Prevention activities	**Number**
Maintenance of firewall trenches	678 ha
New firewall trenches	214 ha
Maintenance of road verges	1 866 km
Maintenance of clearings under high voltage lines	109 ha
Maintenance of railway verges	72 km
Maintenance of forest trails	1 120 km
New forest trails	799 km
Maintenance of water points	96 units
Construction of new water points	70 units
Silvicultural activities	13 227 ha

Organizational actions

Planning measures undertaken to better manage the various situations related to forest fires. These include:

- Updating the forest fire plans of the 40 wilayas affected by this risk: these plans determine the modalities for the implementation of the means of fighting the fire.
- Organization of a forest fire simulator training cycle, for the benefit of civil protection officers in charge of the command of forest fire intervention operations.
- Inspection and control by the Directorate General of Civil Protection, of the control material and equipment available for intervention units around the forest massifs.
- Regular operation of "heatwave alert" meteorological bulletins, and forecast data relating to forest fire risk available on the EFFIS website to disseminate fast and accurate warning bulletins to the local services concerned.

Actions relating to cross-sectoral coordination.

- Organization of several "forest fire fighting" simulation exercises in collaboration with the various sectors involved in forest fire fighting operations.
- Implementation of operational committees responsible for coordinating control operations, at national, Wilaya, Daïra and Commune levels.
- Set-up local residents' committees composed of farmers and citizens, who play an important role in fire prevention and first intervention in isolated and remote localities.

Monitor, alert, and response reinforcement

In accordance with the Algerian regulations for the protection of the national forest heritage, surveillance, alert and first intervention were ensured during the season by the Forest Conservation Service through watch posts and small mobile brigades, allocated within the forest massifs. Meanwhile, actual interventions on forest fires were provided by forest-based civil protection units.

However, in order to ensure more effective operations to combat forest fires, the Directorate General of Civil Protection has put in place two additional provisions, which are:

- Installation of Mobile brigades, consisting of important human and material resources, whose mission is to intervene to reinforce the operational units in the event of a fire.
- Implementation of local units, consisting of appropriate fire-fighting means, regularly mobilized close to large crop fields during the harvest-threshing season, and in proximity to recreational forests.

Below, a representative diagram (Figure 92) of the national operational system deployed to support the 2016 forest fire campaign.

Figure 92. Resources used in the 2016 campaign in Algeria.

Loss of life

During the fire season of 2016, the deaths of a forester and a citizen were recorded during forest fires.

Various other cases of accidents such as respiratory problems, fractures and injuries were sustained by the elements of the Civil Protection and Forest Services response teams during operations combatting forest fires.

Mutual assistance operations between states

Algeria did not request any international assistance in the fight against forest fires during the 2016 season, and the intervention means of the Directorate General of Civil Protection did not participate in any intervention operation outside Algerian territory.

(Source: Direction Générale de la Protection Civile; Direction Générale des Forêts, Algeria).

1.4.2 Lebanon

Fire danger in 2016

Lebanon's annual forest fire reports are completed within the framework of a collaborative work between the Ministry of Environment (MOE) and the Land and Natural Resources Program, Institute of the Environment, University of Balamand (LNR-IOE-UOB). The present information is mostly based on the 2016 fire report (MOE/UOB, 2017). Reported fires were based on field inspections. Un-reported fires may have not been initially visited in the field.

Fire season

The calculated start date of the fire season for 2016 was 10 May, 2016 and the calculated end date was 28 November, 2016. The peak month (in number of fires) was June (a total of 56 fires damaging a minimum area of 299.93 ha of vegetated land). A total of 260 fires were reported, affecting a total area of 1870.54 ha (Figure 93).

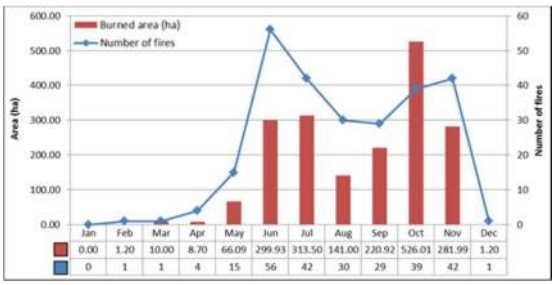


Figure 93. Monthly distribution of fire occurrence and fire affected areas in 2016 (source: MOE/UOB, 2017).

Land use type

The land use of fire affected areas (Figure 94) comprised forests/woodlands (64%), agricultural land (15.3%), and grassland (12.56%).

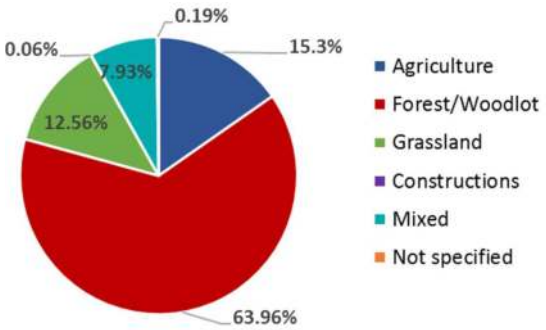


Figure 94. Land use of fire affected areas (source: MOE/UOB, 2017).

Affected fuel type

A total of 36.54% of affected fuel types (Figure 95) was mixed agriculture and forests, followed by mixed forests (18.81%) and grassland (14.32%).

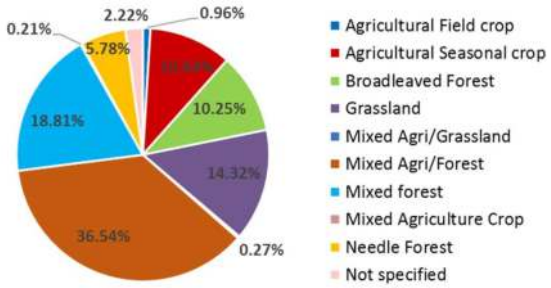


Figure 95. Distribution of fuel type affected by fires (source: MOE/UOB, 2017)

Causes of fire

The main fire causes were unknown (61%). Negligence was reported as the main cause of fires for 16.61% of the reported fire events. A total of 11.99% of causes were attributed to Arson. Human activities in nature, and landfills represented 4.31% and 3.78% respectively of the total fire causes (Figure 96).

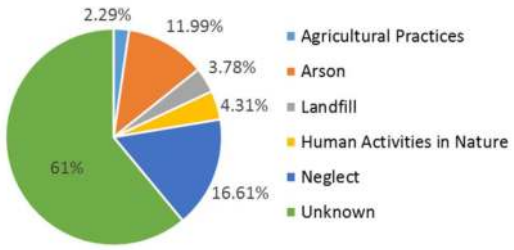


Figure 96. Distribution of main fire causes (source: MOE/UOB, 2017)

Intervention time

It was observed that 64.23% of first interventions in fire suppressions occurred within the first 20 minutes after the reporting time, while 20.38% of interventions happened after 20 minutes and before 1 hour from the reporting time. Only 0.77% of interventions in fire suppression happened after one hour and a half from the reporting time (Figure 97).

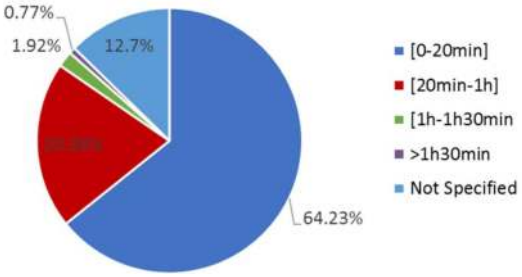


Figure 97. Times for intervention after reporting fires (source: MOE/UOB, 2017).

Figure 98. Aerial fire suppression in 2016 of a 3-day fire in Daroun – North of Beirut (*source: Mitri, G.*).

Fire duration

The largest number of fires lasted between 1 and 2 hours (42.3%). A total of 30.77% of fires lasted between 2 and 5 hours, and 11.92% of fires lasted between 5 and 12 hours. It was also observed that 7.69% of fires lasted between 12 and 24 hours. However, 3.85% of fires lasted more than 24 hours (Figure 99).

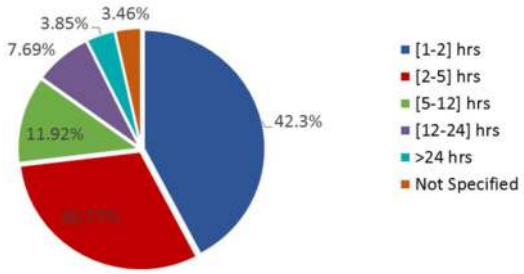


Figure 99. Fire duration (source: MOE/UOB, 2017).

Resources employed in fire suppression

The following human and technical resources were involved in fire suppression of reported fires:

Table 33. Human and technical resources involved in fire control in 2016 (source: MOE/UOB, 2017)

	Number				Lebanese Army helicopters (interventions)
	Small Cars	Water Tanks	Other Cars	Human Resources	
Civil Defense	159	486	31	1180	
Army	87	9	27	929	89
Internal Security	172	7	7	578	
Ministry of Agriculture	7	0	0	8	
NGO	28	43	0	283	
Local Resident	0	0	0	1042	
Total	**453**	**545**	**65**	**4020**	

Forest fire initiatives and campaigns

Ministries of Environment, Agriculture, Interior and Municipalities, the National Disaster Risk Management Unit have continued developing initiatives to reduce risks of forest fires and their possible environmental and socio-economic impact.

In 2016, LNR-IOE-UOB launched a new fire danger forecast system in Lebanon. The newly developed system takes into account fire hazard and vulnerability in addition to a fire weather index derived daily by the European Forest Fire Information System (EFFIS). It generates fire danger forecast over a period of 9 days that users can access at any time through a web-interface to browse fire danger at the local, regional, and national level (http://ioe-firelab.balamand.edu.lb).

Municipalities in collaboration with local NGOs have worked at the local level mainly for reducing fire risk (cleaning, pruning, raising awareness, etc.). In this context, Lebanon Reforestation Initiative (LRI), and the Association for Forests, Development and Conservation (AFDC) have been involved in empowering local communities to manage forest fire risk at the local level.

Casualties

Three firefighters died while performing their duties in 2016. A few people were injured while dozens of people were affected by smoke inhalation.

Reference:

MOE/UOB, 2017. State of Lebanon's wildfires in 2016. Beirut, Lebanon.

(Source: Land and Natural Resources Program, Institute of the Environment, University of Balamand, Lebanon).

1.4.3 Morocco

Background

In over 9 million hectares of forest domain representing more than 20% of the national area, forest formations in Morocco cover an area of 5 814 000 ha (broadleaves, conifers…) and 3 318 260 ha of *stipa tenacissima* (Figure 100), and are distributed among the different bioclimatic zones, from semi-arid to humid.

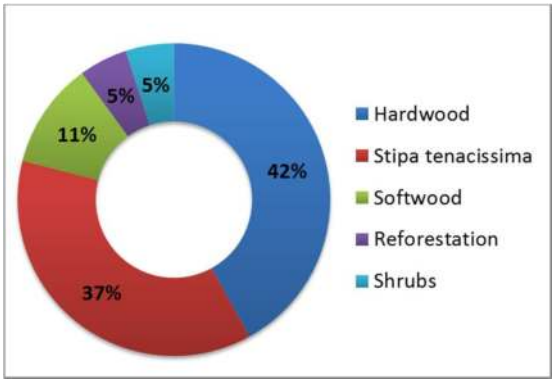


Figure 100. Composition of forest land in Morocco.

As in Mediterranean countries, forested areas in Morocco are subject to a recurrent risk of fires that is favoured by the extreme flammability of forest species during the summer. The consequences of this risk are prejudicial in terms of social, economic and environmental components. Indeed, the forest land is an open space where access (except rare situations) is free. Riparian forest populations live in a subsistence economy (using forests for their needs of construction wood and firewood, various non-timber forest products, and pasture). Consequently, forests are under a very strong human pressure.

Through the analysis of annual reports of forest fires during the years 1960 to 2015, an average of 285 fires per year is calculated for an annual average area affected of 3 032 ha (HCEFLCD, 2015).

Although limited compared to the average area burned in other countries with similar conditions, especially the Mediterranean, this area is important in view of the major roles played by forests and the difficulties of their reconstruction and regeneration with regard to the national socio economic and environmental context.

To face the recurring and imponderable phenomenon of fire, a **National Plan of Prevention and Fight against forest fires** (in French: *Plan Directeur de Prévention et de Lutte Contre les Incendies "PDCI"*) was adopted with the participation of all institutional partners concerned by this issue: Ministry of the Interior (MI), High Commission of Forests, Water and combating Desertification (HCEFLCD), Ministry of Equipment and Transport (MET), Royal Gendarmerie (GR), Civil Protection (PC), Agency for Economic and Social Development for Northern Provinces and Prefectures (ADPN) and the Administration of Land Conservation, Cadastre and Mapping (ACFCC). The plan focuses on the actions of equipment and forest management for fire prevention, risk prediction, monitoring and warning and also on the coordinated operations to fight against forest fires.

Despite the efforts made at different levels by all institutions involved in forest fire management in Morocco, **the system calls for continuous improvements**, not only in terms of prevention and prediction, but also in terms of operational and organizational interventions.

Fire occurrence and affected surfaces

From 1960 to 2015

Through the analysis of the available data on forest fires in Morocco during the period 1960 to 2015, a total of 15 985 outbreaks of fire (Figure 101) and a total area damaged (but not lost) of 169 772 ha are reported, giving an average of 285 fires per year for an annual average area of 3 032 ha affected, with maxima of 11 000 ha in 1983 and 8 660 ha in 2004. The absolute minimum is recorded in 2002 with 593 ha.

It should also be noted that, globally and since 1960, the trend of fire numbers and area affected by forest fires has never stopped increasing; but the shapes of the increases are not similar. Indeed, the increase in fire number has been continuous from an average of 242 between 1990-1994, to 451 forest fires in the last decade (2004-2015) (Figure 101).

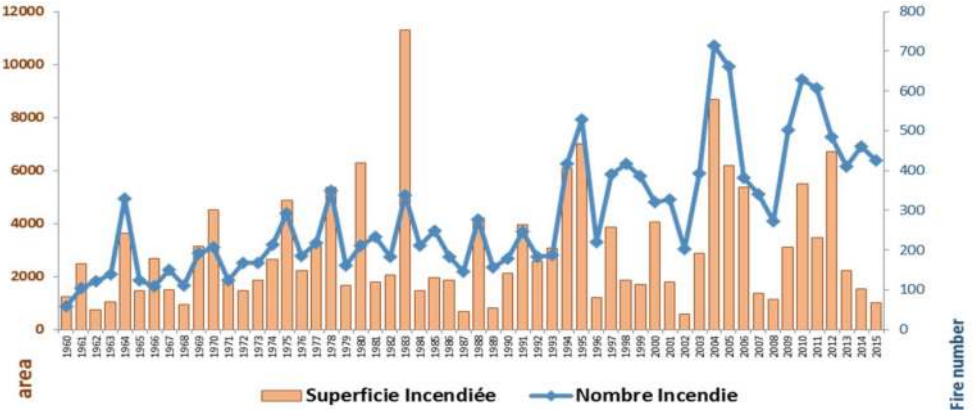


Figure 101. Evolution of forest fire number and burnt area from 1960 to 2015 (HCEFLCD, 2015).

The period from 1960 to 1974 represents the portion where fire number and area burned are at the lowest levels (154 fires and 2 073 ha) compared to the averages for the period covering 1975 to 2014 (331 fires and 3 442 ha). We note that the area affected per fire, which reached the value of 7 ha during the period 2005-2015, has decreased by 41% compared to the national average recorded since 1960, which is 12 ha per fire (Figure 101).

Over the past decade, the years 2004, 2005, 2010, 2011, 2012 and 2014 were exceptional both in forest fire numbers declared and in affected areas. Indeed, it is mainly the Rif and Pre-Rif provinces which were most affected because of the high sensitivity to fire of pine, cork oak and shrub formations and the strong pressure on land resulting from the use of fire as a cleaning land practice for cultivation.

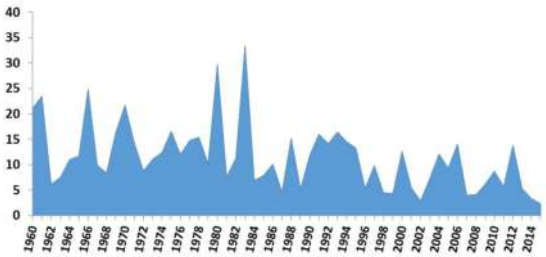


Figure 102. Evolution of the area affected per fire from 1960 to 2015

<u>2016 fire season</u>

During 2016, there was recorded a total of 422 fires affecting an area of 2 585 ha, an average of 6 ha per fire.

Both the number of fires and the total burnt area have decreased in comparison to the average for the last decade 2006-2015, by 6% and 16% respectively (Figure 103 and Figure 104).

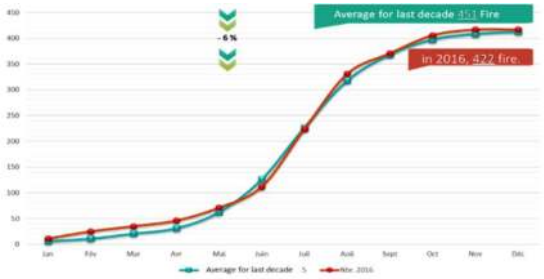


Figure 103. Evolution of the number of fires in 2016 compared to the last decade.

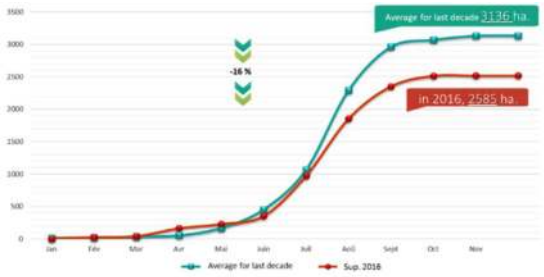


Figure 104. Evolution of burnt area in 2016 compared to the last decade.

The distribution of fires recorded in 2016 (Table 34), based on the type of vegetation affected, is as follows:

- For wooded land, an area of 1319 ha (51% of the total area burned) was affected by 155 fires (36% of the total number of fires);
- The shrub and herbaceous covers were affected by 267 fires that covered an area of 1265 ha, equivalent to 63% respectively of the total number of reported fires and 48% of the total area burned.
- For wooded stands, *Pinus* species (*Pinus halepensis*, *Pinus canariensis*, *Pinus pinea*) are in first place with an area of 693 ha affected, equivalent to 26% of the total area burned in this category, followed by the oak trees (Zeen oak, Tauzin oak, holm oak and cork oak) with 375 ha affected (14%).

Table 34. Distribution of fires based on the type of vegetation affected in 2016.

Category		Species	Burnt Area (ha)	% Area	Number of fires	% Number
Wooded land	broadleaves	Cork oak	266.90	10.32	25	5.92
		Holm oak	68.75	2.66	24	5.69
		Zeen oak	39.59	1.53	4	0.95
		Eucalyptus	221.91	8.58	10	2.37
		Acacia	0.07	0.00	2	0.47
		Total broadleaves	**597.23**	**23.10**	**65**	**15.40**
	Coniferous	Atlas cedar	0.89	0.03	16	3.79
		Red cedar	5.36	0.21	5	1.18
		Oxycedrus	4.03	0.16	3	0.71
		Pines	693.46	26.83	54	12.80
		Thuja	18.63	0.72	12	2.84
		Total conifers	**722.37**	**27.94**	**90**	**21.33**
Total wooded			**1319.60**	**51.05**	**155**	**36.73**
Non wooded land		Alfa	269.35	10.42	27	6.40
		Shrubs	830.34	32.12	106	25.12
		Grass cover	165.70	6.41	134	31.75
Total non wooded			**1265.40**	**48.95**	**267**	**63.27**
Total			**2585**	**100.00**	**422**	**100.00**

The data relating to the distribution of fires according to size classes of affected areas are represented in Table 35. Indeed, 89% of reported fires were under control with the speed and efficiency required, since the area affected has not exceeded 5 ha for each fire. It is also noted that only 8 fires (2% of the total number of fires) affected an area of over 100 hectares, representing over 56% of the total area burned.

Table 35. Distribution of fires according to size classes of affected areas.

Size Class (ha)	***Number***		***Area (ha)***	
	Count	***%***	***Area***	***%***
0-5 ha	377	89.34	187.41	7.44
5-10 ha	15	3.55	106.9	4.25
10-20 h	8	1.90	115.2	4.58
20-50 ha	7	1.66	243.92	9.69
50-100 ha	7	1.66	512.57	20.36
>100 ha	8	1.90	1417	56.27
Total	422	100.00	2518	100.00

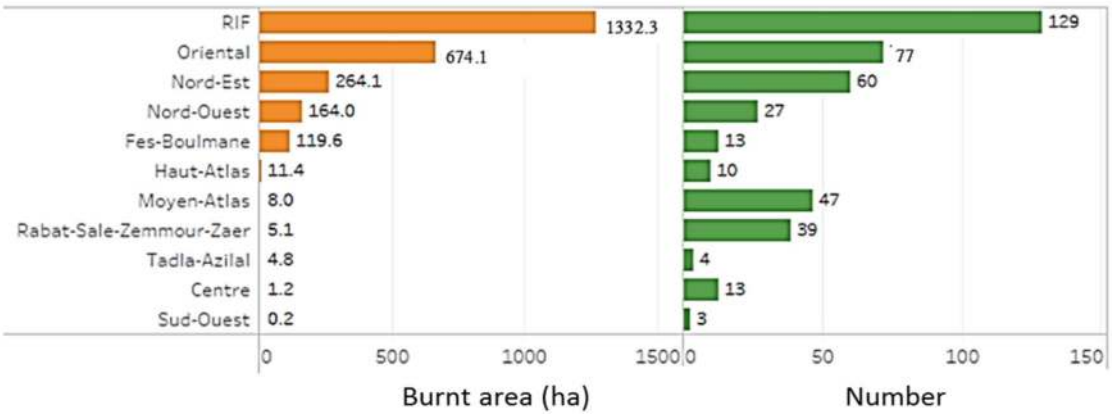


Figure 105. Number of fires and area affected (ha) by forest region.

The Rif region (Tanger, Tetouan, Larache, Ouazzan, Chefchaouen...) ranks first both in terms of area affected with 1332.3 ha (51% of the total area recorded nationally) and the numbers of fires with 129 fires (30% of the total number (Figure 105 above).

The occurrence of fires is concentrated in the provinces of Rif and Pre-Rif (including Tangier and Tetouan); this situation is favoured by the terrain, the high sensitivity of forest stand types (pine, cork oak matorral...) and the intense human pressure on land resulting from the use of fire as a practice of cleaning land for their cultivation.

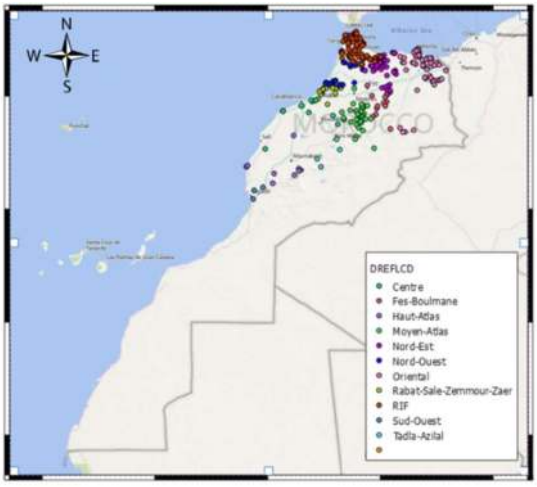


Figure 106. Location of the forest fires recorded in 2016 in Morocco.

Firefighting means

The means mobilized by the different departments in 2016 in Morocco for the operations against forest fires, are as follows:

Table 36. Firefighting means in 2016.

Activities	*Department*	*Quantity*
Monitoring and alerts	High Commission of Forests, Water and combating Desertification	**1200** watchers
	Ministry of the Interior	**1000** watchers
Ground intervention	High Commission of Forests, Water and combating Desertification	**332** forest fighters with **95** vehicles for the first response
	Civil Protection	**-**
	Auxiliary Forces	[Estimated at 300 persons]
	Royal Armed Forces	[Estimated at 300 persons]
Aerial control	Royal Gendarmerie	Twelve **(12)** Turbo Trush aircraft
	Royal Air Forces	Five **(5)** Canadairs

Fire Causes

Forest fires of unknown origin represent a dominant share (99%). Almost all forest fires result from human action, either intentionally or by negligence (Table 37).

Table 37. Causes of fires.

Origin	***Cause***	***Number***		***Area***	
		Count	***%***	***Ha***	***%***
Accidental	Landfill, Honey extraction, High tension line	2	0.47	12.31	0.48
Intentional	Land clearing, Vandalism	4	0.95	5.72	0.22
Natural	Lightning	5	1.18	0.01	0.01
Unknown	Unknown	411	97.39	2567	99.3
Total		**422**	**100**	**2585**	**100**

Information campaigns

In Morocco and before 2005, the program of public awareness conducted by the HCEFLCD and its partners did not have a national scope, but was limited mainly to setting up of panels of awareness along the roads, distributing posters and organizing meetings of provincial committees around the issues of forest fires.

Up to 2015, the HCEFLCD has gradually accumulated experience in designing and disseminating educational materials to raise awareness, and has succeeded in building a real communication device that drives the public to realize that a simple act, of negligence or innocent, may cause natural, environmental, or economic damage and even sometimes dramatic loss of human lives. Thus, during this period the following activities were undertaken:

- the design and broadcasting in different languages, during prime time during the risk season, of 10 television spots and 7 radio messages, specific and generic, with a consistent and diversified content aimed at attracting attention and curiosity, showing the problem of forest fires and revealing solutions.
- the distribution of posters, leaflets and brochures written in Arabic and French in public places: schools, government offices, roads, highways, bazaars, villages, etc;
- posting signs of awareness in the vicinity of major roads and highways, especially at the exit of large cities, and those leading to the most sensitive forest areas.
- The organization of press briefings to raise awareness of print and audiovisual media on progress of the campaign of prevention and fight against forest fires.

Figure 107. Example of television spots.

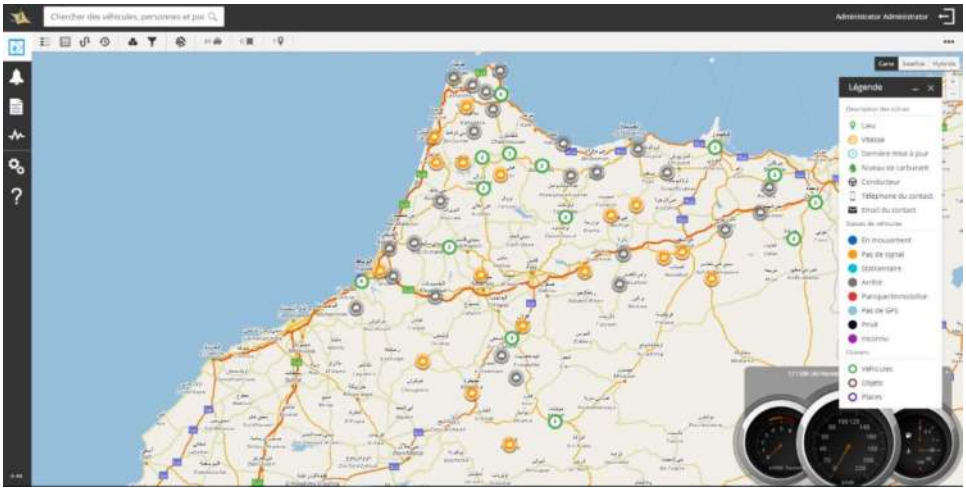


Figure 108. Geolocation platform for the Vehicles of First Response (VFR)

Geolocation of vehicles of first response

In 2016, the High Commissioner For Water, Forest and combating Desertification set up a new geolocation platform for all Vehicles of First Response (VFR); this platform allows the manager to follow in the real time the exact position of each VFR. This system helps to streamline and optimize the mobilization of intra- and interregional VFRs to support and to ensure response as quickly as possible.

Loss of human lives

No lives were lost in the 2016 season.

(*Source: Service de la Protection des Forêts, Haut-Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification, Morocco*).

2 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 regard 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 services[2] 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 queried[3]. 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 damages.

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 of 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 75% to 80% of the total area burnt in Europe each year.

[2] http://effis.jrc.ec.europa.eu

[3] see http://effis.jrc.ec.europa.eu/current-situation

2.1 EFFIS Danger Forecast: 2016 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 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 2016 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 2016 as determined by the average FWI values assessed during the fire season in the individual countries.

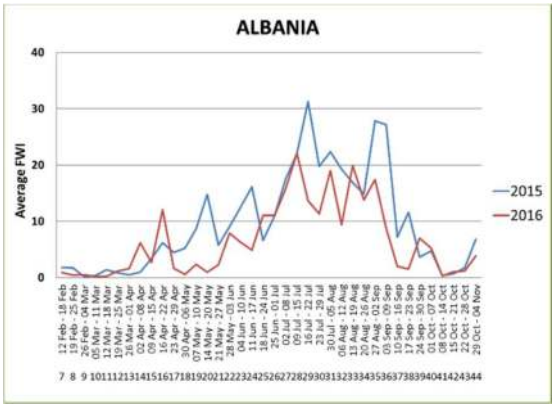
In 2016 there was a noticeable peak in the fire danger early in the season around April-May for a number of the more northern countries. The peak was late (September) for temperate countries, and in August for the Mediterranean and MENA countries.

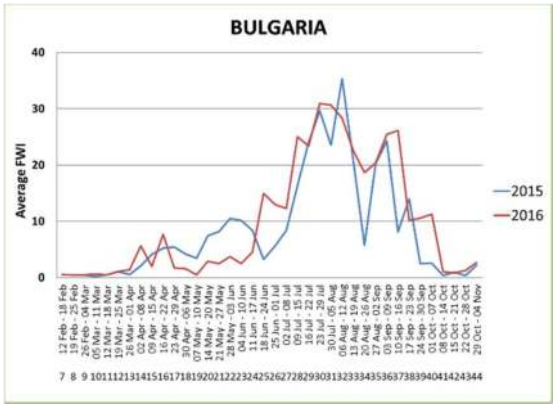
The graphs show the weekly averages of FWI over entire countries; therefore local peaks might have been flattened, especially in those countries such as France or Italy, where there are strong differences in fire danger level with changing latitudes; nevertheless the general trend is depicted providing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

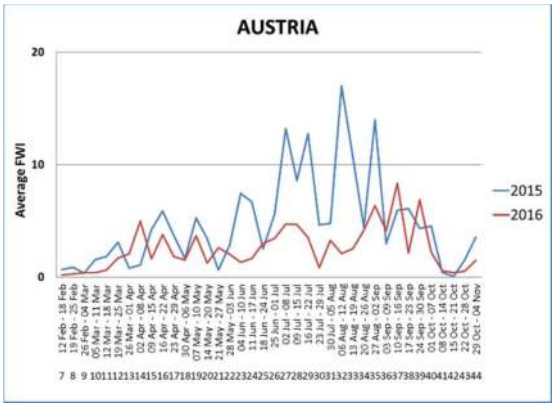
To allow a better comparison with past seasons, the curve of 2015 is presented in conjunction with 2016 for all countries.

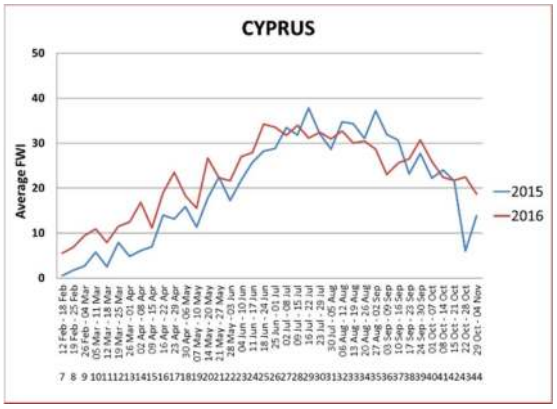
The countries analysed are those participating in the EFFIS network for which data are available, and are presented in alphabetic order within the two groups (European countries and MENA countries) in the graphs that follow.

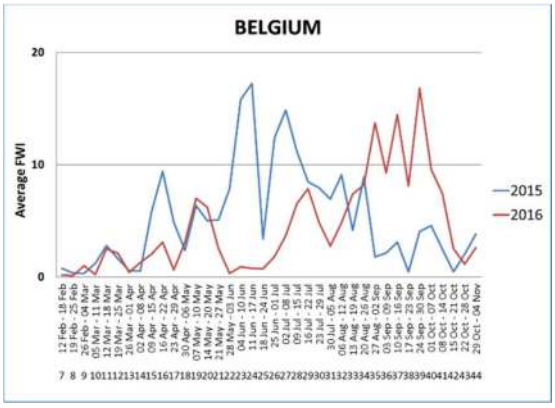
NOTE: In order to make the graphs more readable, 4 scales have been used to present the FWI: 0-20 for the most northern countries where fire danger rarely reaches high levels; 0-40 for central countries, 0-50 for the Mediterranean and Turkey, and 0-60 for the MENA countries.

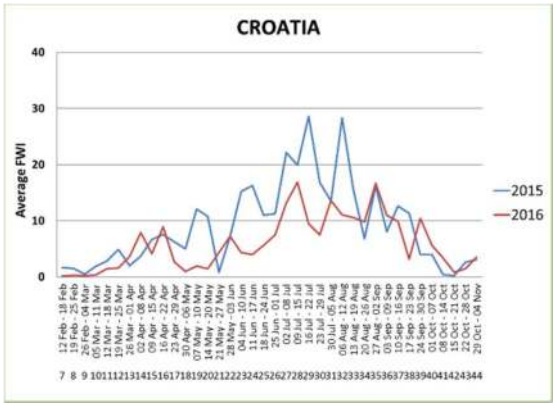

ALBANIA
Average FWI
2015
2016

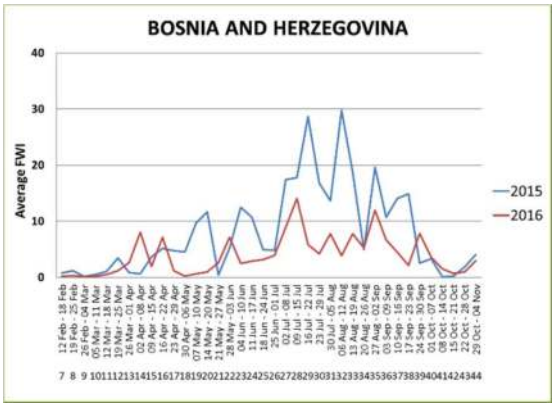

BULGARIA
Average FWI
2015
2016

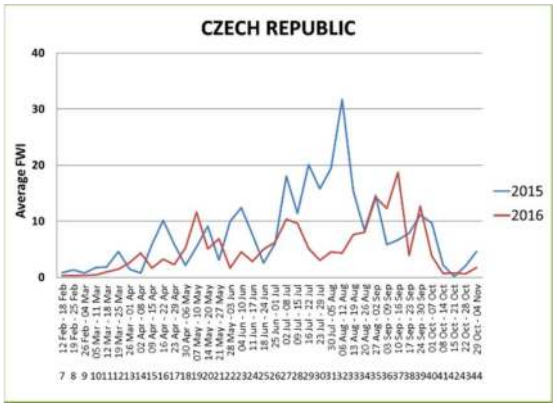

AUSTRIA
Average FWI
2015
2016

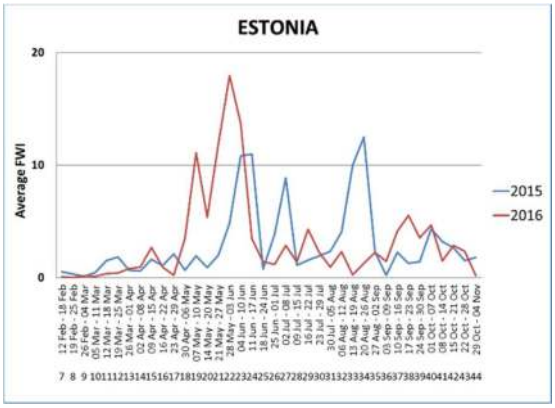

CYPRUS
Average FWI
2015
2016

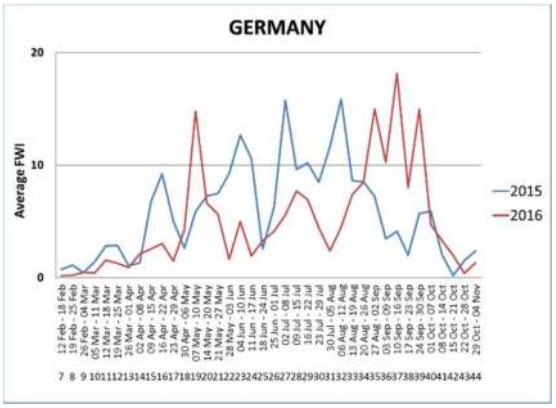

BELGIUM
Average FWI
2015
2016

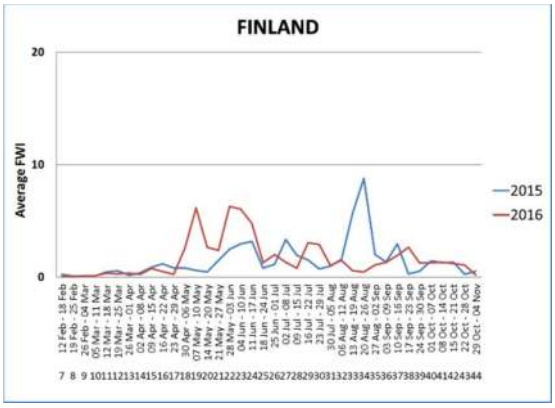

CROATIA
Average FWI
2015
2016

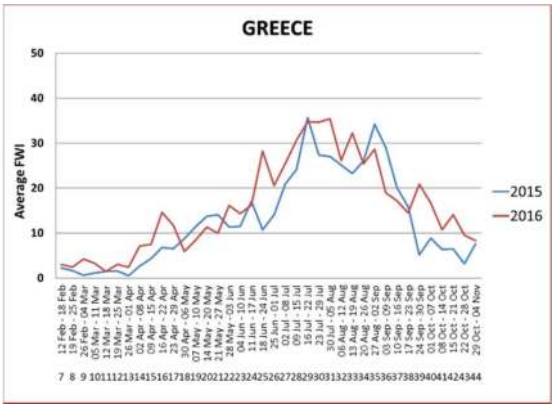

BOSNIA AND HERZEGOVINA
Average FWI
2015
2016

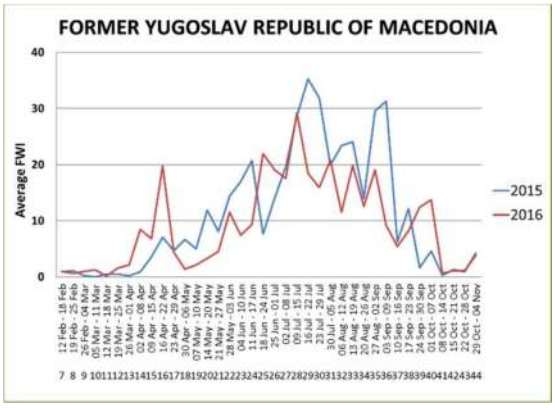

CZECH REPUBLIC
Average FWI
2015
2016

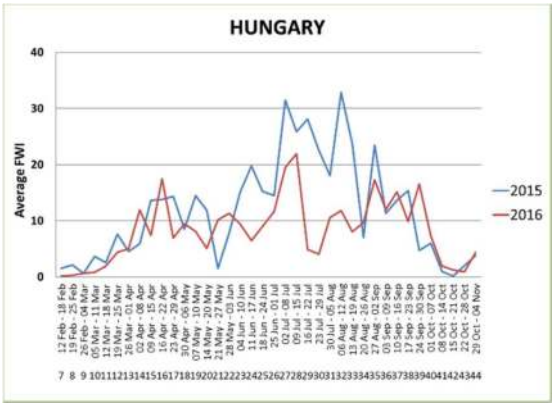

ESTONIA
Average FWI
2015
2016

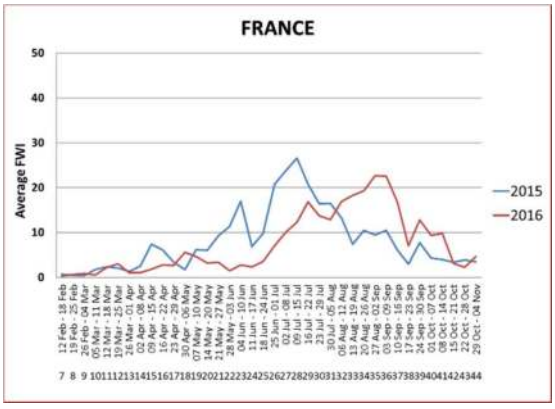

GERMANY
Average FWI
2015
2016

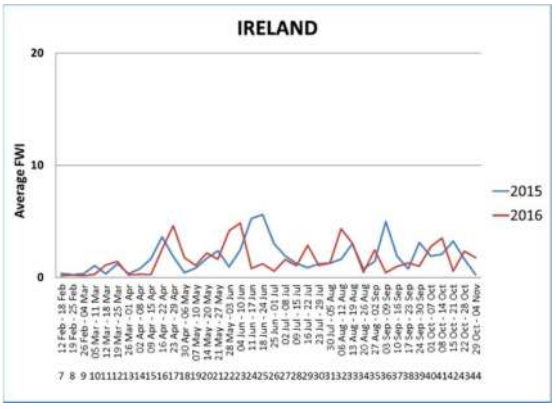

FINLAND
Average FWI
2015
2016

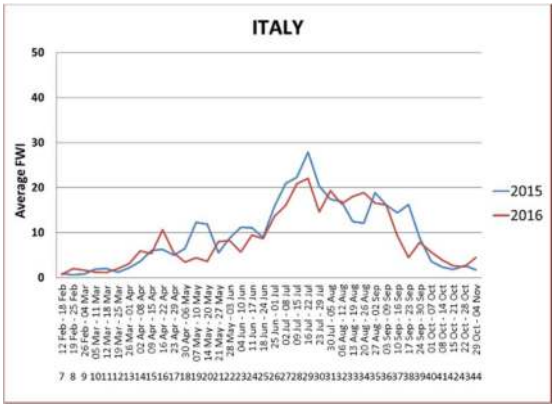

GREECE
Average FWI
2015
2016

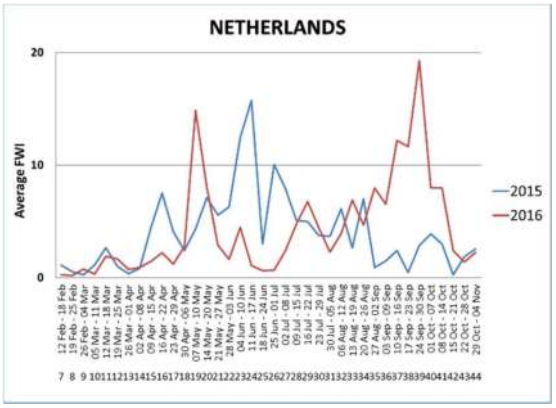

FORMER YUGOSLAV REPUBLIC OF MACEDONIA
Average FWI
2015
2016

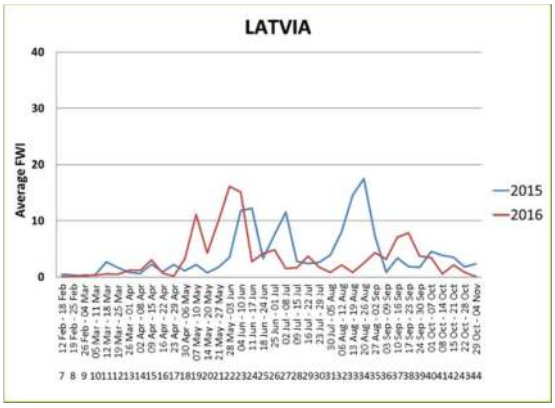

HUNGARY
Average FWI
2015
2016

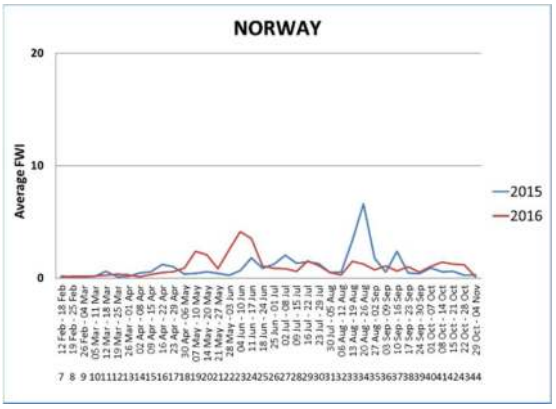

FRANCE
Average FWI
2015
2016

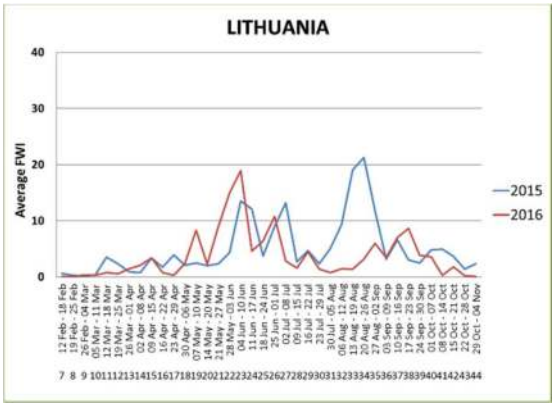

IRELAND
Average FWI
2015
2016

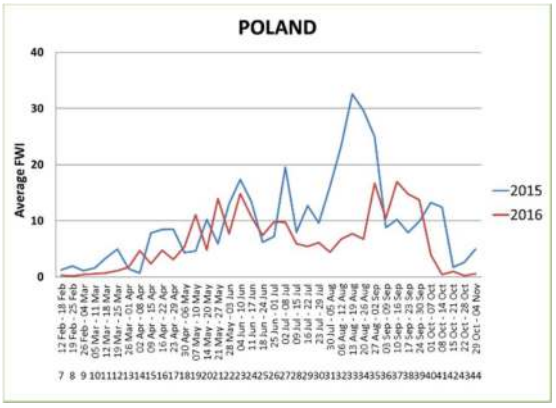

ITALY
Average FWI
2015
2016

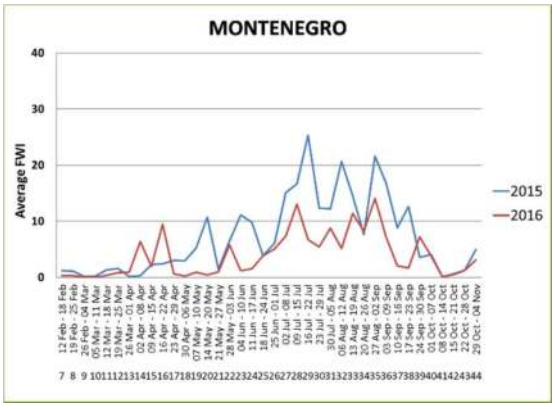

NETHERLANDS
Average FWI
2015
2016

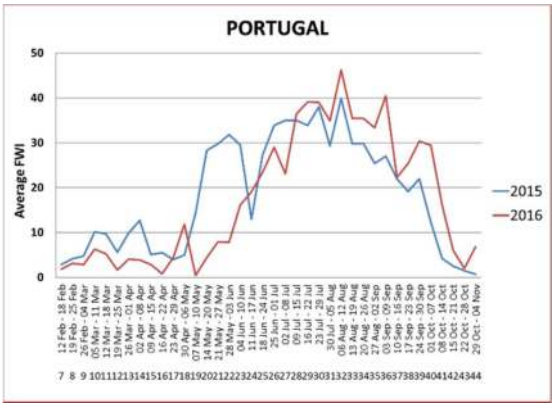

LATVIA
Average FWI
2015
2016

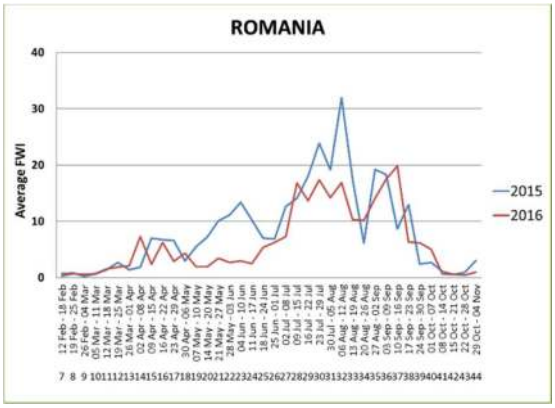

NORWAY
Average FWI
2015
2016


LITHUANIA
Average FWI
2015
2016


POLAND
Average FWI
2015
2016

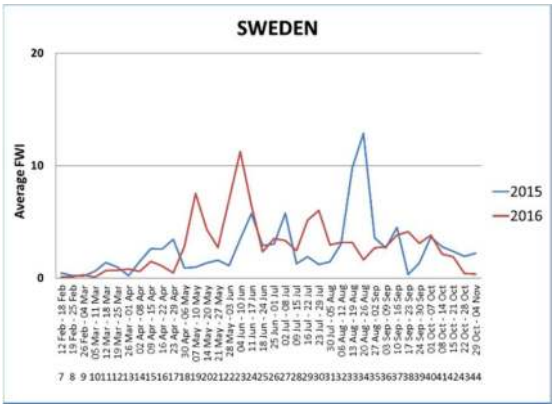

MONTENEGRO
Average FWI
2015
2016

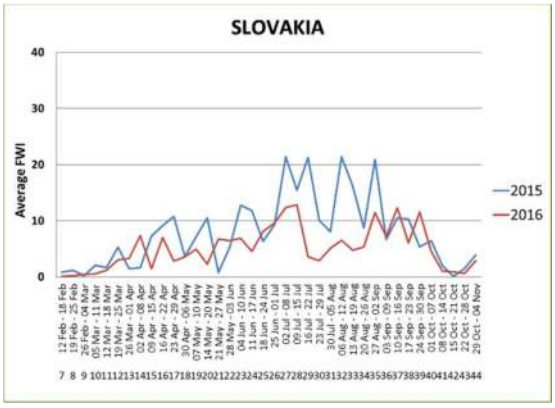

PORTUGAL
Average FWI
2015
2016

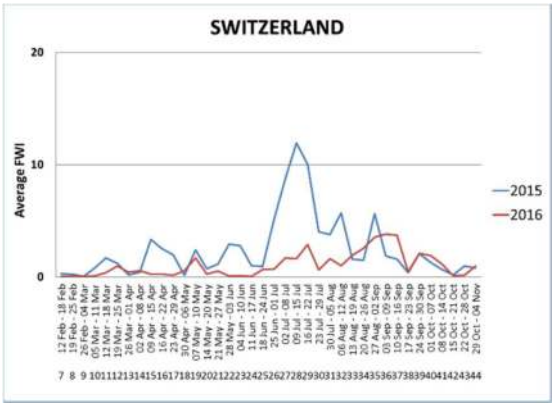

ROMANIA
Average FWI
2015
2016

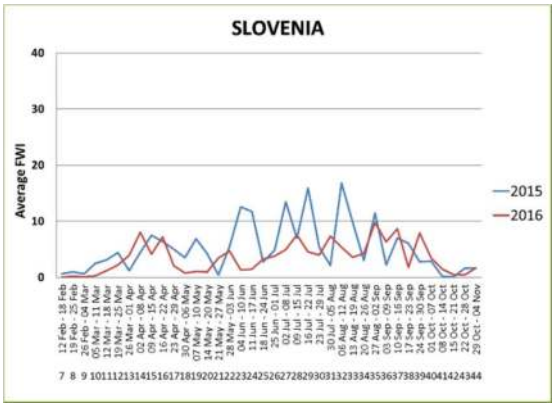

SPAIN
Average FWI
2015
2016

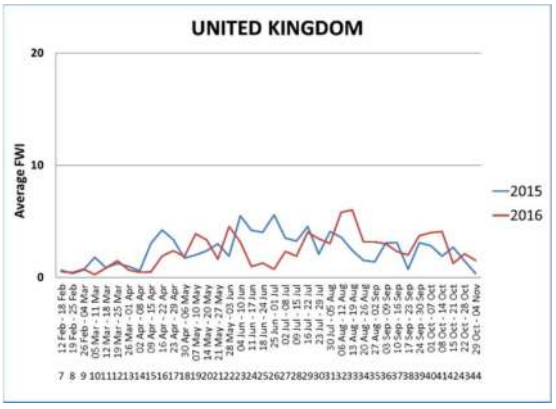

RUSSIAN FEDERATION
Average FWI
2015
2016

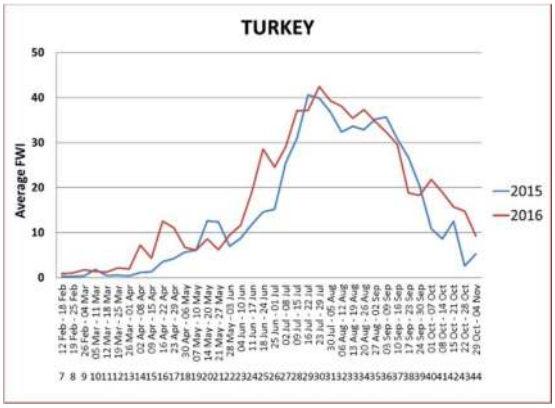

SWEDEN
Average FWI
2015
2016


SLOVAKIA
Average FWI
2015
2016

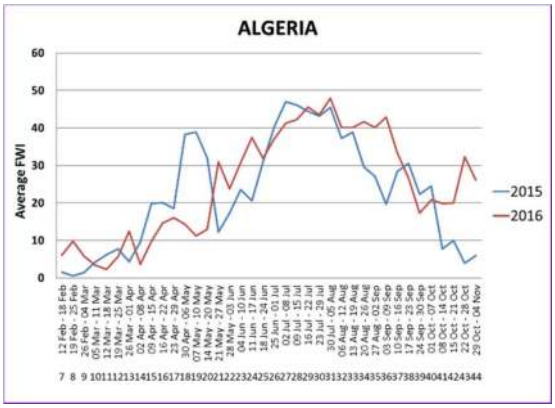

SWITZERLAND
Average FWI
2015
2016

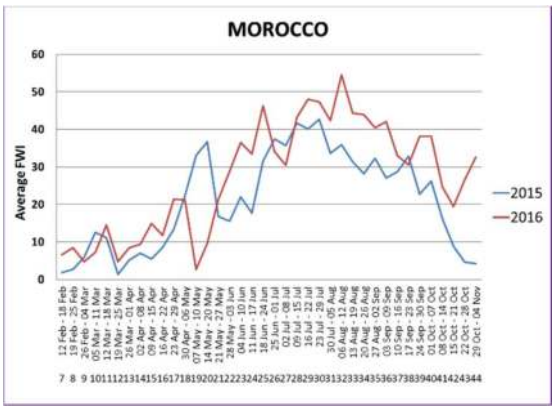

SLOVENIA
Average FWI
2015
2016

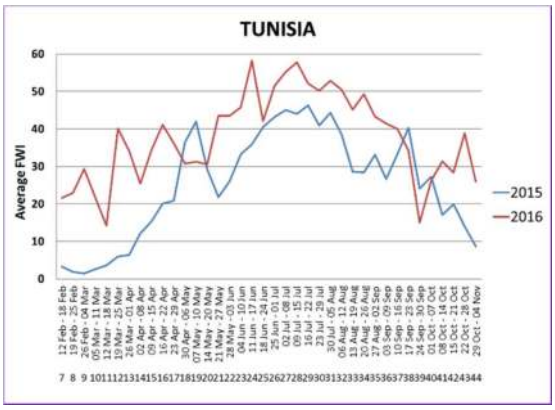

UNITED KINGDOM
Average FWI
2015
2016



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 109. 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.

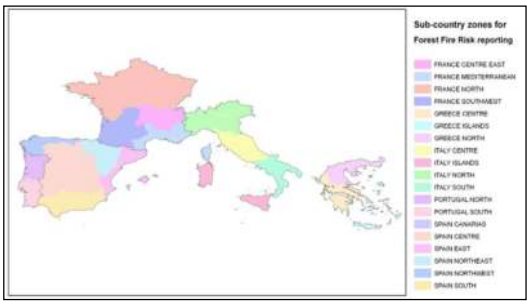


Figure 109. Sub-country regions identified for fire danger trend reporting in the five largest Mediterranean Member States.

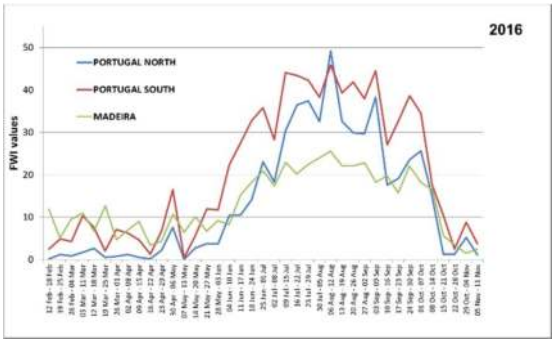


Figure 110. Fire danger trends in 2016 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal.

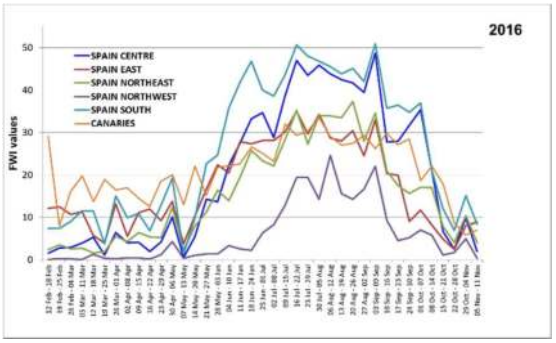


Figure 111. Fire danger trends in 2016 as determined by the Fire Weather Index (FWI) in the regions identified for Spain.

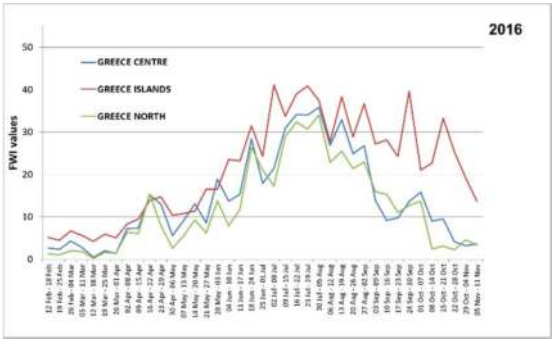


Figure 112. Fire danger trends in 2016 as determined by the Fire Weather Index (FWI) in the regions identified for Greece.

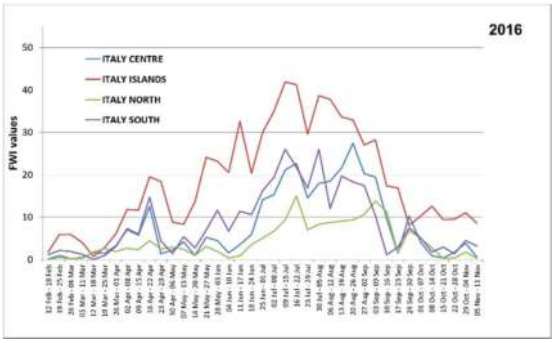


Figure 113. Fire danger trends in 2016 as determined by the Fire Weather Index (FWI) in the regions identified for Italy.

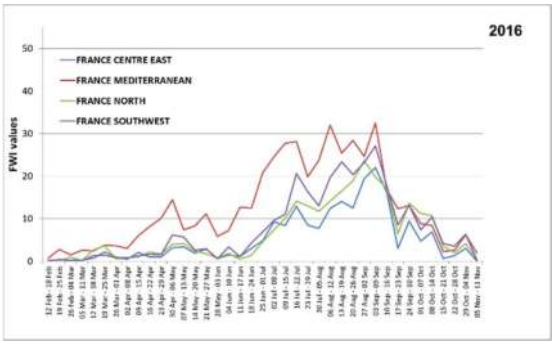
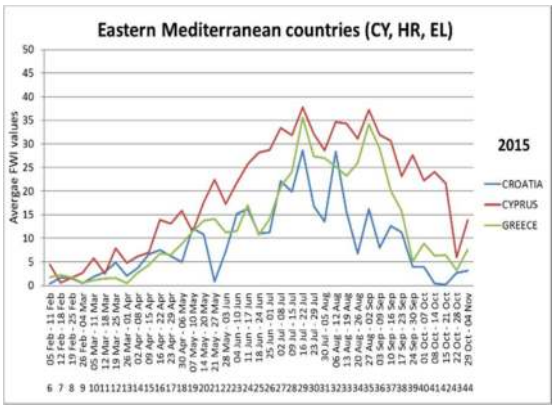
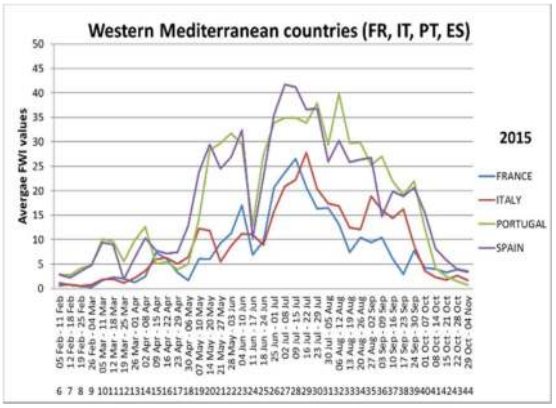


Figure 114. Fire danger trends in 2016 as determined by the Fire Weather Index (FWI) in the regions identified for France.

To facilitate the comparison among the different countries in EU, in the next graphs (Figure 115 to Figure 121), 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 and 2016.





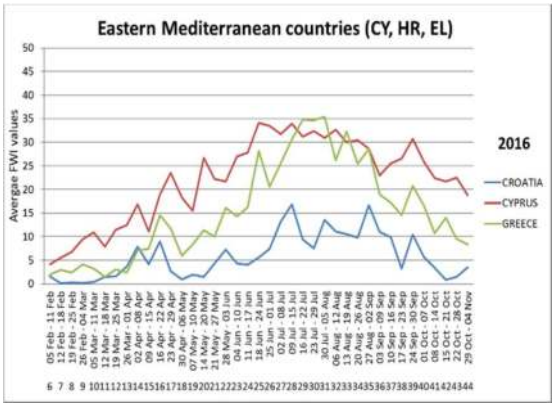


Figure 115. Fire danger trends 2015-2016 in eastern EU Mediterranean countries (CY, HR, GR).

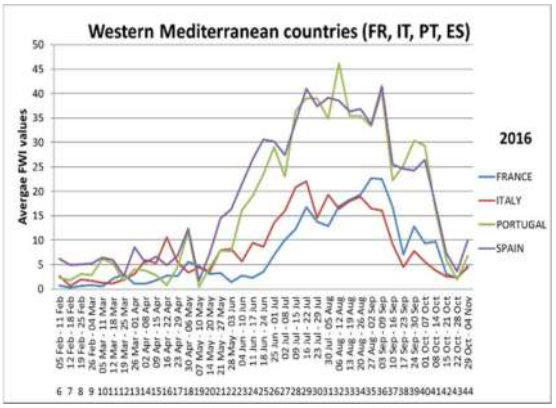
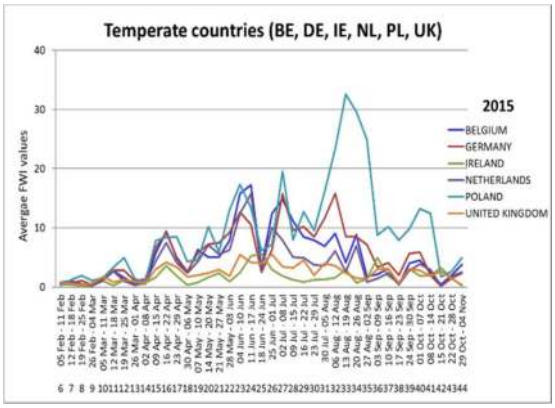
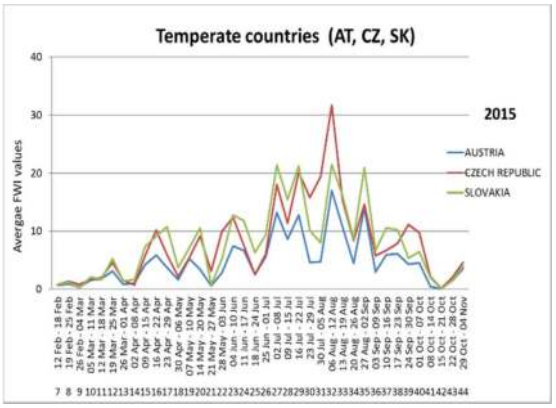
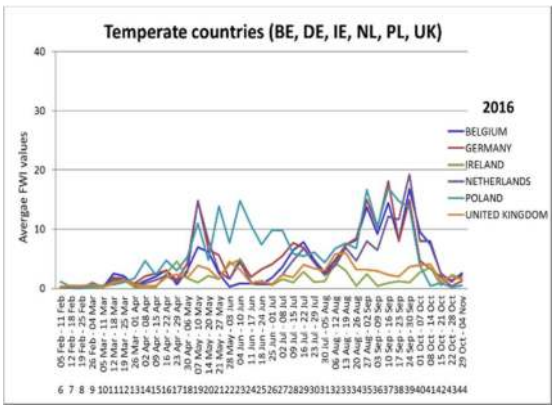


Figure 116. Fire danger trends 2015-2016 in western EU Mediterranean countries (FR, IT, PT, ES).







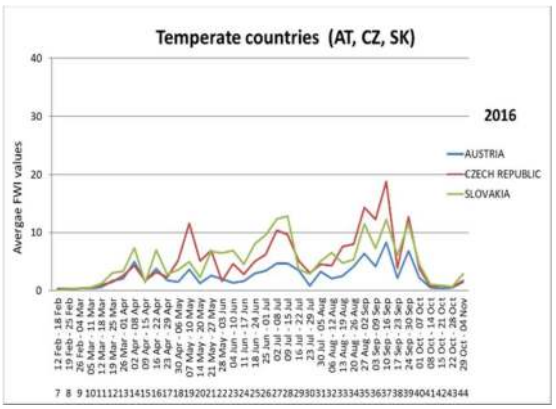


Figure 117. Fire danger trends 2015-2016 in some northern EU temperate countries (BE, DE, IE, NL, PL, UK).

Figure 118. Fire danger trends 2015-2016 in some central EU temperate countries (AT, CZ, SK).

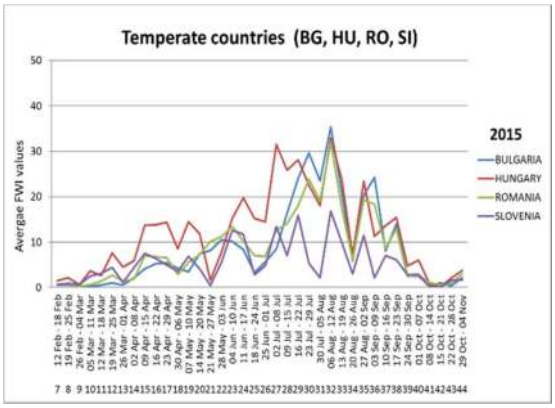


Figure 119. Fire danger trends 2015-2016 in some eastern EU temperate countries (BG, HU, RO, SI).

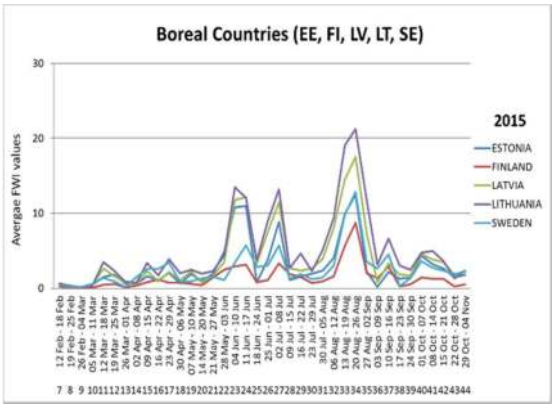
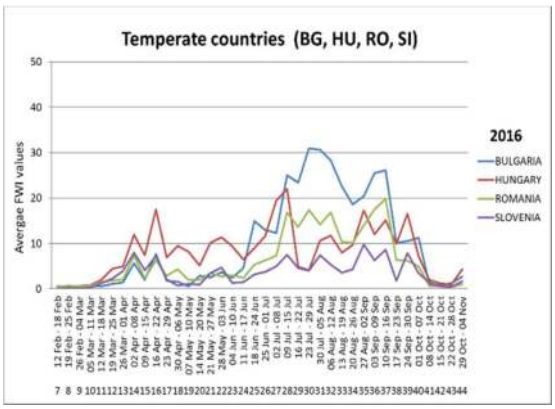
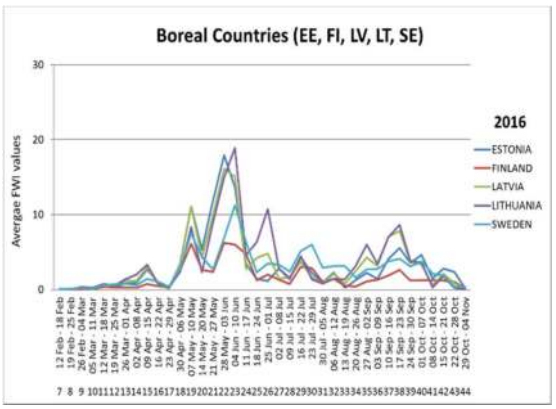
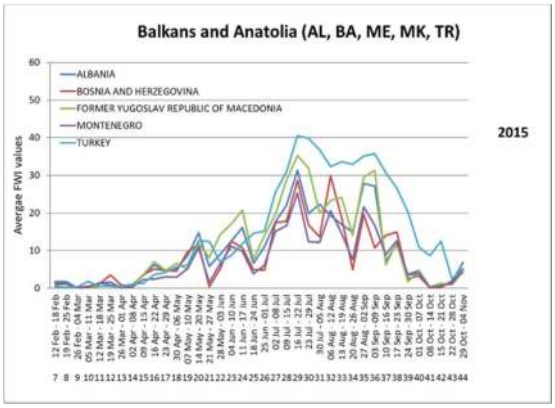
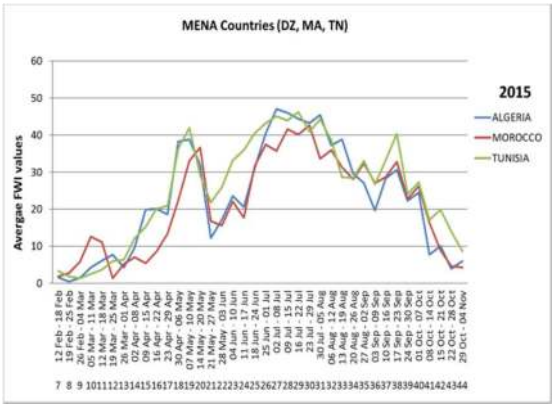


Figure 120. Fire danger trends 2015-2016 in some EU boreal countries (EE, FI, LV, LT, SE).









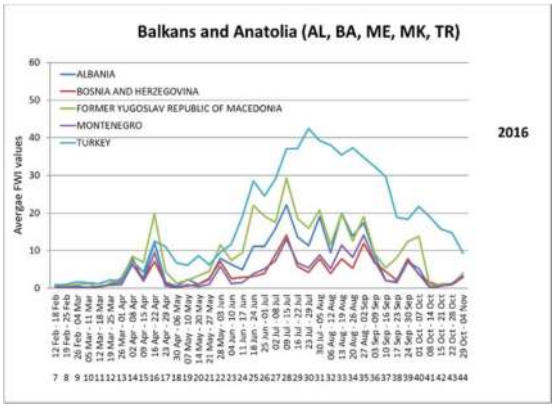


Figure 121. Fire danger trends 2015-2016) in the Balkans and Anatolia (AL, BA, ME, MK, TR).

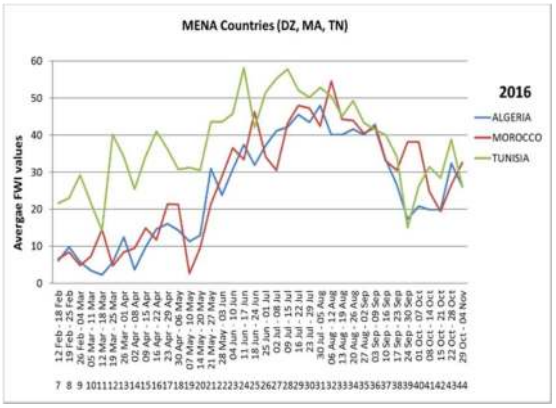


Figure 122. Fire danger trends 2015-2016 in MENA countries (DZ, MA, TN).

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.

2.2 The EFFIS Rapid Damage Assessment: 2016 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 the mapping of all fires of about 30 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 2000 (CLC) database were used. Therefore the mapped burned areas were overlaid to the CLC data, allowing the derivation of 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 meters (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 meters bands, although the MODIS bands at 500 meters 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. This is intended to be a first step towards the enlargement of EFFIS to the non-European countries of the Mediterranean basin.

The results for each of the European 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.

In 2016 fires of greater than 30 ha were observed in 28 countries and a total burnt area of 542 338 ha was mapped. This is around 35% more than the previous year, although still below the high of over 950 000 ha recorded in 2012. The year started quietly, with below average or average levels recorded until August. In the first week of August a greater area burnt than had been recorded in the rest of the year, most of it in Portugal and Turkey.

The total area burned in 2016 by fires larger than 30 ha, as shown by the analysis of satellite imagery, was 542 337 ha (Table 38). These figures may also include agricultural and urban areas that were burned during the forest fires.

Table 38. Areas burned by fires of at least 30 ha in 2016 estimated from satellite imagery.

Country	*Area (Ha)*	*Number of Fires*
Albania	5037.72	21
Algeria	25290.58	87
Belgium	53.88	1
Bosnia & Herzegovina	34481.99	89
Bulgaria	11486.82	29
Croatia	9109.03	30
Cyprus	2737.82	2
France	10792.20	28
Germany	314.35	3
Greece	31759.06	54
Ireland	1177.81	6
Israel	756.79	3
Italy	35291.88	145
Kosovo under UNSCR 1244	403.44	6
Montenegro	8195.21	24
Morocco	3865.25	19
Palestinian Territory	74.05	1
Portugal	166065.41	322
Romania	4366.74	11
Serbia	771.90	5
Slovenia	320.34	3
Spain	52731.77	128
Sweden	99.16	1
Syria	1706.54	9
The former Yugoslav Republic of Macedonia	3908.45	7
Tunisia	4538.96	18
Turkey	125803.61	269
United Kingdom	1196.74	9
TOTAL	**542337.5**	**1330**

Figure 124 below shows the scars caused by forest fires during the 2016 season.

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.

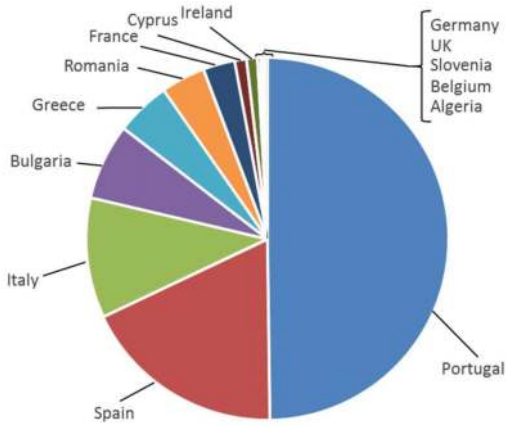
The category of Natura2000 areas only exists in the countries of the European Union.

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 in Figure 123.

The total burnt in protected areas in 2016 was 107 906 ha, more than twice that recorded in 2015. Portugal was by far the most affected country in 2016, accounting for half of the total Natura2000 burnt area.

Summary	Total Area (Ha)
EU28	**327503.02**
Other European countries	**178602.32**
Middle East and North Africa	**36232.18**
Natura2000 and protected sites	**107905.65**

Country	*Area (Ha)*	*% of Natura2000 Area*	*Number of Fires*
Belgium	53.88	0.014	1
Bulgaria	7317.34	0.195	19
Cyprus	1132.19	0.696	2
France	3089.29	0.045	10
Germany	314.35	0.006	3
Greece	5271.54	0.147	20
Ireland	1036.05	0.114	4
Italy	11590.71	0.201	44
Portugal	53719.33	2.811	98
Romania	4226.39	0.099	10
Slovenia	310.17	0.043	3
Spain	19589.61	0.143	58
UK	220.9	0.013	3
EU28 total	**107871.8**		**275**
Algeria	33.9	0.02	2
TOTAL	**107905.7**		**277**



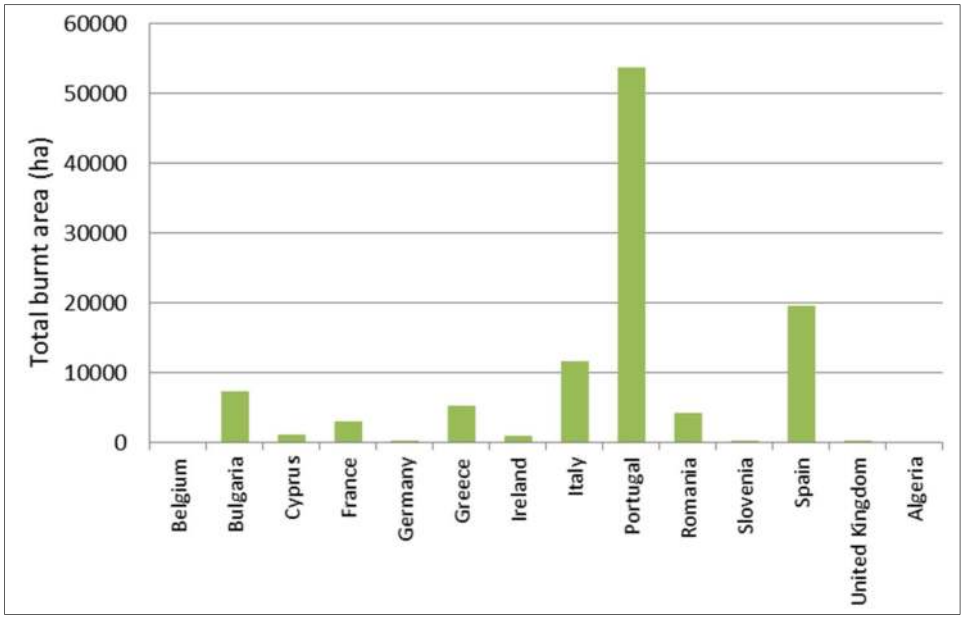


Figure 123. Burnt area in Natura2000 sites and other protected areas in 2016.

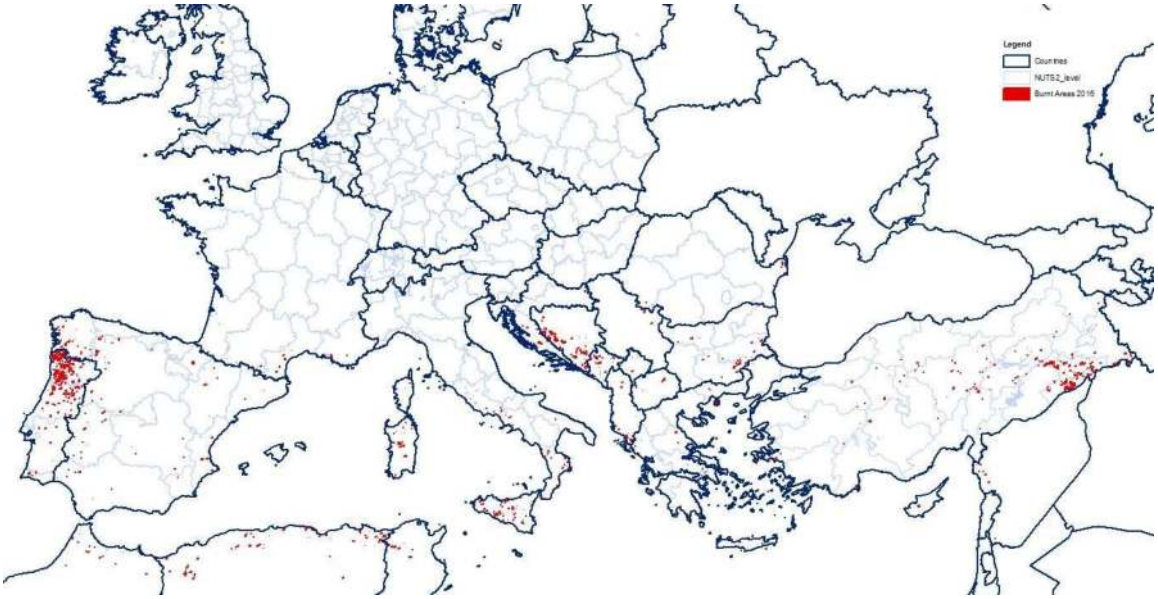


Figure 124. Burnt scars produced by forest fires during the 2016 fire season.

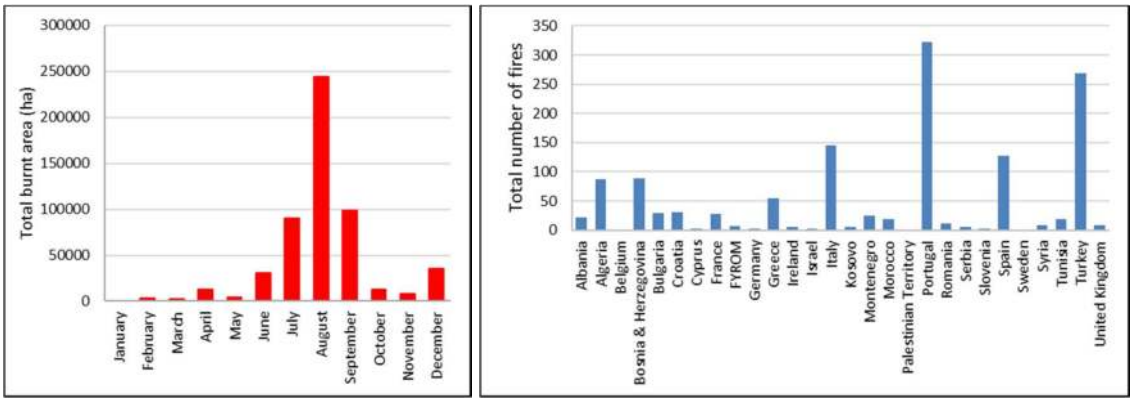


Figure 125. Total burnt area of fires >30 ha by month and by country in 2016

European countries

In 2016, 13 of the EU28 countries were affected by fires of over 30 ha: (Belgium, Bulgaria, Cyprus, France, Germany, Greece, Ireland, Italy, Portugal, Romania, Slovenia, Spain, United Kingdom), burning 327 503 ha in total (around twice the amount that was recorded in 2015, and above the long term average). Of this total, 107 872 ha (33%) were on Natura2000 sites.

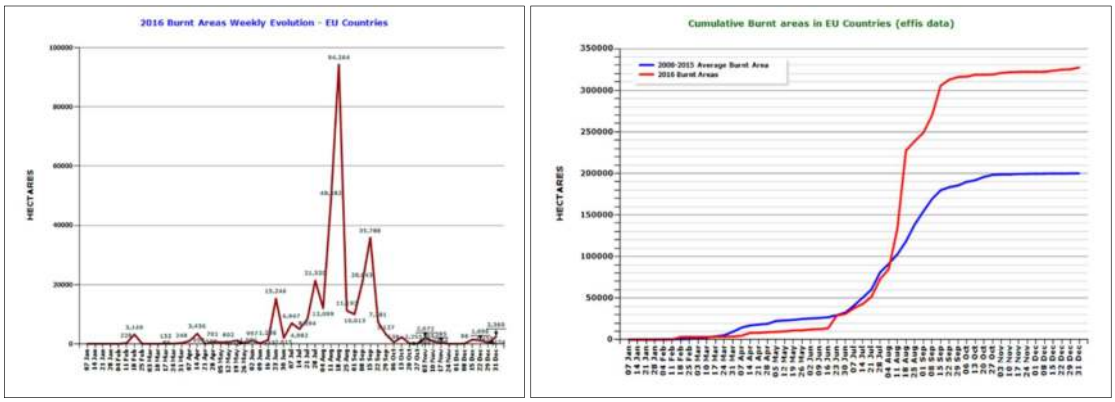


Figure 126. Figure 2. Burnt area weekly evolution and cumulative burnt area (European Union countries).

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

2.2.1 Albania

The total burnt area in Albania went up for the third year running to over 5 000 ha, although this is still only one-tenth of the amounts recorded in 2011 and 2012. There were 21 fires of over 30 ha in 2016, two-thirds of them occurring in August. The largest fire of the year burnt 1 011 ha in Sarandës Province in July, and three fires in August were also over 500 ha. The burnt area scars left by the 2016 fires in Albania can be seen in Figure 128 below.

Table 39. Distribution of burnt area (ha) in Albania by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	2582.31	51.26
Other Natural Land	2182.50	43.32
Agriculture	204.99	4.07
Artificial Surfaces	67.92	1.35
TOTAL	**5037.72**	**100**

2.2.2 Belgium

In Belgium, a fire of 54 ha was recorded in September. This occurred in a Natura2000 site, corresponding to 0.014% of the total Natura2000 areas in the country.

2.2.3 Bosnia and Herzegovina

There were 89 fires of over 30 ha recorded in Bosnia-Herzegovina resulting in a total burnt area of 34 482 ha, over twice that recorded in 2015 and the highest amount since 2012. Two-thirds of the damage was recorded in December, including the biggest two fires of the year, which each covered more than 2 000 ha. Five other fires of over 1 000 ha were also recorded. Table 40 presents the distribution of the mapped burnt area by land cover type. Visible fire scars caused by forest fires in Bosnia-Herzegovina can be seen in Figure 128 below.

Table 40. Distribution of burnt area (ha) in Bosnia-Herzegovina by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	11140.99	32.31
Other Natural Land	17601.12	51.04
Agriculture	5738.99	16.64
Other Land Cover	0.89	0
TOTAL	**34481.98**	**100**

2.2.4 Bulgaria

A total of 29 fires of over 30 ha were recorded in Bulgaria in 2016. In common with much of the region, it was a worse season than the previous three years, while not reaching the amounts of damage seen in 2012. Most of the fires occurred in August and September, including the two largest fires of the season which occurred in Haskovo province and burnt over 1 000 ha each. Of the annual total, 3 717 ha occurred on Natura2000 sites, amounting to 64% of the total and 0.195% of Natura2000 land. The scars caused by these fires can be seen in Figure 127 below.

Table 41. Distribution of burnt area (ha) in Bulgaria by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	3379.69	29.42
Other Natural Land	2178.86	18.97
Agriculture	5871.75	51.12
Artificial Surfaces	17.41	0.15
Other Land Cover	39.11	0.34
TOTAL	**11486.82**	**100**

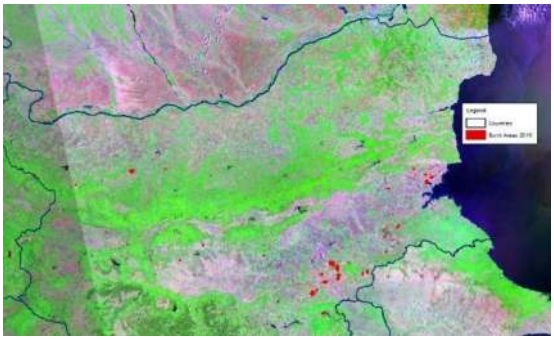


Figure 127. Fire scars in Bulgaria in 2016.

2.2.5 Croatia

The 2016 season in Croatia was worse than the previous 3 years, although well short of the damage seen in 2011 and 2012. The total of 9 109 ha from 30 fires is very close to the long term average. Nearly half of the damage occurred early in the season in April, largely because of one fire in Splitsko-dalmatinska zupanija province that covered 2 836 ha. There was another peak around July/August, and significant damage also occurred at the end of the year in December. The scars caused by these fires can be seen in Figure 128 below. Table 42 presents the distribution of the mapped burnt area by land cover type.

Table 42. Distribution of burnt area (ha) in Croatia by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	3194.22	35.07
Other Natural Land	5057.72	55.52
Agriculture	854.63	9.38
Artificial Surfaces	2.46	0.03
TOTAL	**9109.03**	**100**

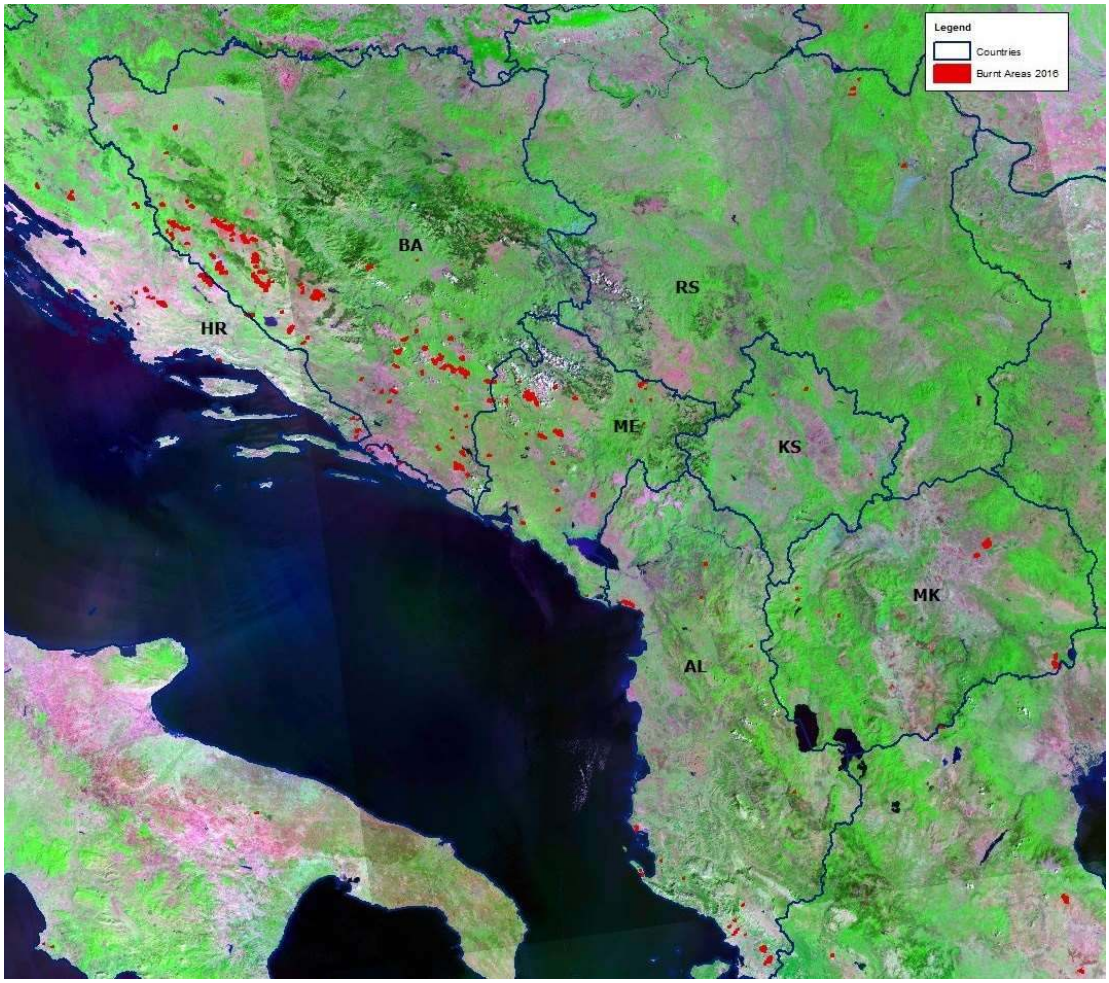


Figure 128. Burnt area scars across the Balkans in 2016. (AL: Albania; BA: Bosnia & Herzegovina; HR: Croatia; KS: Kosovo under UNSCR 1244; ME: Montenegro; MK: former Yugoslav Republic of Macedonia; RS: Serbia).

2.2.6 Cyprus

The total of 2 738 ha burnt in Cyprus was the second highest for 10 years (only 2013 was slightly worse). The damage came from two very large fires that both occurred in June and burnt 1 939 and 799 ha. Of the total, 1 132 ha were on Natura2000 sites, corresponding to 41% of the total area burned, and 0.696% of the total Natura2000 area in the country. The scars caused by these two fires can be seen in Figure 129. Table 43 presents the distribution of the mapped burned area by land cover type.

Table 43. Distribution of burnt area (ha) in Cyprus by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	2716.85	99.23
Agricultural Areas	20.97	0.77
TOTAL	**2737.82**	**100**

Figure 129. Impact of forest fires in Cyprus in 2016.

2.2.7 The former Yugoslav Republic of Macedonia

2016 was the quietest year in the former Yugoslav Republic of Macedonia since 2010. There were 7 large fires burning 2 908 ha, of which 4 in August caused most of the damage. The largest fire occurred in the Eastern province and covered 1 789 ha, and there were two other fires of over 500 ha the same month. The rest of the damage came from 3 smaller fires in December. Visible fire scars from these fires can be seen in Figure 128 above. Table 44 presents the distribution of the mapped burned area by land cover type.

Table 44. Distribution of burnt area (ha) in FYROM by land cover types in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded Land	1178.02	30.14
Other Natural Land	93.05	2.38
Agricultural Areas	2613.83	66.88
Other Land Cover	23.55	0.6
TOTAL	**3908.45**	**100**

2.2.8 France

France had the worst fire season for more than a decade. In common with many other countries, the season was quiet until August, when over 6 000 ha burnt in one month: more than the annual totals of the previous 6 years. The south of the country was particularly affected, with one fire of over 3 000 ha occurring in the Bouches du Rhone region. 6 other fires were over 500 ha, including one of 656 ha in Corsica. In total 10 792 ha was affected by 28 fires of over 30 ha. Of this, 3 089 ha were on Natura2000 sites, corresponding to 28% of the total area burned, and 0.045% of the total Natura2000 areas in the country. Table 45 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 130.

Table 45. Distribution of burnt area (ha) in France by land cover types in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded Land	6841.69	63.39
Other Natural Land	1785.95	16.55
Agriculture	1488.06	13.79
Artificial Surfaces	644.09	5.97
Other Land Cover	32.41	0.3
TOTAL	**10792.2**	**100**

2.2.9 Germany

In Germany there were three fires in May, August and September which resulted in a total burnt area of 314 ha. The area covered was 100% in Natura2000 sites, and amounts to 0006% of the Natura2000 area in the country.

Table 46. Distribution of burnt area (ha) in Germany by land cover types in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded Land	77.35	24.61
Other Natural Land	237.00	75.39
TOTAL	**314.35**	**100**

Figure 130. Impact of fires in southern France and Corsica in 2016.

2.2.10 Greece

The fire season in Greece was the worst since 2012. Some of the islands were particularly affected: one fire on Chios covered 5 242 ha (see box on page 105). There were also very large fires on Thasos, Samos and Crete. The season was long, with significant fires occurring from June to September, but also with activity continuing until December. Of the total burnt area in 2016, 5 271 ha were on Natura2000 sites, corresponding to 16% of the total area burned and to 0.147% of the Natura2000 areas in the country. Table 47 presents the distribution of the mapped burnt area by land cover type. Figure 131 shows the damage caused by forest fires in Greece.

Table 47. Distribution of burnt area (ha) in Greece by land cover types in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded Land	18676.17	58.81
Other Natural Land	6068.71	19.11
Agriculture	6716.58	21.15
Artificial Surfaces	296.23	0.93
TOTAL	**31757.7**	**100**

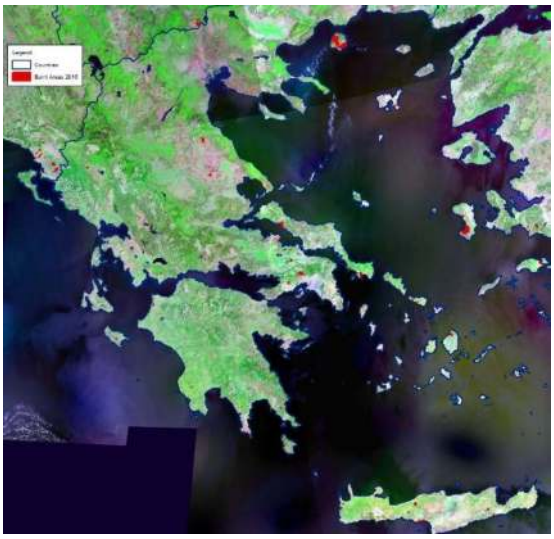


Figure 131. Satellite image showing burnt area scars in Greece in 2016.

2.2.11 Ireland

Ireland had a much lighter season than the previous year, with 6 fires of over 30 ha burning 1 178 ha in April and May. Half of the damage came from a single large fire in the west of the country, which burned over 600 ha. 88% of the burnt area (1 036 ha) was recorded in Natura2000 sites, corresponding to 0.114% of the total Natura2000 land in the country. The most affected land type was Other Natural Land, as shown in Table 48.

Table 48. Distribution of burnt area (ha) in Ireland by land cover types in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded Land	72.85	6.19
Other Natural Land	1103.33	93.68
Agriculture	1.03	0.09
Other Land Cover	0.59	0.05
TOTAL	**1177.81**	**100**

2.2.12 Italy

In Italy a greater amount burned than in the previous three years combined, although this was still far below the peak of 2012 and below the long term average. The critical month was July, but large fires were recorded from May to December. The 10 largest fires of the season all occurred on Sicily and Sardinia (the biggest one occurred in Oristano province in July and covered over 5 000 ha). Of the year's total, 11 591 ha of damage occurred on Natura2000 sites, corresponding to 33% of the total area burned, and 0.2% of the total Natura2000 area in the country. Table 60 presents the distribution of the mapped burnt area by land cover type. Figure 132 shows the burnt area scars left by fires in Italy and the islands in 2016.

Table 49. Distribution of burnt area (ha) in Italy by land cover types in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded Land	11121.9	31.51
Other Natural Land	8252	23.38
Agriculture	15688.88	44.45
Artificial Surfaces	171.13	0.48
Other Land Cover	57.98	0.16
TOTAL	**35291.88**	**100**

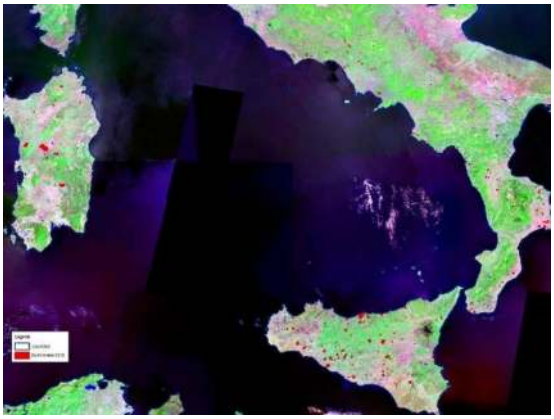


Figure 132. Burnt area scars in Italy, Sicily and Sardinia in 2016.

2.2.13 Kosovo under UNSCR 1244

In 2016 there were 6 fires of over 30 ha in Kosovo, burning a total of 403 ha. Most of the damage occurred in April, but there was also some damage in December. Table 52 shows the classification of the burnt area by land type. The burnt area scars left by these fires can be seen in Figure 128 above.

Table 50. Distribution of burnt area (ha) in Kosovo by land cover types in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded Land	369.14	91.5
Other Natural Land	32.60	8.08
Agriculture	1.70	0.42
TOTAL	**403.44**	**100**

2.2.14 Montenegro

Montenegro had a lighter season than in 2015. 24 fires over 30 ha burnt a total of 8 195 ha – two-thirds the damage recorded the previous year. Around 75% of the total burnt area occurred from a number of large fires in December – the largest in Plužine burned over 2 000 ha. The scars from these fires can be seen in Figure 128 above and Table 51 shows the classification of the burnt area by land type.

Table 51. Distribution of burnt area (ha) in Montenegro by land cover types in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded Land	3237.89	39.51
Other Natural Land	4775.31	58.27
Agriculture	178.93	2.18
Artificial Surfaces	3.08	0.04
TOTAL	**8195.21**	**100**

2.2.15 Portugal

Portugal was by far the country most affected by forest fires. Nearly one-third of the total burnt area recorded in 2016 was from Portugal – the vast majority in the first half of August, although before then the year had been relatively quiet (Figure 134). The largest fire of 2016 was recorded in Portugal – 26 593 ha in Entre Douro e Vouga. 29 other fires were greater than 1000 ha in size, in addition to over 30 others of more than 500 ha. The Portuguese island of Madeira was also severely affected by two very large fires that between them burned over 5 000 ha. Of the total burnt area mapped in 2016, 53 719 ha occurred on Natura2000 sites, corresponding to 32 % of the total area burnt, and 2.8 % of the total Natura2000 areas in Portugal. The distribution of the mapped burnt area by land cover type is shown in Table 52. The mapped burnt areas can be seen in Figure 133. Box 1 below shows the damage caused in Madeira.

Table 52. Distribution of burnt area (ha) in Portugal by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	91989.28	55.39
Other Natural Land	56808.15	34.21
Agriculture	16336.68	9.84
Artificial Surfaces	854.41	0.51
Other Land Cover	76.89	0.05
TOTAL	**166065.41**	**100**

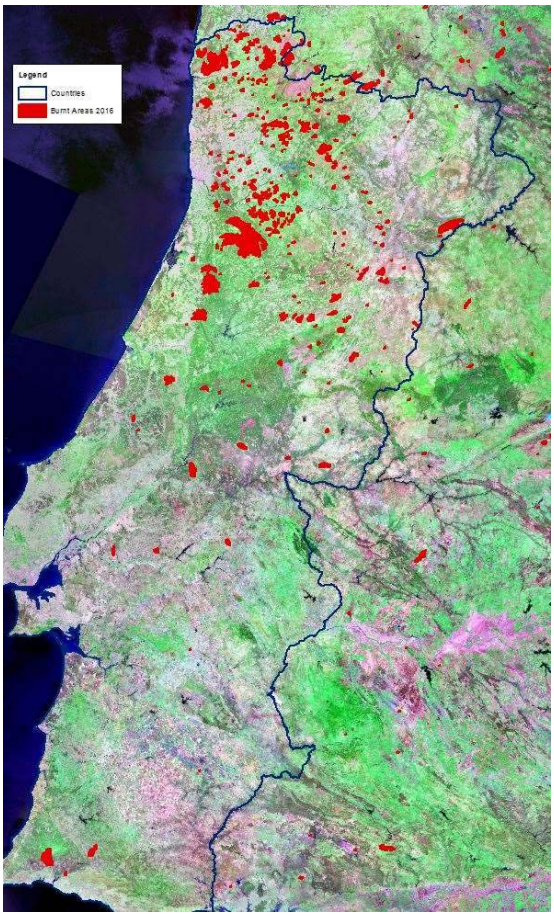


Figure 133. Burnt area scars in Portugal in 2016.

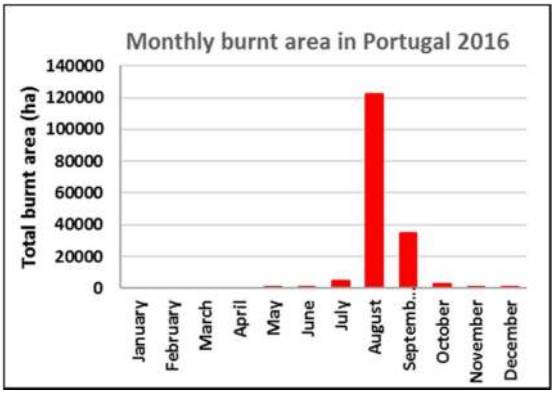


Figure 134. Monthly evolution of burnt area in Portugal in 2016.

2.2.16 Romania

In Romania there were there were 11 large fires burning a total of 4 367 ha in 2016, around 60% of the total of the previous year. Over three-quarters of the damage occurred early in the season in February, including Romania's largest fire of the season (1 446 ha in the east of the country in Tulcea province) as well as two other fires of over 500 ha in the same province (Figure 135). As in 2015, almost all (97%) of the mapped burnt area was on Natura2000 sites. This represents 0.099% of the total Natura2000 area of Romania. Table 52 presents the distribution of the mapped burnt area by land cover type. The fires in the Other Land Cover class occurred in the Danube Delta, entirely in the reed vegetation.

Table 53. Distribution of burnt area (ha) in Romania by land cover types in 2016.

Land cover	*Area*	*% of total*
Other Natural Land	120.11	2.75
Other land cover	4226.39	96.79
Agriculture	20.24	0.46
TOTAL	**4366.74**	**100**

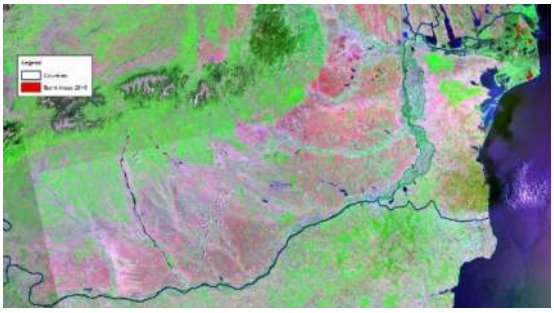


Figure 135. Burnt area scars in Romania in 2016.

2.2.17 Serbia

There were 5 fires of over 30 ha in Serbia, all occurring in April, resulting in a total burnt area of 772 ha. This is around 75% of the area burnt the previous year. Table 54 presents the breakdown of burnt area by land cover type. Figure 128 above shows the location of these fires.

Table 54. Distribution of burnt area (ha) in Serbia by land cover type in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded Land	549.48	71.19
Other Natural Land	167.79	21.74
Agriculture	54.63	7.08
TOTAL	**771.9**	**100**

2.2.18 Slovenia

In Slovenia, three large fires in August caused a total of 320 ha of damage. Almost all of this (97%) was on Natura2000 land, accounting for 0.043% of the Natura2000 area of the country. Table 55 presents the distribution of the mapped burned area by land cover type.

Table 55. Distribution of burnt area (ha) in Slovenia by land cover types in 2016.

Land cover	*Area*	*% of total*
Forest/Other Wooded	156.49	48.85
Other Natural Land	1.47	0.46
Agriculture	162.39	50.69
TOTAL	**320.34**	**100**

2.2.19 Spain

Spain had a somewhat lighter year than in 2015, although it was still ranked as the third most affected country in 2016 (behind Portugal and Turkey). 128 fires over 30 ha were recorded from May to December, burning a total of 52 732 ha. Three-quarters of the damage occurred in August and September. Spain's largest fire of the year occurred in the island La Palma, where 4 629 ha were burnt. A further 14 fires of over 1 000 ha were also recorded. Of the total burnt in 2016, 19 590 ha were on Natura2000 sites, corresponding to 37% of the total area burned, and 0.143% of the Natura2000 areas in Spain. Table 56 presents the distribution of the mapped burnt area by land cover type. The most noticeable fires in Spain during 2016 are shown in Figure 136. For an image of the fire in La Palma, see the box on page 105.

Table 56. Distribution of burnt area (ha) in Spain by land cover type in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	30156.71	57.19
Other Natural Land	15026.02	28.5
Agriculture	7417.92	14.07
Artificial Surfaces	119.60	0.23
Other Land Cover	11.51	0.02
TOTAL	**52731.77**	**100**

Figure 136. Burnt area scars in Spain in 2016.

2.2.20 Sweden

In Sweden a single large fire of 99.16 ha was mapped in May. The burnt area was entirely in Forest and Other Wooded Land and none of it impacted Natura2000 areas.

2.2.21 Turkey

After a bad fire season in 2015 in Turkey, the 2016 one was even worse, making it the second most affected country after Portugal. 269 fires of over 30 ha were recorded throughout the year, covering a total of 125 804 ha, most of it in the south-east regions of the country. This is more than twice as much as was recorded in 2015 (itself the worst year for a decade). Two-thirds of the damage occurred in July and August, although large fires were recorded from April to November. Mardin was the most affected province with 15 fires of over 1 000 ha, the largest in August in Nusaybin covering 5 587 ha. Table 57 presents the distribution of the mapped burned area by land cover type. Two-thirds of the burnt area in the Forest/Other Wooded Land category was in transitional woodland/shrubland. The visible scars from forest fires in the south-east of the country are shown in Figure 137.

Table 57. Distribution of burnt area (ha) in Turkey by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	39054.18	31.04
Other Natural Land	68923.45	54.79
Agriculture	17562.52	13.96
Artificial Surfaces	170.17	0.14
Other Land Cover	93.29	0.07
TOTAL	**125803.61**	**100**

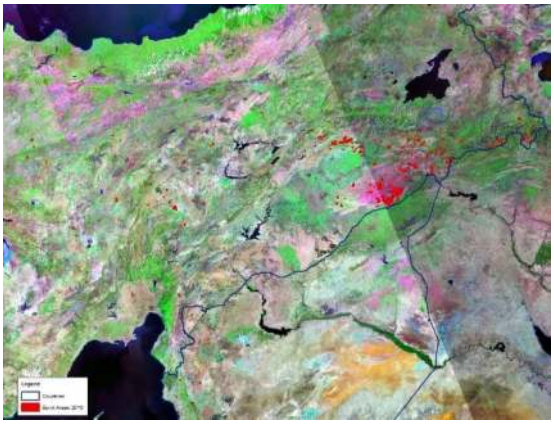


Figure 137. Burnt area scars in Turkey in 2016.

2.2.22 United Kingdom

Nine fires of over 30 ha burned 1 197 ha in the UK in 2016 between March and June, around half the amount recorded in 2015. 221 ha of this occurred on Natura2000 land, amounting to 18% of the total and 0.013% of the Natura2000 land in the UK. Table 58 presents the distribution of the mapped burnt area by land cover type.

Table 58. Distribution of burnt area (ha) in the UK by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	46.72	3.9
Other Natural Land	1150.02	96.1
TOTAL	**1196.74**	**100**

Box 1. Large fires on small islands

2016 was notable in that a number of the largest fires of the season occurred on small islands, having a huge impact as a result. These include:

8 July Samos 783 ha

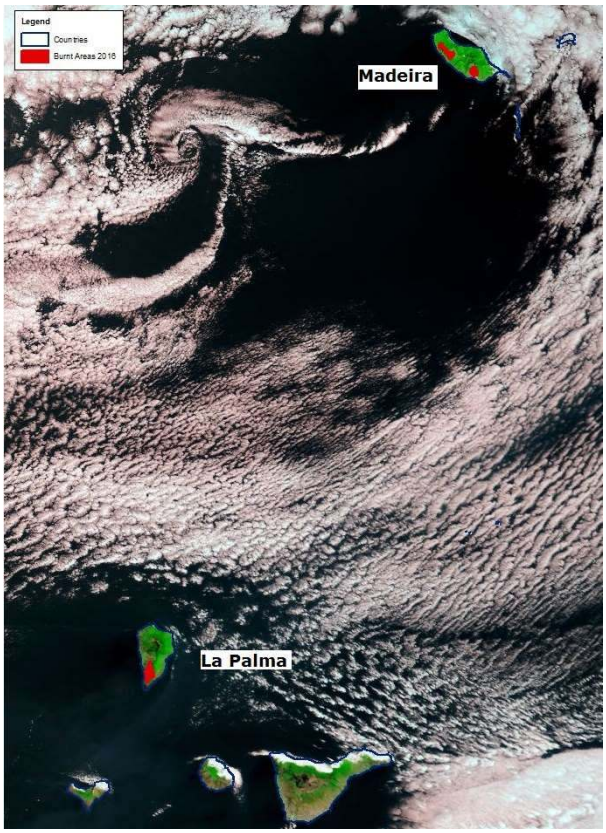
This fire was started accidentally by a crew of workers conducting repair work near a rubbish dump.

25 July Chios 5242 ha

The fire destroyed mastic trees in the south of the island just before the August harvesting season for the product, and prompted a state of emergency.

10 September Thasos 4079 ha and 3896 ha

During a powerful "dry" storm, dozens of lightning strikes hit the island's mountains and ignited a number of forest fires. Fed by very strong winds, the fires quickly spread and grew to something not seen since the fires of the late 1980s.



3 August La Palma 4629 ha

Started negligently by a man burning his toilet paper, the fire covered nearly 7% of the island causing mass evacuations and one death.

8 August Madeira: Ponta do Sol 3264 ha and Funchal 2145 ha

The fire in the capital Funchal caused 3 deaths and destroyed buildings in the city. A second fire in Canhas (Ponta do Sol) raged at the same time and affected mostly natural vegetation, including Madeira's natural laurel forest.

2.3 Middle East and North Africa

The 2016 fire season in North Africa and the Middle East was the best for several years, with a total burnt area recorded over the region of 36 232 ha, around a quarter of the amount recorded in 2015. The most affected of the MENA countries was Algeria, amounting to over two-thirds of the total.

2.3.1 Algeria

Algeria had a very light year for forest fires in 2016, despite being the most affected of the MENA countries. The season peaked in July, slightly earlier than usual, and finished later than usual, with some large fires occurring in November and December. In total there were 87 fires over 30 ha, burning 25 291 ha. Very little damage was recorded in Protected Areas in 2016 (only 34 ha). Three fires were over 1 000 ha in size, the largest in Sidi-Bel-Abbes province (1 508 ha). The burnt scars left by these fires can be seen in Figure 138 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 59.

Table 59. Distribution of burnt area (ha) in Algeria by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	10346.10	40.91
Other Natural Land	3431.04	13.57
Agriculture	11513.43	45.52
TOTAL	**25290.58**	**100**

2.3.2 Israel

In 2016 there were a number of serious fires in Israel. Most of them were too small to be mapped but 3 fires, all in November, caused 757 ha of damage. The majority of this was from one fire in Jerusalem province which burned 580 ha (Figure 139 below). Table 60 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 60. Distribution of burnt area (ha) in Israel by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	462.73	61.14
Agriculture	294.06	38.86
TOTAL	**756.79**	**100**

2.3.3 Morocco

Morocco's fire season was somewhat worse than the previous 3 years. 19 fires burning a total of 3 865 ha were recorded between March and October, two-thirds of the damage occurring in July and August. None of this total, however, occurred in Protected Areas. 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 61 and the burnt area scars left by the fires are shown in Figure 138.

Table 61. Distribution of burnt area (ha) in Morocco by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	2995.86	77.51
Other Natural Land	128.93	3.34
Agriculture	740.47	19.16
TOTAL	**3865.25**	**100**

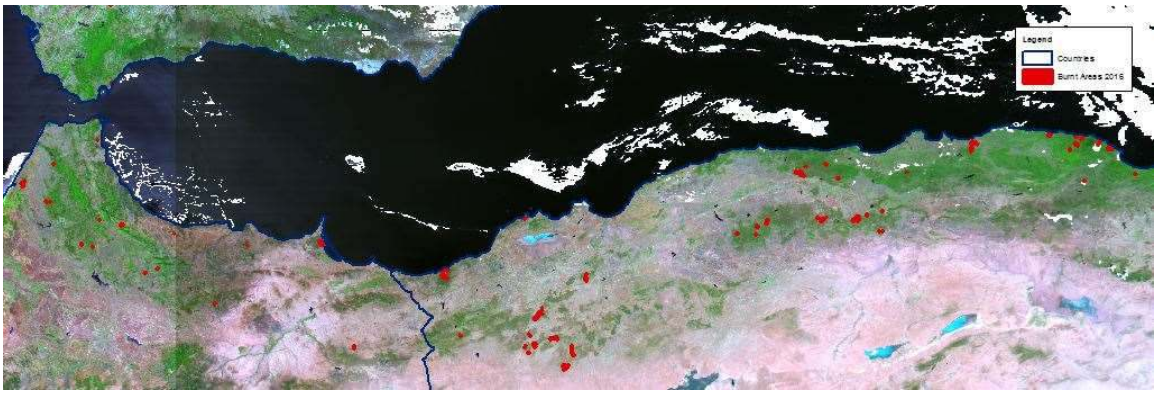


Figure 138. Burnt area scars in Morocco and Algeria in 2016.

2.3.4 Palestinian Territory

In November a fire of 74 ha was recorded in Palestinian territory, a marked decrease from the 1 533 ha recorded in 2015. Table 60 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 62. Distribution of burnt area (ha) in Palestinian Territory by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	25.58	34.55
Agriculture	48.47	65.45
TOTAL	**74.05**	**100**

Figure 139. Forest fire scars across the Middle East in 2016.

2.3.5 Syria

In contrast to 2015, when over 90 000 ha was burnt, 2016 was a much quieter year for Syria regarding forest fires. Only 9 fires of over 30 ha were recorded between April and November resulting in a total burnt area of 1 707 ha. The largest fire burnt 650 ha in Hamah district in July (in contrast to the previous year when there were 46 fires over 500 ha). The Globcover land cover map, harmonised with CLC, was used to split the burnt area into different land type categories.

Table 63 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 139.

Table 63. Distribution of burnt area (ha) in Syria by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	870.74	51.02
Other Natural Land	25.56	1.5
Agriculture	810.24	47.48
TOTAL	**1706.54**	**100**

2.3.6 Tunisia

In common with the other MENA countries, Tunisia had a light year for forest fires. 18 fires greater than 30 ha were recorded between June and September, burning a total of 4 539 ha, around 75% the total recorded in 2015. 95% of the damage occurred in July and August, including one fire of 924 ha in Le Kef province in August. Figure 140 shows the burnt scars left by these fires, and 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 64.

Table 64. Distribution of burnt area (ha) in Tunisia by land cover types in 2016.

Land cover	*Area burned*	*% of total*
Forest/Other Wooded Land	4164.25	91.74
Other Natural Land	9.14	0.2
Agriculture	339.33	7.48
Artificial Surfaces	1.98	0.04
Other Land Cover	24.26	0.53
TOTAL	**4538.96**	**100**

Figure 140. Burnt area scars in Tunisia in 2016.

2.4 EFFIS Applications

2.4.1 The EFFIS Fire Database

Background information

The Fire Database is an important component of EFFIS, containing forest fire information compiled by EU Member States and the other countries members of the EFFIS network.

The first steps to create a forest fire database were taken under the **Regulation EEC No 2158/92** (now expired), which set up an action framework focussing mainly on measures for the prevention of forest fires. Under the regulation, a first forest fire information system, referred to as the Common Core Database, was established in order to collect information on forest fires, their causes and to improve the understanding of forest fires and their prevention.

Detailed rules for the application of this forest fire information system were given in the subsequent **Regulation EEC No 804/94** which made the systematic collection of a minimum set of data on each fire event a matter of routine for the Member States participating in the system. The Common Core Database covered six Member States of the Union: Germany, Portugal, Spain, France, Italy and Greece. Regulation 2158/92 was renewed for five years in 1997 and expired on 31 December 2002.

The **Forest Focus Regulation (EC) No 2152/2003** was built on the achievements of the two previous Council Regulations on the protection of Community's forests against atmospheric pollution and forest fires. According to the implementing rules of the Regulation, monitoring of forest fires in Europe continued to be recorded in order to collect comparable information on forest fires at Community level.

The forest fire data provided each year by individual EU Member States through the above-mentioned EU regulations, and additional data coming from other European countries have been checked, stored and managed by JRC within EFFIS.

Structure and collected information

The database contains four types of information: about the time, location, size and cause of the fire (Table 65).

Before being accepted into the database, the submitted data pass through a validation phase. The checks include the following:

Time of fire

- Is the date valid?
- Does the date given in the file match the year given in the filename?
- Does the date/time of intervention/extinction occur after the initial date/time of alert?
- Is the duration of the fire reasonable given its size?

Location of fire

- Do the place names exist and are they correctly spelt?
- Are the commune name/code/NUTS codes consistent with each other?
- Is the correct (up to date) code used?
- If information is missing, is it possible to obtain it from cross-referring other data?
- If North/East values are given, are they plausible?

Size of fire

- Are the values plausible (e.g. correct units)?
- Have the categories (Forest, Non-forest, etc.) been assigned correctly?

Cause of fire

- Is the mapping between the country cause code and EU code consistent/correct?

Data stored in the database

In 2012 the 4 MENA countries submitted data for entry into the database, bringing the number of countries now contributing to 26 (Algeria, Bulgaria, Croatia, Cyprus, Czech, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Lebanon, Morocco, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tunisia and Turkey). The database currently contains 2.55 million individual fire event records (1.94 million forest fires). See Table 66 on page 112 for a summary.

More detailed information about the database can be found in the technical report "*The European Fire Database: Technical specifications and data submission*" EUR26546 EN, which can be downloaded from:

http://effis.jrc.ec.europa.eu/reports-and-publications/effis-related-publications/

Access to the information

This application can be accessed at http://effis.jrc.ec.europa.eu/applications/fire-history/, which allows the users to retrieve general information such as maps of the number of fires, burnt area and average fire size for a selected year and for the countries for which data are available (Figure 141).

The data can be displayed at country, NUTS1, NUTS2 or NUTS3 level and may be filtered to exclude fires below a certain size, while an interactive graphical facility allows the user to display the same fire statistics over time.

Requests can be made to the EFFIS team for data aggregated by NUTS3 region or country and summarised by month or year.

Table 65. Information collected for each fire event.

ID	Unique Fire identifier	FIREID
TIME OF FIRE	Date of first alert [YYYYMMDD]	DATEAL
	Time of first alert [HHMM]	TIMEAL
	Date of first intervention [YYYYMMDD]	DATEIN
	Time of first intervention [HHMM]	TIMEIN
	Date of fire extinction [YYYYMMDD]	DATEEX
	Time of fire extinction [HHMM]	TIMEEX
LOCATION OF FIRE	Province Code (national nomenclature)	PROVCODE
	NUTS3 code	NUTS3
	Commune Code (national nomenclature)	CODECOM
	Commune Name (national nomenclature)	NAMECOM
	Latitude [decimal degrees]	NORTH
	Longitude [decimal degrees]	EAST
SIZE OF FIRE (Ha)	Burnt Area FOREST	BAFOR
	Burnt Area OTHER WOODED LAND	BAOW
	Burnt Area OTHER NON WOODED NATURAL LAND	BAONW
	Burnt Area AGRICULTURE AND OTHER ARTIFICIAL LAND	BAAGR
CAUSE OF FIRE	Certainty of knowledge of Presumed Cause (New EU code)	CAUSE_KNOWN
	Presumed Cause (New EU categories code)	CAUSE_EU
	Presumed Cause (Country detailed categories code)	CAUSE_CO

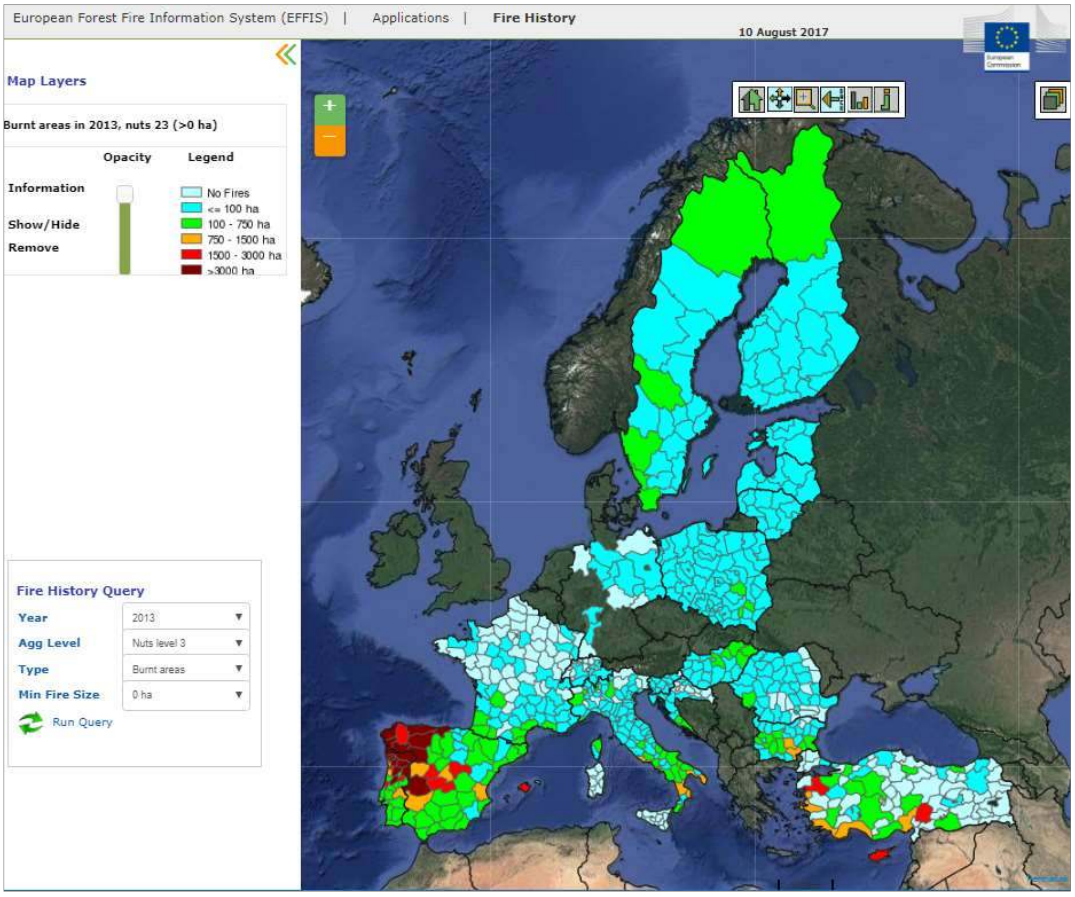


Figure 141. Access to the information stored in the European Fire Database from EFFIS web interface.

2.4.2 The Fire News Application

The purpose of this application is to display geo-located news items about forest fires from a number of sources. News items are added to the map daily by team members during the fire season. The resulting list can be sorted by any of the displayed variables and filtered by date, size class or country.

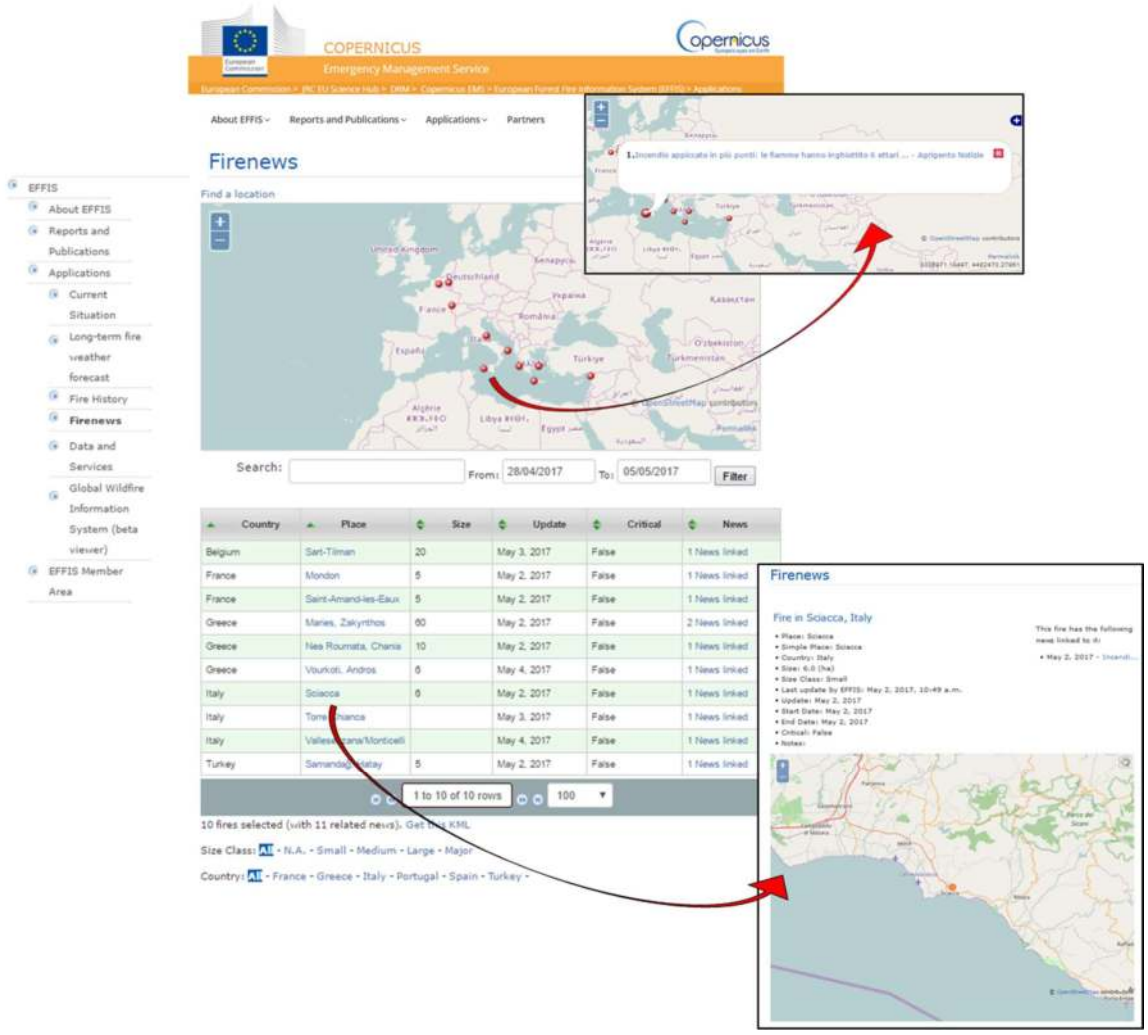
[**N.B.** It is important to note that not all fires are displayed here: only those reported in the media with an identifiable location. Fires are not always reported individually (or at all) in the press, and the space devoted to them depends on other current world events].

Clicking on a point on the map gives a link to the original news item associated with that point.

Clicking on the name in the list gives a table with details of the fire and a close-up of the map.

By default the display shows fires occurring in the last week, but the **From** and **To** boxes can be used to select other time periods – even for past years. The Search box allows the user to narrow down the display from among the total selected in the date filters.

This application can be accessed at http://effis.jrc.ec.europa.eu/applications/fire-news/



2.4.3 The Current Situation Application

The current situation allows the user to view and query map layers, giving an indication of the fire situation across Europe for the current date and surrounding short term time frame.

The application is normally updated between March and October.

In the Fire Danger Forecast section ① two different sources and 8 different indices can be displayed, for the current day and up to 8 days in the future.

The Rapid Damage Assessment ② allows the user to display active fire information and burnt area information from two sources.

In the Analysis Tools section ③ there is a Burnt area locator, where the burnt area for the whole area or for a given country/region can be displayed. A close-up view of the individual fire perimeter is shown if the user clicks on a specific fire.
The Seasonal Trend button displays the current cumulative burnt area or number of fires mapped in EFFIS, alongside the long term average.

A tool bar ④ has a number of controls for changing the view and displaying the legend.

This application can be accessed at
http://effis.jrc.ec.europa.eu/static/effis_current_situation/public/index.html

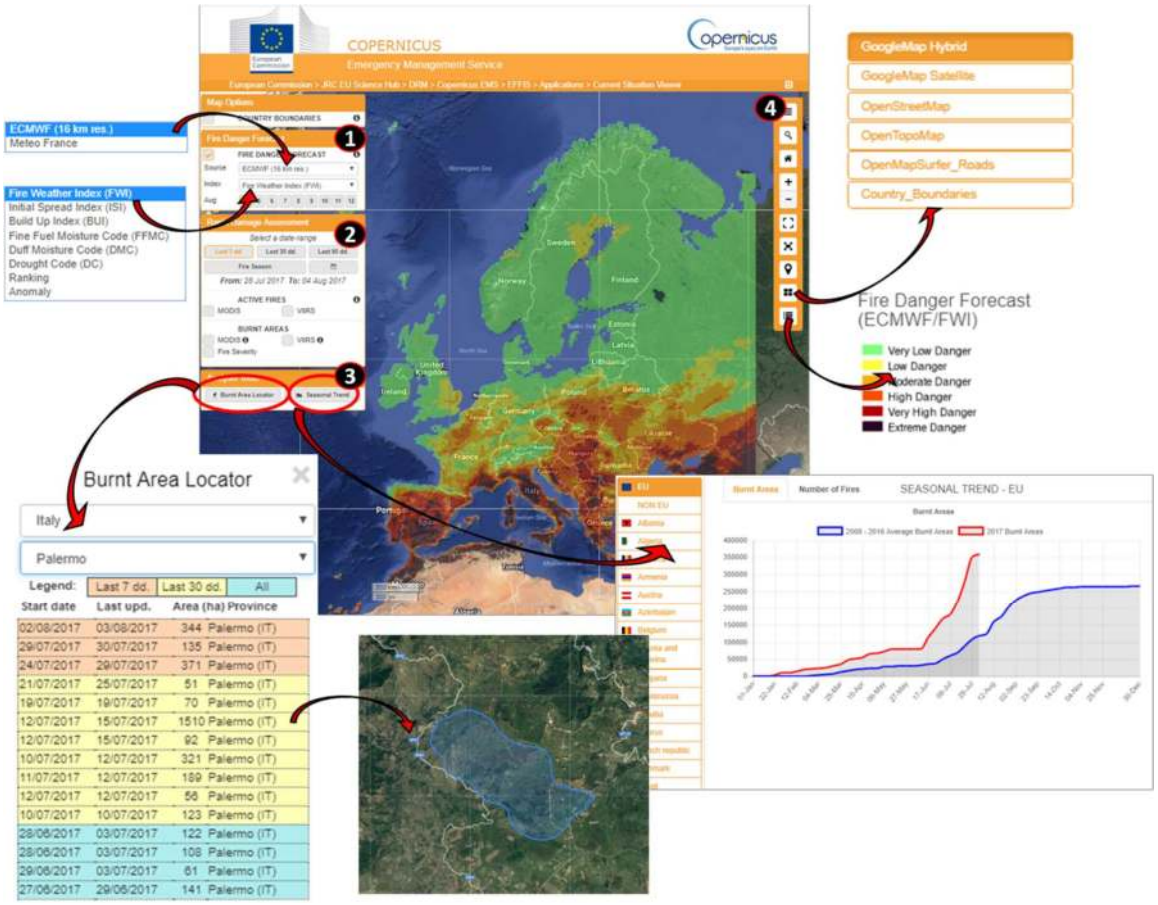


Table 66. Summary of data records stored in the Fire Database.

	BG	CH	CY	CZ	DE	EE	ES	FI	FR	GR	HR	HU	IT	LT	LV	PL	PT	RO	SE	SI	SK	TR	DZ	LB	MA	TN
1980		86															2349									
1981		151															6730									
1982		82															3626									
1983		117								945							4542									
1984		178								1184							7356									
1985		114					12235		3732	1417			12931				8441									75
1986		86					7514		2657	1088			6115				5036									89
1987		121					8816		2116	1234			8506				7705									207
1988		78					9440		2240	1798			9785				6131									158
1989		189					20250		3321	1203			8328				21896									70
1990		249					12914		3297	1283			11560				10745									118
1991		151					13529		2372	1036			7580				14327									97
1992		84					15956		2708	2008			10044				14954									182
1993		83					14253		4766	2707			14317				16101									183
1994		86			706		19249		4728	1955			7153			24361	19983									131
1995		94			525		25557		6539	1494			5505			23816	34116			44						13
1996		126			822		16586		6401	1527	3147		6064			23582	28626		4854	47						13
1997		177			276		22320		8001	2271	3795		11608			25068	23497		7057	55						98
1998		117			592		22003		6289	605	5485		9565			21342	34676		2503	143						-
1999		50			794		17943		4881	513	3856		6956			32646	25477		4707	55						-
2000		66	285		930		23574		4343	1469	7897		8609			31809	34109		4708	100						-
2001		64	299		373		19099		4259	1313	4048		7227			24511	27982		4831	60						-
2002		105	243		278		19929		4097	572	4713	429	4607			38154	28738		6490	64						-
2003		262	427		1238		18616		7023	622	6937	373	9716			79013	26941		8282	227						-
2004		71	221	957	300		21396		3767	739	2859	104	6341	430	647	36315	26945	34	4955	50	153					-
2005	251	81	185	653	299	65	25492	2631	4698	718	3372	150	7918	267	365	46542	40965	64	4573	74	287	1530				-
2006	393	78	172	697	717	248	16334	6314	4608	764	3580	97	5651	1444	1929	35630	23647	105	4618	106	238	2227			347	216
2007	1479	79	111	809	435	64	10932	2813	3382	1226	5177	603	10736	245	426	31303	23956	478	3787	129	463	2706			304	292
2008	582	57	114	470	560	71	11656	3161	2781	1071	228	502	6648	272	716	35786	18619	91	5420	68	182	2135			267	259
2009	314	83	91	-	575	47	15642	2746	4808	354	181	608	5423	471	890	30912	29218	190	4180	122	347	-			487	199
2010	222	73	133	-	525	30	11722	3100	3828	540	131	109	4884	106	319	24443	25013	70	3120	33	123	1861			597	264
2011	635	102	85	-	515	24	16417	2871	4283	953	279	2021	8181	137	373	39011	38118	340	3534	114	303	-			568	262
2012	876	71	78	-	451	5	15978	1050	3713	-	570	2657	10345	81	162	53907	30740	911	2213	168	517	2449	5036	99	484	493
2013	408	58	135	-	355	15	10797	2864	2061	-	137	761	2077	119	420	25652	27372	118	4907	75	-	3755	-	-	411	-
2014	151	57	68	-	251	91	9806	3637	1729	-	43	1042	1821	155	695	38115	11387	83	4374	35	-	-	-	-	460	-
2015	439	-	87	-	594	67	-	1644	2891	-	176	1069	5424	247	704	60176	23175	250	2700	93	-	-	-	-	425	-

General notes on Table 66:

- 2016 data are still undergoing validation checks and are not presented.
- The totals given in this table do not always match the published number of fires for a number of reasons:
  1. Purely agricultural fires are stored in the database if submitted by the country, but are excluded from forest fire calculations;
  2. Some countries do not report detailed records for the whole of their territory and the information is only available in summary form.

3 Background documentation

NB All reports from past years can be found in
http://forest.jrc.ec.europa.eu/effis/reports/annual-fire-reports/

European Commission, 2001, Forest Fires in Southern Europe: Bulletin of the 2000 fire campaign, SPI 01.85, p. 8.

European Commission, 2001, Forest fires in Southern Europe: Report No. 1, July 2001, SPI 01.95, Office for Official Publications of the European Communities, Luxembourg. p. 40.

European Commission, 2002, Forest Fires in Europe: 2001 fire campaign, SPI.02.72, Office for Official Publications of the European Communities, Luxembourg, p. 27.

European Commission, 2003, Forest Fires in Europe: 2002 fire campaign, SPI.03.83, Office for Official Publications of the European Communities, Luxembourg. p. 35.

European Commission, 2004, Forest Fires in Europe: 2003 fire campaign, SPI.04.124, Office for Official Publications of the European Communities, Luxembourg. p. 51.

European Commission, 2005, Forest Fires in Europe 2004, S.P.I.05.147, Office for Official Publications of the European Communities, Luxembourg. p. 45.

European Commission, 2006, Forest Fires in Europe 2005, EUR 22312 EN, Office for Official Publications of the European Communities, Luxembourg. p. 53.

European Commission, 2007, Forest Fires in Europe 2006, EUR 22931 EN, Office for Official Publications of the European Communities, Luxembourg. p. 77.

European Commission, 2008, Forest Fires in Europe 2007, EUR 23492 EN, Office for Official Publications of the European Communities, Luxembourg. p. 77.

European Commission, 2009, Forest Fires in Europe 2008, EUR 23971 EN, Office for Official Publications of the European Communities, Luxembourg. p. 83.

European Commission, 2010, Forest Fires in Europe 2009, EUR 24502 EN, Publication Office of the European Union, Luxembourg. p. 83.

European Commission, 2011, Forest Fires in Europe 2010, EUR 24910 EN, Publications Office of the European Union, Luxembourg, p. 92.

European Commission, 2012, Forest Fires in Europe, Middle East and North Africa 2011, EUR 25483 EN, Publications Office of the European Union, Luxembourg, p. 108.

European Commission, 2013, Forest Fires in Europe, Middle East and North Africa 2012, EUR 26048 EN, Publications Office of the European Union, Luxembourg, p. 109.

European Commission, 2014, Forest Fires in Europe, Middle East and North Africa 2013, EUR 26791 EN, Publications Office of the European Union, Luxembourg, p. 107.

European Commission, 2015, Forest Fires in Europe, Middle East and North Africa 2014, EUR 27400 EN, Publications Office of the European Union, Luxembourg, p. 107.

European Commission, 2016, Forest Fires in Europe, Middle East and North Africa 2015, EUR 28158 EN, Publications Office of the European Union, Luxembourg, p. 117

Annex – Summary Tables of Fire Statistics

Statistics on burnt area divided into forest and non-forest area are supplied in the individual country reports, where available.

NOTE

Every effort is made to ensure that the published figures are correct. However, at the time of printing some data are provisional and may be changed in the future. Where there is a discrepancy between figures published in different reports, the later report should be taken as the definitive version.

Table 67. Number of forest fires in five Southern Member States (1980-2016)

Year	*PORTUGAL*	*SPAIN*	*FRANCE*	*ITALY*	*GREECE*	*TOTAL*
1980	2 349	7 190	5 040	11 963	1 207	27 749
1981	6 730	10 878	5 173	14 503	1 159	38 443
1982	3 626	6 545	5 308	9 557	1 045	26 081
1983	4 539	4 791	4 659	7 956	968	22 913
1984	7 356	7 203	5 672	8 482	1 284	29 997
1985	8 441	12 238	6 249	18 664	1 442	47 034
1986	5 036	7 570	4 353	9 398	1 082	27 439
1987	7 705	8 679	3 043	11 972	1 266	32 665
1988	6 131	9 247	2 837	13 588	1 898	33 701
1989	21 896	20 811	6 763	9 669	1 284	60 423
1990	10 745	12 913	5 881	14 477	1 322	45 338
1991	14 327	13 531	3 888	11 965	858	44 569
1992	14 954	15 955	4 002	14 641	2 582	52 134
1993	16 101	14 254	4 769	14 412	2 406	51 942
1994	19 983	19 263	4 618	11 588	1 763	57 215
1995	34 116	25 827	6 563	7 378	1 438	75 322
1996	28 626	16 771	6 401	9 093	1 508	62 399
1997	23 497	22 320	8 005	11 612	2 273	67 707
1998	34 676	22 446	6 289	9 540	1 842	74 793
1999	25 477	18 237	4 960	6 932	1 486	57 092
2000	34 109	24 118	4 603	8 595	2 581	74 006
2001	26 533	19 547	4 309	7 134	2 535	60 058
2002	26 488	19 929	4 097	4 601	1 141	56 256
2003	26 195	18 616	7 023	9 697	1 452	62 983
2004	21 870	21 396	3 775	6 428	1 748	55 217
2005	35 697	25 492	4 698	7 951	1 544	75 382
2006	19 929	16 354	4 608	5 634	1 417	47 942
2007	18 722	10 936	3 364	10 639	1 983	45 644
2008	13 832	11 655	2 781	6 486	1 481	36 235
2009	26 119	15 643	4 800	5 422	1 063*	53 047
2010	22 026	11 721	3 900	4 884	1 052*	43 583
2011	25 221	16 414	4 500	8 181	1 653*	55 929
2012	21 176	17 503	4 105	8 252	1 559*	52 595
2013	19 291	10 626	2 223	2 936	862*	35 938
2014	7 067	9 771	2 778	3 257	552*	23 425
2015	15 851	11 928	4 440	5 442	510*	38 171
2016	**13 261**	**8 817**	**4 285**	**4 793**	**777***	**31 933**
% of total in 2016	**42%**	**28%**	**13%**	**15%**	**2%**	**100%**
Average 1980-1989	7 381	9 515	4 910	11 575	1 264	34 645
Average 1990-1999	22 250	18 152	5 538	11 164	1 748	58 851
Average 2000-2009	24 949	18 369	4 418	7 259	1 695	56 690
Average 2010-2016	17 699	12 397	3 686	5 392	989	40 164
Average 1980-2016	18 100	14 787	4 715	9 128	1 459	48 189
TOTAL (1980-2016)	669 698	547 135	174 462	337 722	53 983	1 783 000

* Provisional data.

Table 68. Burnt area (hectares) in five Southern Member States (1980 – 2016)

Year	*PORTUGAL*	*SPAIN*	*FRANCE*	*ITALY*	*GREECE*	*TOTAL*
1980	44 251	263 017	22 176	143 919	32 965	506 328
1981	89 798	298 288	27 711	229 850	81 417	727 064
1982	39 556	152 903	55 145	130 456	27 372	405 432
1983	47 811	108 100	53 729	212 678	19 613	441 931
1984	52 710	165 119	27 202	75 272	33 655	353 958
1985	146 254	484 476	57 368	190 640	105 450	984 188
1986	89 522	264 887	51 860	86 420	24 514	517 203
1987	76 269	146 662	14 108	120 697	46 315	404 051
1988	22 434	137 734	6 701	186 405	110 501	463 775
1989	126 237	426 693	75 566	95 161	42 363	766 020
1990	137 252	203 032	72 625	195 319	38 594	646 822
1991	182 486	260 318	10 130	99 860	13 046	565 840
1992	57 011	105 277	16 593	105 692	71 410	355 983
1993	49 963	89 267	16 698	203 749	54 049	413 726
1994	77 323	437 635	24 995	136 334	57 908	734 195
1995	169 612	143 484	18 137	48 884	27 202	407 319
1996	88 867	59 814	11 400	57 988	25 310	243 379
1997	30 535	98 503	21 581	111 230	52 373	314 222
1998	158 369	133 643	19 282	155 553	92 901	559 748
1999	70 613	82 217	15 906	71 117	8 289	248 142
2000	159 605	188 586	24 078	114 648	145 033	631 950
2001	111 850	93 297	20 642	76 427	18 221	320 437
2002	124 411	107 464	30 160	40 791	6 013	308 839
2003	425 726	148 172	73 278	91 805	3 517	742 498
2004	129 539	134 193	13 711	60 176	10 267	347 886
2005	338 262	188 697	22 135	47 575	6 437	603 106
2006	75 510	155 345	7 844	39 946	12 661	291 306
2007	31 450	86 122	8 570	227 729	225 734	579 605
2008	17 244	50 322	6 001	66 329	29 152	169 048
2009	87 416	120 094	17 000	73 355	35 342	333 207
2010	133 090	54 770	10 300	46 537	8 967	253 664
2011	73 813	102 161	9 400	72 004	29 144	286 522
2012	110 231	226 125	8 600	130 814	59 924	535 694
2013	152 756	58 985	3 608	29 076	46 676	291 101
2014	19 929	46 721	7 493	36 125	25 846	136 114
2015	64 443	103 200	11 160	41 511	7 096	227 410
2016	**161 522**	**65 817**	**16 093**	**47 926**	**26 540**	**317 898**
% of total in 2016	**51%**	**21%**	**5%**	**15%**	**8%**	**100%**
Average 1980-1989	73 484	244 788	39 157	147 150	52 417	556 995
Average 1990-1999	102 203	161 319	22 735	118 573	44 108	448 938
Average 2000-2009	150 101	127 229	22 362	83 878	49 238	432 809
Average 2010-2016	102 255	93 968	9 968	57 713	29 170	293 074
Average 1980-2016	107 396	161 923	24 657	105 405	44 914	444 295
TOTAL (1980-2016)	3 973 670	5 991 140	912 309	3 899 998	1 661 816	16 438 933

Table 69. Number of forest fires in other countries (1990-2016)

Country / Year	Algeria	Austria	Bulgaria	Croatia	Cyprus	Czech Rep.	Estonia	Finland	former Yugoslav Republic of Macedonia	Germany	Hungary	Latvia	Lebanon	Lithuania	Morocco	Poland	Norway	Romania	Russian Federation	Slovakia	Slovenia	Sweden	Switzerland	Turkey
1990	-	-	-	-	-	-	-	-	-	-	-	604	-	-	179	5756	-	131	-	-	-	-	252	1750
1991	-	-	73	-	-	-	-	-	-	1846	-	225	-	-	247	3528	-	42	-	-	-	-	151	1481
1992	-	-	602	325	-	-	-	-	-	3012	-	1510	-	1180	182	11858	-	187	-	-	-	-	84	2117
1993	-	-	1196	372	-	-	-	-	-	1694	-	965	-	634	187	8821	-	159	-	-	-	-	83	2545
1994	-	-	667	181	-	-	-	-	-	1696	-	763	-	715	417	10705	-	121	-	366	-	-	86	3239
1995	-	-	114	109	-	1331	-	-	-	1237	-	582	-	472	528	7678	-	62	-	254	-	-	96	1770
1996	-	-	246	305	-	1421	-	1475	-	1748	-	1095	-	894	220	7923	-	72	-	662	-	-	128	1645
1997	-	-	200	305	-	1398	-	1585	-	1467	-	768	-	565	391	6817	-	37	-	535	-	-	180	1339
1998	-	-	578	441	-	2563	-	370	-	1032	-	357	-	258	416	6165	-	59	-	1056	-	2503	121	1932
1999	-	-	320	223	-	1402	-	1528	-	1178	229	1196	-	1022	385	9820	-	138	-	426	-	4707	50	2075
2000	-	-	1710	706	285	1499	158	826	-	1210	811	915	-	654	321	12426	-	688	-	824	-	4708	69	2353
2001	-	-	825	299	299	483	91	822	-	587	419	272	-	287	327	4480	117	268	-	311	-	4831	67	2631
2002	-	-	402	176	243	604	356	2546	-	513	382	1720	-	1596	202	10101	213	516	-	570	60	6490	118	1471
2003	-	-	452	532	427	1754	111	1734	-	2524	375	900	-	885	392	17087	198	203	-	872	224	8282	301	2177
2004	-	-	294	204	221	873	89	816	-	626	104	647	-	468	714	7006	119	34	-	153	51	4955	74	1762
2005	-	954	241	147	185	619	65	1069	-	496	150	365	-	301	662	12049	122	64	-	287	73	4573	88	1530
2006	-	912	393	181	172	697	250	3046	-	930	97	1929	-	1545	381	11541	205	105	-	237	112	4618	80	2227
2007	-	750	1479	345	111	-	64	1204	652	779	603	425	-	251	340	8302	65	478	-	463	140	3737	83	2829
2008	-	-	582	275	114	-	71	1456	573	818	502	700	-	301	273	9090	171	91	-	182	74	5420	56	2135
2009	-	218	314	181	91	-	47	1242	80	763	608	823	-	471	501	9162	109	190	-	347	120	4180	88	1793
2010	-	192	222	131	133	-	30	1412	99	780	109	316	-	104	629	4680	62	70	32300	127	32	3120	78	1861
2011	2487	356	635	280	85	-	24	1215	523	888	2021	360	-	142	606	8172	49	340	20851	303	114	3534	107	1954
2012	5110	312	876	569	78	-	5	417	483	701	2657	162	-	81	484	9265	24	911	19535	517	168	2213	74	2450
2013	2443	357	408	137	135	-	15	1452	186	515	761	422	-	123	411	4883	42	116	9754	233	75	4878	58	3755
2014	4629	369	151	43	68	-	91	1660	62	429	1042	698	-	155	460	5245	133	83	17058	153	35	4374	59	2149
2015	2383	345	429	177	87	-	67	745	106	1071	1069	704	107	247	425	12257	29	250	12238	242	93	2700	162	2150
2016	3150	317	584	151	119	-	84	933	60	608	452	641	260	98	422	5286	345	174	10089	136	90	5454	63	3188

Table 70. Burnt area (hectares) in other countries (1990 – 2016)

Country / Year	Algeria	Austria	Bulgaria	Croatia	Cyprus	Czech Rep.	Estonia	Finland	former Yugoslav Republic of Macedonia	Germany	Hungary	Latvia	Lebanon	Lithuania	Morocco	Poland	Norway	Romania	Russian Federation	Slovakia	Slovenia	Sweden	Switzerland	Turkey
1990	-	-	-	-	-	-	-	-	-	-	-	258	-	-	2188	7341	-	444	-	-	-	-	1711	13742
1991	-	-	511	-	-	-	-	-	-	920	-	69	-	-	3965	2567	-	277	-	-	-	-	96	8081
1992	-	-	5243	11131	-	-	-	-	-	4908	-	8412	-	769	2579	43755	-	729	-	-	-	-	64	12232
1993	-	-	18164	20157	-	-	-	-	-	1493	-	570	-	274	3078	8290	-	518	-	-	-	-	37	15393
1994	-	-	18100	7936	-	-	-	-	-	1114	-	326	-	279	6072	9325	-	312	-	-	-	-	408	38128
1995	-	-	550	4651	-	403	-	-	-	592	-	535	-	321	7018	5403	-	208	-	-	-	-	446	7676
1996	-	-	906	11214	-	2043	-	433	-	1381	-	927	-	478	1185	14537	-	227	-	-	-	-	292	14922
1997	-	-	595	11122	-	359	-	1146	-	599	-	448	-	226	3845	6766	-	68	-	-	-	-	1872	6316
1998	-	-	6967	32056	-	1132	-	131	-	397	-	211	-	93	1855	4222	-	137	-	-	-	422	274	6764
1999	-	-	8291	6053	-	336	-	609	-	415	756	1544	-	494	1688	8629	-	379	-	557	-	1771	30	5804
2000	-	-	57406	68171	8034	375	684	266	-	581	1595	1341	-	352	4064	7089	-	3607	-	904	-	1552	70	26353
2001	-	-	20152	16169	4830	87	62	187	-	122	-	311	-	113	1806	3466	895	1001	-	305	-	1254	21	7394
2002	-	-	6513	4853	2196	178	2082	590	-	122	1227	2222	-	746	593	5210	221	3536	-	595	161	2626	719	8514
2003	-	-	5000	27091	2349	1236	207	666	-	1315	845	559	-	436	2858	21551	942	762	-	1567	2100	4002	673	6644
2004	-	-	1137	3378	1218	335	379	358	-	274	247	486	-	253	8660	3782	117	123.7	-	157	138	1883	31	4876
2005	-	71	1456	3135	1838	227	87	495	-	183	3531	120	-	51	6198	5713	346	162	-	524	280	1562	43	2821
2006	-	75	3540	4575	1160	53	3096	1617	-	482	625	3387	-	1199	5360	5657	3829	946	-	280	1420	5710	117	7762
2007	-	48	42999	20209	4483	-	292	576	32665	256	4636	272	-	38	1367	2841	128	2529	-	679	128	1090	322	11664
2008	-	-	5289	7343	2392	-	1280	830	5915	538	2404	364	-	112	1127	3027	3174	373	-	118	75	6113	67	29749
2009	-	22	2271	2900	885	-	59	576	1307	262	6463	646	-	287	3108	4400	1329	974	-	510	177	1537	51	4679
2010	-	37	6526	1121	2000	-	25	520	737	522	878	92.2	-	21.5	5511	2126	769	206	2300000	192	121	540	27	3317
2011	13593	78	6883	15555	1599	-	19	580	17308	214	8055	115	-	293	3460	2678	121	2195	1636232	403	288	945	225	3612
2012	99061	69	12730	24804	2531	-	3	86	10021	269	13978	90	-	20	6695	7235	60	6624	1900000	1683	1006	483	30	10455
2013	13396	165	3314	1999	2835	-	79	461	3027	199	1955	217	-	25	2207	1289	47	421	1416659	270	66	1508	29	11456
2014	43125	192	916	188	669	-	78	881	846	120	4454	591	-	162	1540	2690	770	217	3738207	192	18	14666	46	3117
2015	13010	268	4313	9416	652	-	83	143	1798	526	4730	615	753	71	992	5510	143	1671	2875350	353	65	594	45	3219
2016	18370	398	6340	7100	3205	-	123	310	450	283	974	467	1871	26	2585	1451	1884	675	2419254	175	526	1288	463	9156

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