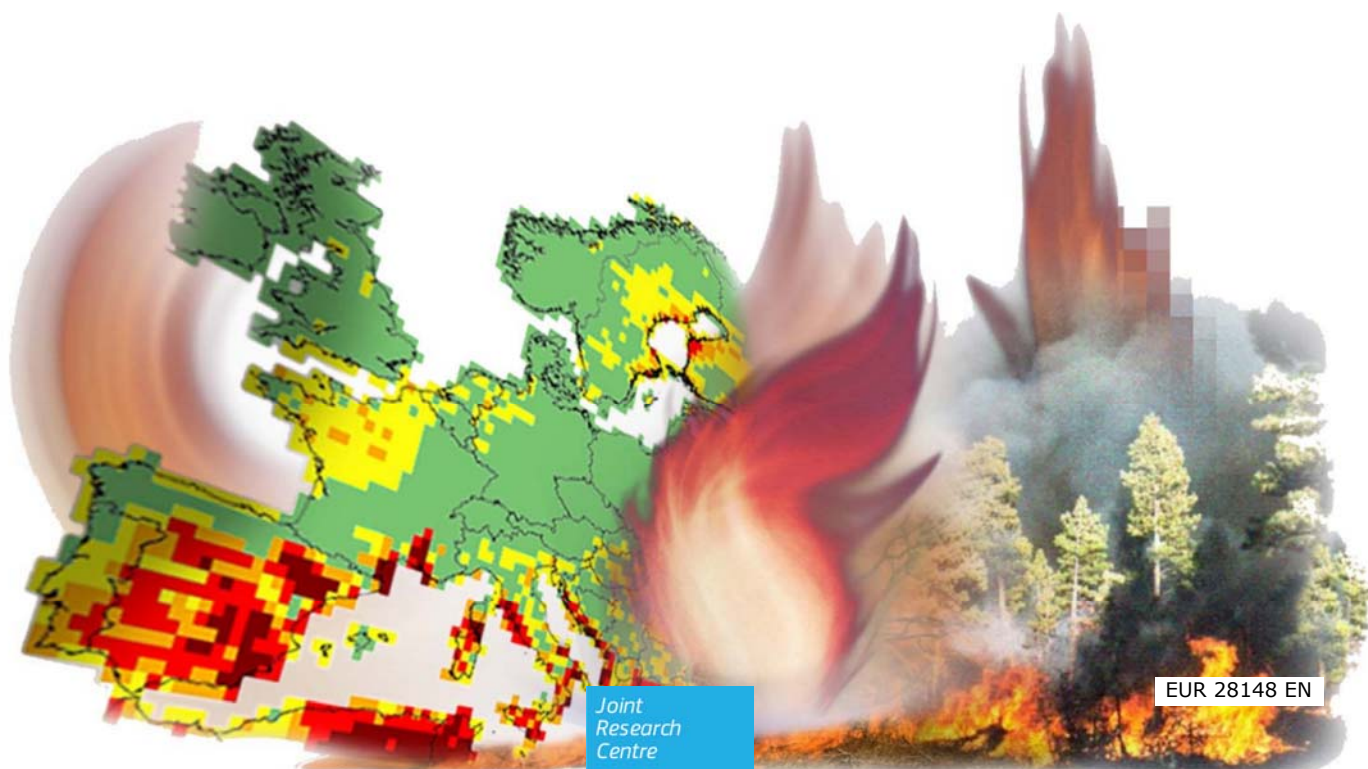


## JRC TECHNICAL REPORTS

# Forest Fires in Europe, Middle East and North Africa 2015

*Joint report of JRC and  
Directorate-General  
Environment*

2016





# Forest Fires in Europe, Middle East and North Africa 2015

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## **Abstract**

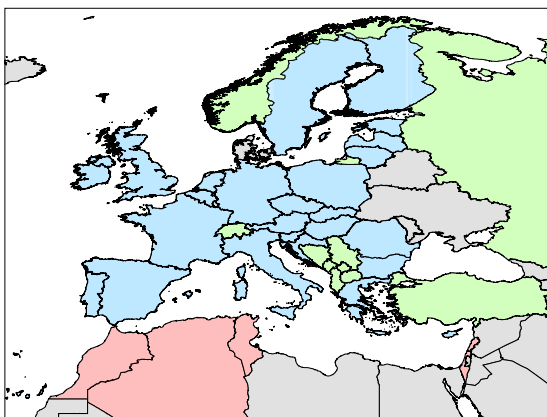
This is the 16th issue of the EFFIS annual report on forest fires for the year 2015. This report is consolidated as highly appreciated documentation of the previous year's forest fires in Europe, Middle East and North Africa. In its different sections, the report includes information on the evolution of fire danger in the European and Mediterranean regions, the damage caused by fires and detailed description of the fire conditions during the 2015 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.

## 1. Preface

This is the 16th issue of the EFFIS annual report on forest fires. In its different sections, the report includes information on the evolution of fire danger in the European and Mediterranean regions during the fire season, the damage caused by fires and detailed description of the fire conditions during the 2015 fire campaign in the countries in the EFFIS network. In addition to the general overview provided by EFFIS, the report includes chapters on national reporting elaborated by the national fire services, which gives an overview of the efforts undertaken at national and regional levels, and provides information of high relevance for all the countries exposed to forest fire risk.

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<sup>1</sup>. 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).

<sup>1</sup>

<http://www.europarl.europa.eu/plenary/en/parliamentary-questions.html>

## 2 FOREST FIRES 2015

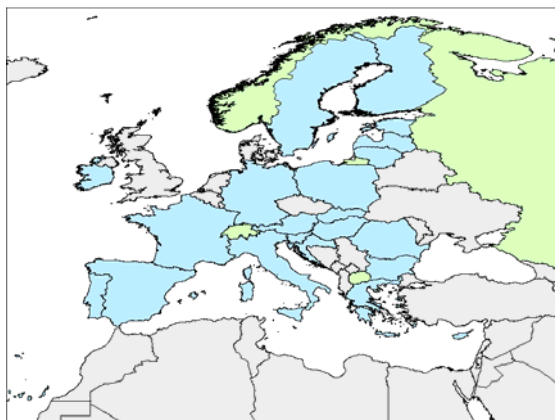
### 2.1 Introduction to the 2015 fire season in Europe, Middle East and North Africa

Table 1. Overview of the number of fires and burnt areas reported by the contributing countries in 2015.

YEAR	Number of fires			Burnt area			Notes
	2015	2005-14 average	2015 as % of average	2015	2005-14 average	2015 as % of average	
Austria	345	491	70	268	84	317	
Bulgaria	429	530	81	4313	8592	50	
Switzerland	162	77	210	45	96	47	
Cyprus	87	117	74	652	2039	32	
Germany	1071	710	151	526	305	173	
Algeria	2383	3667	65	13010	42294	31	Average 2011-14
Estonia	67	66	101	83	502	17	
Spain	11928	14612	82	103200	108934	95	
Finland	745	1417	53	143	662	22	
France	4440	3746	119	11160	10427	107	
FYROM	106	332	32	1798	8978	20	
Greece	510	1313	39	7096	47988	15	
Croatia	177	229	77	9416	8183	115	
Hungary	1069	855	125	4730	4698	101	
Italy	5442	6364	86	41511	76949	54	
Lebanon	107			753			No data in previous years
Lithuania	247	347	71	71	221	32	
Latvia	704	620	114	615	589	104	
Morocco	425	475	90	992	3657	27	
Norway	29	98	30	143	1057	14	
Poland	12257	8239	149	5510	3766	146	
Portugal	15851	20908	76	64443	103970	62	
Romania	250	245	102	1671	1465	114	
Russian Fed	12238	19900	61	2875350	2198220	131	Average 2010-2014
Sweden	2700	4065	66	594	3415	17	
Slovenia	93	94	99	65	358	18	
Slovakia	242	285	85	353	485	73	

### 2.2 European countries

The following chapters contain the reports from the contributing European countries. The reports are arranged in alphabetical order and comprise reports from 21 Member States and 4 other non-EU members of the EFFIS network.



## 2.2.1 Austria

### *Fire danger in the 2015 fire season*

In 2015 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) there were some big fires that burnt more than 50 ha. The biggest one occurred in the mountains of Kärnten with 75 ha (Figure 1). The firefighters were in action for 24 days. They used about 1 million litres of water. In use were 7 helicopters and 2 airplanes. The burned area occurred between 1 500 and 1 700 m over Adria (sea level).



Figure 1. The biggest fire of the year occurred in the Carinthia Alps and burned about 75 ha.

### *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<sup>2</sup>). 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 2 shows the number of fires and burnt area in Austria in 2015, calculated by the Austrian federal fire brigade association based on the reports of the different fire brigades.

17 of the fires burned more than 5 ha.

Table 2. Number of fires and burned area in Austria in 2015.

Fire type	No. of Fires	Burned area(ha)
Non forest fires	875	37
Forest fires	345	268
<b>Total</b>	<b>1220</b>	<b>305</b>

### *Fire fighting 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.

### *Fire prevention activities*

The risks for forest fires in Austria are not a particularly sensitive topic for the Austrian inhabitants. But in the last years there has been a change in this topic.

- The governments and the communities write more regulations on forest fire danger than they did in the past.
- 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.
- ÖBFV has installed an EU module for forest fire fighting with helicopter support and two for forest fire ground fire fighting.

### *Injuries and loss of human lives*

In 2015 there were no deaths (either firefighters or civilians) during forest fires.

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

## 2.2.2 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 2015 the number of forest fires in Bulgaria was 429 and the burnt area is estimated to be 4 313 ha. The average size per forest fire in 2015 increased to 9.8 ha, and the biggest forest fire affected 800 ha.

The largest number and area burnt by forest fires were reported in Regional Forest Directorate /RFD/ Sofia – 82 fires burning 872.3 ha, RFD Lovech with 35 fires and 1470.5 ha, and RFD Kardzhali with 48 fires and 268.7 ha.

According to the ownership, distribution of the burnt areas in 2015 is:

- State forest - 59%,
- Municipal forest – 18%
- Private forest – 17%
- Other forests – 6%.

The main causes for the forest fires during 2014 are as follows:

- Carelessness – 293 in number (68%)
- Arson - 42 in number (10%)
- Natural - 12 in number (3%)
- Unknown - 82 in number (19%)

The direct losses by forest fires in 2015 are estimated to be less than 380 000 Euro, although the average damage for the last 10 years is about 2 500 000 Euro.

Table 3. Forest fire statistics for Bulgaria 2006-2015

Year	Burnt area (ha)		Fire causes (number)			Total number of fires
	Total	Forest lands	Human activities	Natural	Unknown	
2006	3537	3537	191	9	192	392
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
<b>Mean</b>	<b>8879</b>	<b>8879</b>	<b>414</b>	<b>11.7</b>	<b>122.5</b>	<b>548</b>

The total number of fires, burnt area and average fire size from 1991 to 2015 is presented in Figure 2.

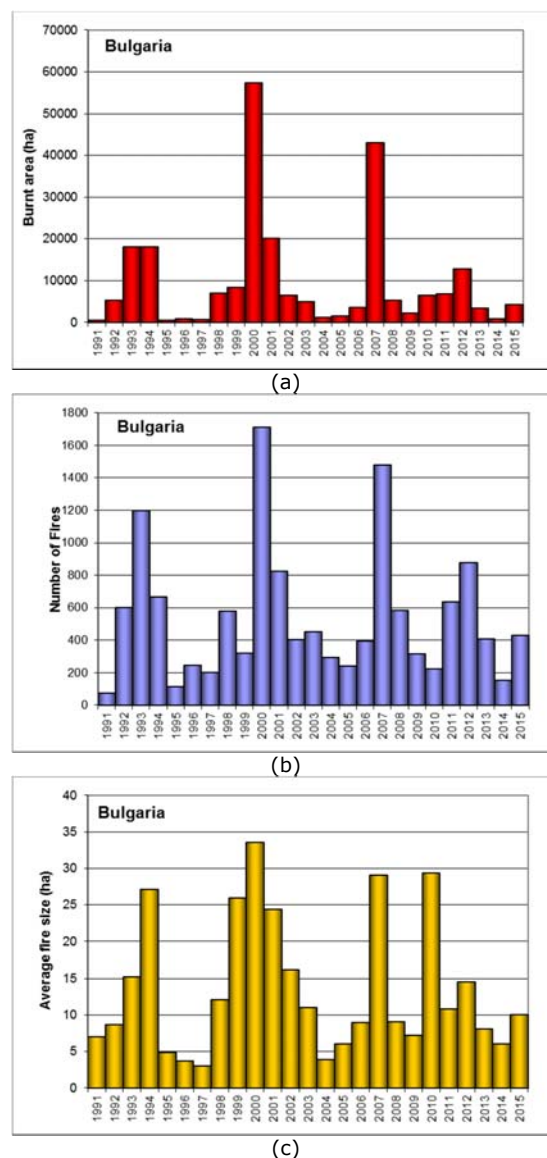


Figure 2. Burnt areas (a), number of fires (b) and average fire size (c) in Bulgaria from 1991 to 2015.

### *Injuries and loss of human lives*

During 2015 there were no reported losses of human lives or injuries from forest fires.

(Source: Executive Forest Agency, Bulgaria).



## 2.2.3 Croatia

### *Fire danger in the 2015 fire season*

Climatic analysis of the average monthly temperature in May 2015 shows that it was higher than the average mean over the entire Adriatic coast and the interior parts of Croatia. However, the average monthly precipitation differed significantly between most parts of the interior and Adriatic area.

In the Adriatic area precipitation was very unevenly distributed, so the average monthly amount of precipitation in many locations was lower than usual, but in some areas (for example town Komiža on Vis island) it was much higher.

On the other hand, interior parts had abundant rain, especially in the period from 22nd to 25th of May when the Genoa cyclone influenced the weather, combined with a high cyclone which lingered over the region for several days.

The end of May was characterized by stabilisation and temperature growth, so the average daily Fire Danger Ratings increased again in the Adriatic and coastal area and were mostly moderate, and high in Dalmatia. In central, eastern and mountainous areas the average daily Fire Danger Ratings were low or very low.

In the whole country June 2015 was warmer than the multiannual mean. In Adriatic and coastal areas, average monthly temperature was 2° to 3° C higher than usual. The monthly precipitation was lower than average for June. Generally, the amount of rainfall decreased about 50%, with a few exceptions - Hvar island and the Dubrovnik area had precipitation amounts higher than the 30-year monthly mean as a consequence of prevailing weather conditions; i.e. synoptic situations. In June there were mainly balanced or slightly raised values for air pressure. Regarding altitude, the Adriatic and coastal area was under the impact of a thermobaric ridge or the area of Croatia was on the front side of the ridge. In these synoptic circumstances the amount of precipitation is very low.

A thermobaric ridge from the south-west carries hot air from the south, which was especially evident in the period from 10th to 15th of June when the temperature was significantly higher than the average for that time of the year, and this mostly contributed to the extremely hot weather in June.

After that a rather cold period followed with rain and rain showers with thunder occurring in the Adriatic especially in the period from 15th to 17th of June. In the third part of the month the weather in the Adriatic again became warmer and sunnier although not completely stable. In the end of June, the average monthly Fire Danger Rating for forest fires was mainly high or moderate in the Adriatic.

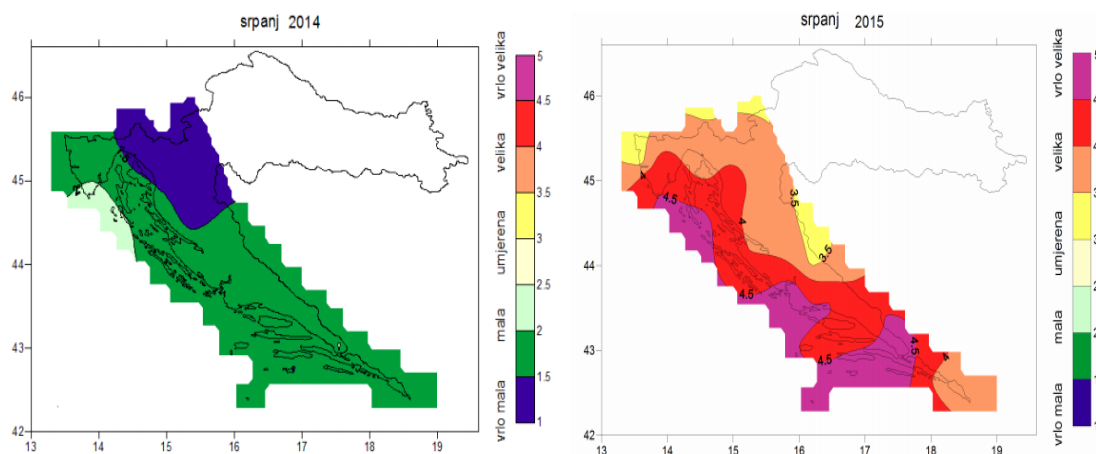


Figure 3. Comparison of the Average monthly Fire Danger Rating for forest fires by Canadian method for July 2014 and July 2015

The average temperature in July 2015 was higher than the 30-year mean over the whole country. In the Adriatic it was 3° to 5° C higher. The amount of precipitation was in most of the area significantly lower and Dalmatia suffered the biggest deficit of rain where only 20% of average rain fell, and because of that there was the biggest danger of extreme forest/shrubs fire behaviour.

Fires on the island of Korčula and Pelješac peninsula were extreme mainly because of weather conditions. In those areas there was, apart from drought, also a long period of extremely high temperatures. In the time when the fires started the wind of the coastal circulation suddenly shifted its direction and the atmosphere was dry and extremely unstable.

Taking into account those extreme weather conditions, a day before the fires started on Korčula island a special meteorological alert was issued pointing out a potentially extreme instability in dry air. The synoptic situation which preceded the fires showed that there was a long term thermobaric ridge by altitude over the country in which hot air came from the south and later from south east. In southern parts of Dalmatia the thermobaric ridge lasted a whole month with weakening by height circulation change around 25th of July. That made fire extinguishing much harder.

The analysis of average monthly Fire Danger Rating in August 2015 showed that it was significantly lower than usual as a result of low or very low ratings in the second half of the month. The average monthly Fire Danger Ratings in most parts of Dalmatia were moderate, and in the northern Adriatic, inlands and northern Dalmatia it was low. The temperature was about 2° to 3° C higher than the 30-year mean (1961-1990), which suggests that it was extremely hot.

As regards to amount of precipitation, August 2015 can be categorised as normal or rainy. In most parts of the Adriatic and coastal area the amount of precipitation was a bit higher than average for that referent period. Only in a few sporadic areas in the northern Adriatic and mountainous areas it was less than usual.

That precipitation situation was a consequence of locally abundant rain in the form of rain showers after August 15th. In the first half of the month the weather was mainly affected by the thermobaric ridge by altitude with a field of middle balanced or slightly raised values of air pressure.

Inflow of warm and dry air from northern Africa continued in another heat wave from 5th to 15th of August. In that period the Average monthly Fire Danger Ratings for vegetation fires were mostly high. Dry air and unstable atmosphere represent especially adverse meteorological conditions and make protecting forest from fires harder.

Inflow of cooler, wet and unstable air was noticed on August 15th and 16th due to the impact of the cold front and shallow cyclone. Wet and rather cold air circulated in the higher layers of the atmosphere. That is why on August 15th additional warnings were issued for especially dangerous weather conditions for evolving and spreading of vegetation fires.

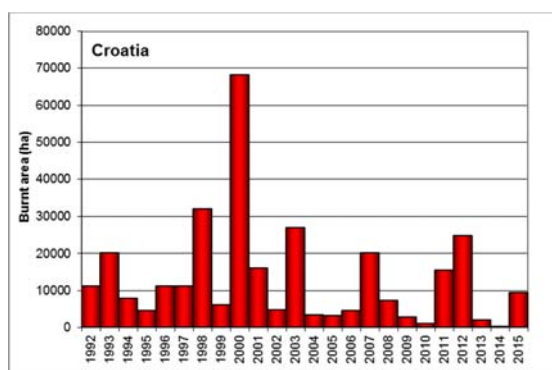
After that period with rain and cooler weather the Average monthly Fire Danger Ratings dropped and were low or very low. At the end of August, Fire Danger Ratings increased but the most intensive part of fire danger season ended on August 16th.

The temperatures in September were 1° to 2° C higher than the 30-year mean, so the weather was in most of the areas hot or very hot. The amount of precipitation was in the average range for this referent period. Considerable deviation from average amount of precipitation was noticed only in Komiža where the amount of precipitation was higher than a 30-year mean.

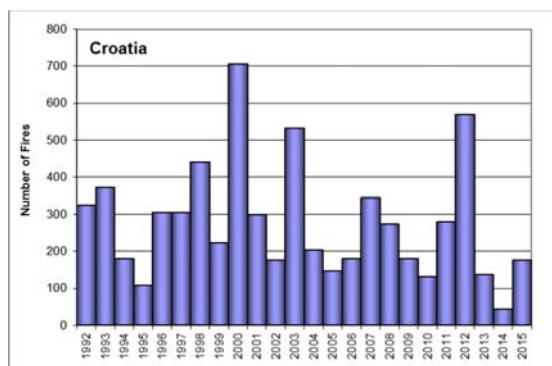
#### *Fire occurrence and affected surfaces*

During 2015, 177 wildfires affected 9 416 hectares of land. Most fires (143) occurred in the Split area (80% of the number of fires and 94% of the affected surfaces).

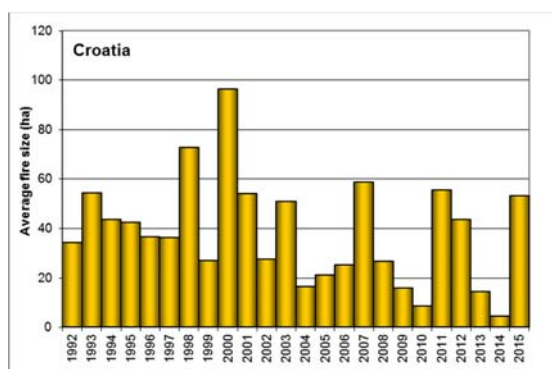
The trend of number of fires, burnt area and average fire size can be seen in Figure 4.



(a)



(b)



(c)

Figure 4. Burnt areas (a), number of fires (b) and average fire size (c) in Croatia from 1992 to 2015.

Of the total affected surfaces, 1 504 hectares or 16% of high forests were affected, 5 065 ha or 54% of other forests (medium forest, coppice, bushes and shrubbery, macquis, garigue) and 2 847 ha or 30% of unwooded forest and agricultural land.

As far as the ownership structure of the affected surfaces is concerned, it can be noted that 6 595 ha or 70% of the state owned surfaces were affected and 2 823 ha or 34% of the private surfaces (forest and agricultural land).

Table 4. Burnt area in Croatia by land type

Year	Area burned in forest fires (ha)			Total
	Forest	Non-forest	Other/ Agricultural	
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
<b>2015</b>	<b>6569</b>	<b>1462</b>	<b>1385</b>	<b>9416</b>

#### *Fire prevention activities*

Measures for fire protection and prevention and operational activities of firefighting systems are defined in the Fire Protection and Prevention Act, the Fire Service Act and corresponding bylaws. In addition to the above mentioned Acts, each year the Government of the Republic of Croatia adopts an additional Program of fire protection measures. The Program of measures is implemented by state administration bodies, public institutions and firefighting organizations, and additional financial resources for operational action by the firefighting system shall be granted pursuant to the Program. The National Protection and Rescue Directorate is responsible for coordinating and monitoring the implementation of fire protection measures.

In accordance with the Program of measures, National Protection and Rescue Directorate has prepared a National Engagement Plan for Firefighting forces. The National Plan establishes Fire Fighting Commands and standard operating procedures for the firefighting system. Standard operating procedures also determine activities of an aircraft during extinguishing of forest fires. Before the start of the fire season, assessments are made and Fire Protection Plans are drafted for particularly vulnerable areas: islands Korčula, Lastovo, Brač, Hvar, Vis, Šoltu, Dugi otok and the Pelješac peninsula.

Firefighters and fire-fighting equipment from the continental part of the country were deployed to 12 vulnerable coastal locations during the summer months. On average, 18 firefighting vehicles with 83 firefighters were preventively deployed during one shift to the coastal part of the Republic of Croatia.

In addition to local firefighting forces an additional 1 110 seasonally employed firefighters were engaged in the coastal area and allocated to professional and voluntary fire brigades, and 45 local professional firefighters were allocated in State firefighting intervention brigades and Seasonal intervention firefighting brigades on islands Mljet, Korčula, Brač and Pelješac peninsula.

#### *Firefighting means and information campaigns*

During the fire season, the Fire-fighting Operations Centre was coordinating ground and air fire-fighting forces for the entire coastal area and communicating with the Air Forces Command operating under the Ministry of Defence. Fire-fighting Operations Centre informed the Centre in Brussels (Emergency Response Coordination Centre - ERCC) once a week about the situation at fire sites, together with providing an account of weekly events in the Republic of Croatia via video conferencing.

A Fire Weather Index was produced daily by the Meteorological and Hydrological Service. Before the start of the fire season, additional training of fire-fighters was conducted in extinguishing forest fires (assault operations and joint operations with aircrafts).

The Air force consists of six aircrafts of the type "Canadair" CL-415, five aircrafts of type "air Tractor" AT-802 and two helicopters of type Mi-8 MTV1. These aircraft realised 1242.35 hours of flight time in 8 625 flights and were engaged in 204 fire extinguishing interventions.

The Ministry of Interior had performed additional inspections of fire-prone areas, forests, tourist destinations, hotels, campsites and national parks. Also, promotional activities were carried out to inform residents and tourists of fire hazards.

Other relevant inspection services have conducted inspections of all other fire-prone areas. Inspections included forest fire prevention roads and firebreaks, railways, public roads of national importance and objects on these roads, as well as those areas where fires occurred during previous years that had hampered the flow of road traffic.

Also an inspection was conducted of road routes of local importance that are additionally burdened with increased traffic during the tourist season (access roads to resort hotels, campsites, public garages, cultural and historical sites and other facilities where large numbers of guests or tourists are staying or gathering).

Furthermore, inspections were carried out and measures were taken in national parks, nature parks and other protected forest areas, municipal landfills with controlled disposal of municipal waste, particularly in coastal areas.

#### *Operations of mutual assistance*

In accordance with signed intergovernmental Agreements on mutual assistance in case of major disasters, contacts with Bosnia and Herzegovina, Montenegro and Slovenia are continuing. There is a standard operating procedure signed with Bosnia and Herzegovina, Montenegro and Slovenia with regard to unhindered crossing of state borders by ground and air forces in a case of major fire in the border area.

#### *Loss of human lives*

During extinguishing of vegetation fires in coastal and karst areas, 8 fire fighters sustained minor injuries, while there were no fatalities among fire fighters. In these fires, two people lost their lives while there were 4 injured (no injured tourists).

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

## 2.2.4 Cyprus

### *Fire danger in the 2015 fire season*

During the fire season, the meteorological conditions in Cyprus were slightly above normal and were generally characterised by high temperatures and lack of precipitation.

In January the weather was wet, with rain during most days of the month and snow in the mountains. The mean air temperature was around normal and the average precipitation was well above normal.

In February the weather was wet with unstable weather conditions during certain periods of the month giving rain, isolated thundery showers, hail and snow. The mean air temperature was around normal and the average precipitation above normal.

March was relatively warm. The mean air temperature was 2° C above normal and the average precipitation was around normal.

In April the weather was relatively dry. The mean air temperature was slightly below normal and the average precipitation was 54% of normal.

In May, both the mean air temperature and the average precipitation were around normal.

June was relatively dry and the mean air temperature was approximately 1° C below normal.

During July the weather was relatively dry and the mean air temperature was around normal. Relatively high temperatures were recorded during the period 19-23 of July, when maximum and minimum temperatures were up to 4° C above normal.

In August the weather was relatively warm and dry. The mean air temperature was about 2° C above normal. Relatively very high temperatures were recorded during the period 1-5 of August, when maximum and minimum temperatures were about 2 to 7° C above normal.

During September and October the weather was relatively warm and the mean air temperature was about 2.5° C and 1.5° C above normal, respectively. During the first half of September very high daily temperatures were recorded, when maximum and minimum temperatures were up to 10° C above normal.

November was dry and warm. The mean air temperature was approximately 2° C above normal and the average precipitation was well below normal.

In December the weather was extremely dry and relatively warm. The mean air temperature was about 1° C above normal and the area average precipitation was well below normal.

### *Fire occurrence and affected surfaces*

During the year 2015, a total number of 87 forest fires were recorded, burning a total area of 652 hectares. Compared to the figures of 2014, the number of forest fires increased by 28% and the total burnt area was similar to the previous year. There were 3 fires with burnt area greater than 50 ha, that affected an area of 457 ha.

### Major fires in 2015

- Theletra village, Pafos District. The fire broke out on the afternoon of 29th of August 2015, near Theletra village. Due to strong winds the fire raged out of control, burning 260 hectares of forest trees, wild vegetation and agricultural crops.

Table 5. Number of forest fires and burnt areas in Cyprus from 2010 to 2015

Year	Number of fires	Burned area (ha)		
		Total	Forest and other wooded land	Agriculture and other artificial land
2010	133	2 000	1 559	441
2011	85	1 599	1 220	379
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

The trends regarding both the number of fires and burnt areas over the last 16 years (2000-2015) are shown in Figure 5.

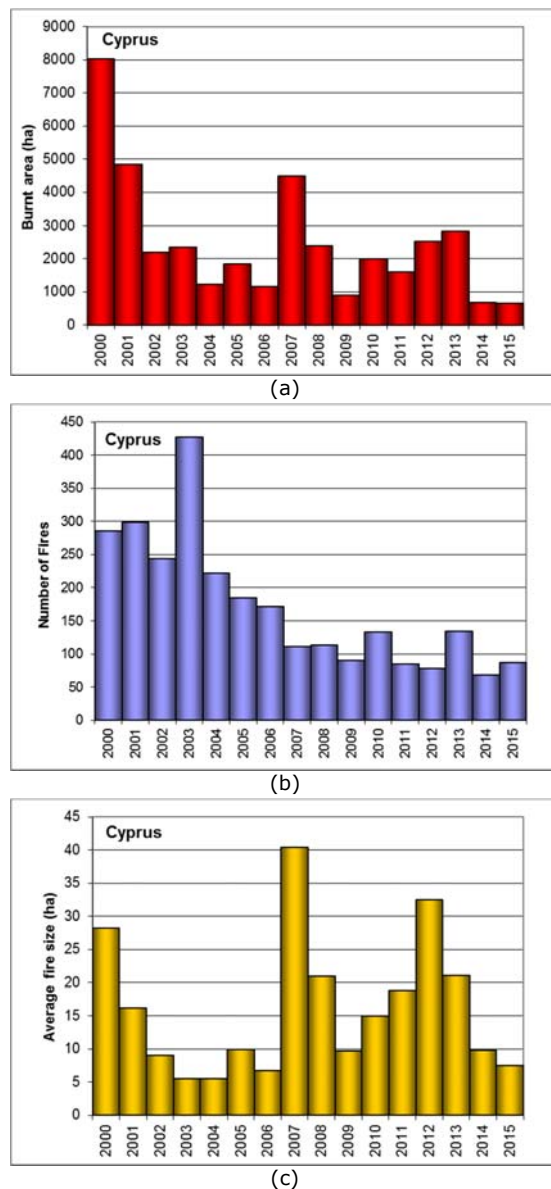


Figure 5. Burnt areas (a), number of fires (b) and average fire size (c) in Cyprus from 2000 to 2015.

### *Injuries and loss of human lives*

There were no casualties reported during the fire suppression operations.

### *Fire prevention activities and fighting means*

Throughout the year, education and sensitization campaigns were organized. All fire suppression means and infrastructure were maintained before the starting of the fire season.

For fire detection purposes, 32 lookout stations operated. The Fire Fighting Task Force consisted of a total number of 423 fire fighters. The aerial means that were used in firefighting operations during 2015, included two firefighting aircrafts and a number of firefighting helicopters.

### *Operations of mutual assistance*

There were no operations of mutual assistance during 2015.

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

## 2.2.5 Estonia

### *Fire occurrence and affected surfaces*

In 2015 a total number of 1 512 forest fires and wildfires were recorded; 67 of these were classified as forest fires.

Table 6. Forest fires in Estonia 2000-2015

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

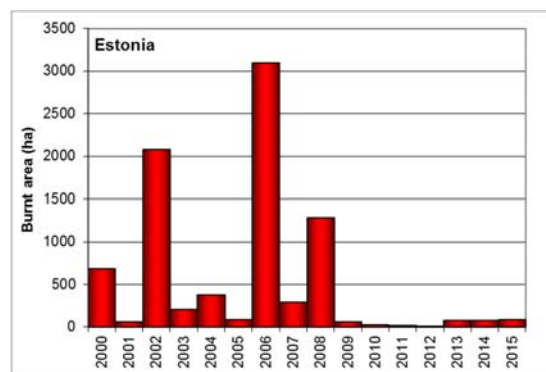
Forest fires in 2015 were recorded in 14 counties. The only county without forest fires was Hiiu county. The first fire in 2015 was recorded in March, the last one in October. The largest fire of 2015 occurred in May in Harju county Pala and burnt an area of 12.5 ha.

In 2015, all of the forest fires were of human direct or indirect origin. 55 % of fires were caused by accident/negligence.

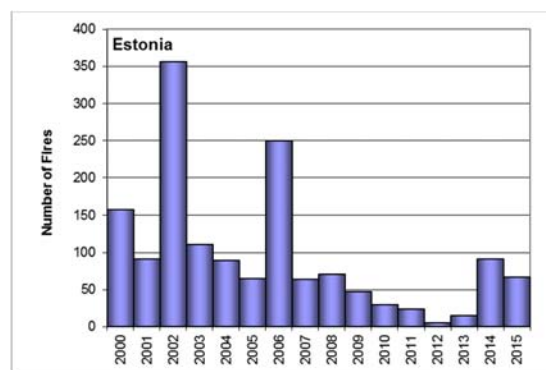
The burnt area, number of fires and average fire size for the years 2000-2015 are shown in Figure 6.

### *Fire fighting means and intervention campaigns*

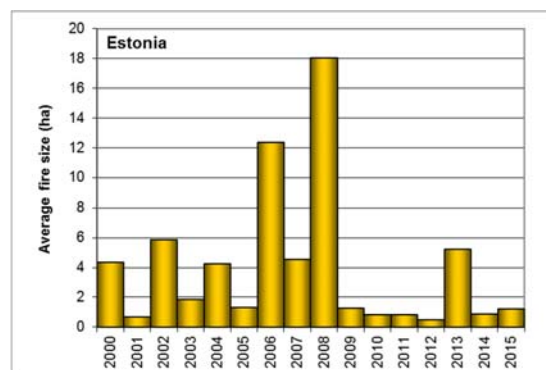
The Estonian Rescue Board is responsible for fighting forest and wildfires. The Estonian Rescue Board cooperates in its operations with the Police and Border Guard Board, Estonian Defence Forces, Environmental Board, State Forest Management Centre, Private Forest Centre, Environmental Inspectorate and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



(a)



(b)



(c)

Figure 6. Burnt areas (a), number of fires (b) and average fire size (c) in Estonia from 2002 to 2015.

### *Loss of human lives and other damage*

Forest fires and wildfires caused the death of one person and destroyed 4 buildings.

(Source: The Estonian Environment Agency, Estonia)



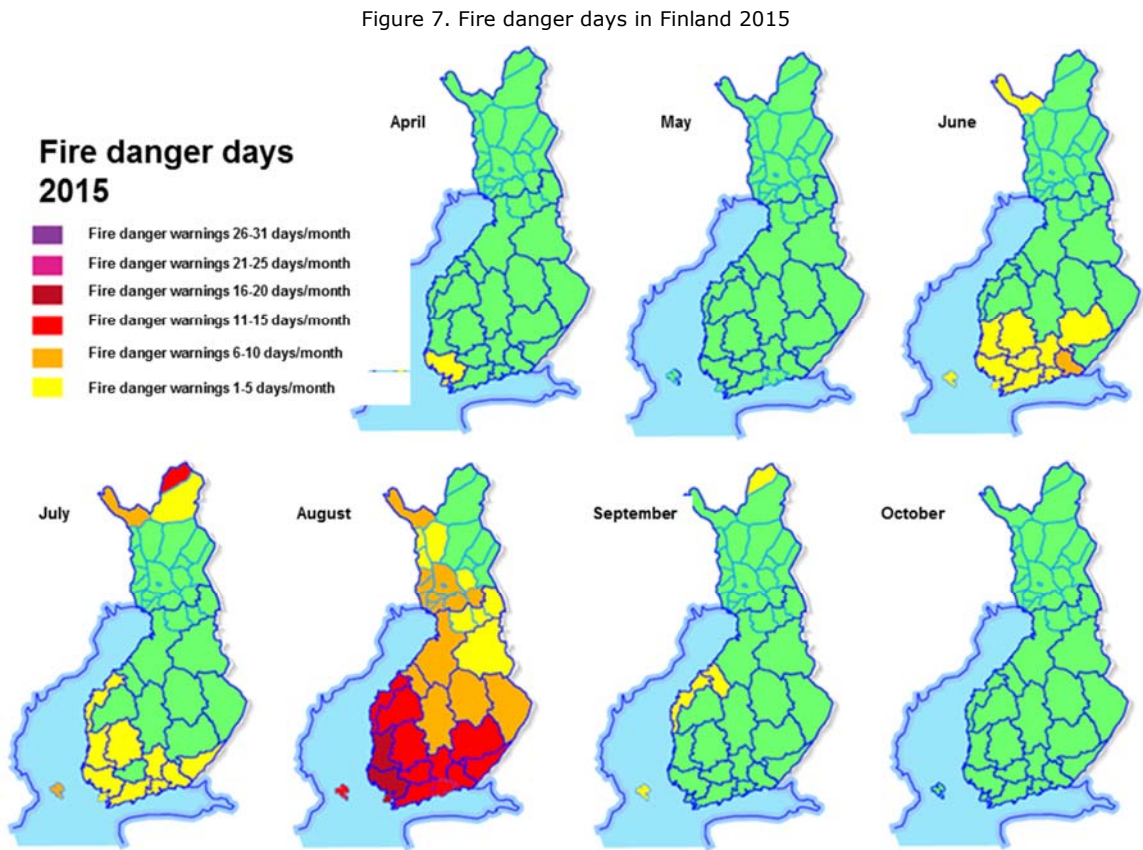
2.2.6 Finland

Fire danger in the 2015 fire season

Based on information from the Finnish meteorological institute, overview of summer 2015 was wet and quite cold in Finland. However, August was warm and dry. Fire danger days for 2015 are presented below in Figure 7.

Fire occurrence and affected surfaces

The number of forest fires in 2015 in Finland was slightly lower than the normal average level. There were 1 581 wildfires in Finland last year and 745 of them were reported as forest fires. The total burned area was around 301 ha, of which 143 ha was forest land. The average burned forest area per fire was 0.19 ha.





The yearly trends in terms of number of fires and burnt area from 1996-2015 in Finland are shown in Figure 8 and Figure 9.

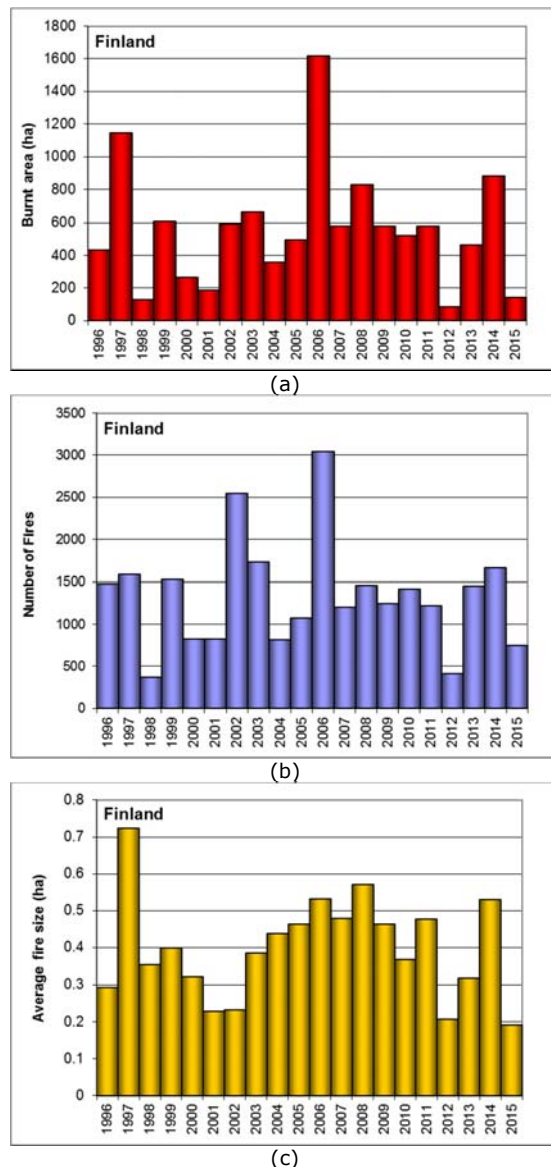


Figure 8. Burnt areas (a), number of fires (b) and average fire size (c) in Finland from 1996 to 2015.

#### Fire causes

The most common cause of wildfires in Finland was human actions. These caused about 2 fires in 3, mainly from accidents. The second biggest reason was natural: 10% of fires. The reason for the fire could not be found in over 15 % of the cases.

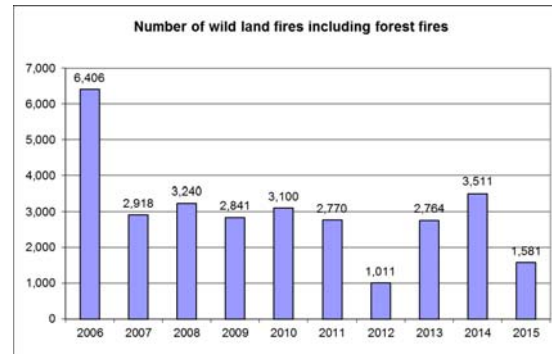


Figure 9. Total number of wildfires including forest fires from 2006-2015.

#### Fire prevention activities

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

#### Fire fighting 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.

#### Loss of human lives

No person died in Finland forest fires in 2015. Three 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

Forest fire experts went to EU forest fire training, and there was other information sharing with neighbouring countries and the EU.

(Source: Ministry of the Interior, Finland).

## 2.2.7 France

### *Fire danger in the 2015 fire season*

The results of 2015 should be analysed taking into account the weather conditions encountered: the year was warmer and drier than normal, especially during the spring and the first half of summer which were marked throughout the country by high temperatures and a very large rainfall deficit.

In addition, a large part of the metropolitan territory was simultaneously exposed to a high fire danger.

This situation gradually improved from the beginning of August with several rainy periods that gradually helped to reduce the level of danger in almost all sensitive areas. Thus, in September, the areas with marked drought were limited to the Roussillon coast of Provence-Alpes-Côte d'Azur and in the southern part of Corsica.

However, late autumn and early winter were again marked by a lack of rainfall and unusually high temperatures for the season that resulted in an increase of the fire danger.

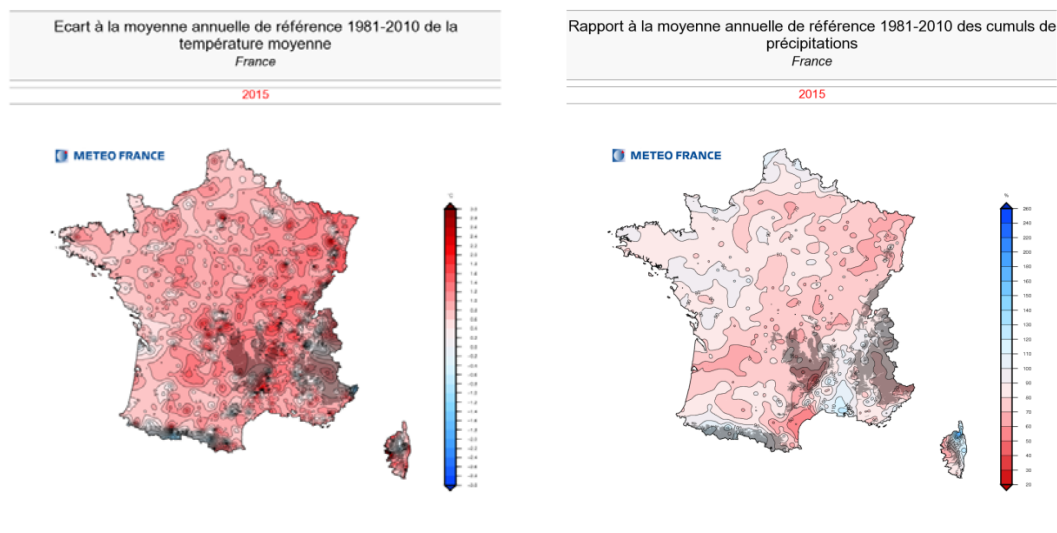


Figure 10a) Difference between 2015 and the seasonal average 1981-2010 temperature. b) Difference between 2015 and the seasonal average 1981-2010 total precipitation

### *Fire occurrence and affected surfaces*

In 2015, 11 160 ha were affected by fire in France (which is consistent with the ten year average):

3 050 ha was burnt in the Mediterranean departments (the ten-year average is 6 530 ha<sup>2</sup>), of which 1 960 ha was in the summer (for 940 fires). The area affected by fire over the summer is less than half the average for the last 10 summers.

5 700 ha was burnt in the southwest (average 3 100 ha), of which 1 575 ha was in the

Landes forest (against 1 000 ha on average), and 3 300 ha in the Pyrenees,

2 400 ha was affected in other metropolitan departments.

This distribution is atypical, since less than 30% of the areas affected by fire in France in 2015 are located in the Mediterranean departments against 65% on average during the past decade (Figure 12). In addition the proportion of affected areas outside the summer period is abnormally high (over 50%).

<sup>2</sup> Prior to implementing the strategy of attacking incipient fires in the late 80s, the average was 34 000 ha.

The meteorological conditions resulted in sustained operational activity outside the southern region. In addition to many stubble fires, several major fires developed including:

- Sarthe (10/07) in Mulsanne: one hundred hectares of scrub and pine affected;
- Ain (16/07), in Saint-Maurice Gourdans: 370 hectares of brush and grasses affected, threatened homes;
- The Loire (17/07), in Châteauneuf: a hundred hectares affected;
- Côte d'Or (20 and 21/07) in Marsannay-la-Côte: 105 ha affected;
- Gironde (24 to 27/07): 570 hectares burnt in Saint-Jean-d'Ilac where some residences were evacuated. This is the biggest fire that occurred in France this summer;
- The Rhône (August 6 and 7): a hundred hectares and a house affected in Beaujeu.

At the end of the year, there were significant wildland fires related to the practice of agricultural burning in the Pyrenees, usually in inaccessible areas and without issues. 2 400 ha of scrub were affected during this period.

In the Southern zone, the number of fires over 100 ha (4) was relatively small. They occurred from the end of July in:

- Saint-Vallier, in the Alpes-Maritimes, 29/07: 195 ha affected;
- Vero, in Corse-du-Sud, 30/08: a hundred hectares affected;
- Menton in the Alpes-Maritimes, 9/09: 130 hectares affected,
- Cerberus in the Pyrenees-Orientales, 17/09: 130 ha were burnt overnight by a fire during which a volunteer firefighter from SDIS66 died while participating in the fight.

#### Actions carried out in Réunion (Indian Ocean)

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 2015 it pre-positioned a Dash water bomber aircraft during the sensitive period, as it has done since 2012. The areas affected this year were limited in Réunion, and in total a hundred hectares of various vegetation types were burned, compared with 300 ha on average during the last 3 years.

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

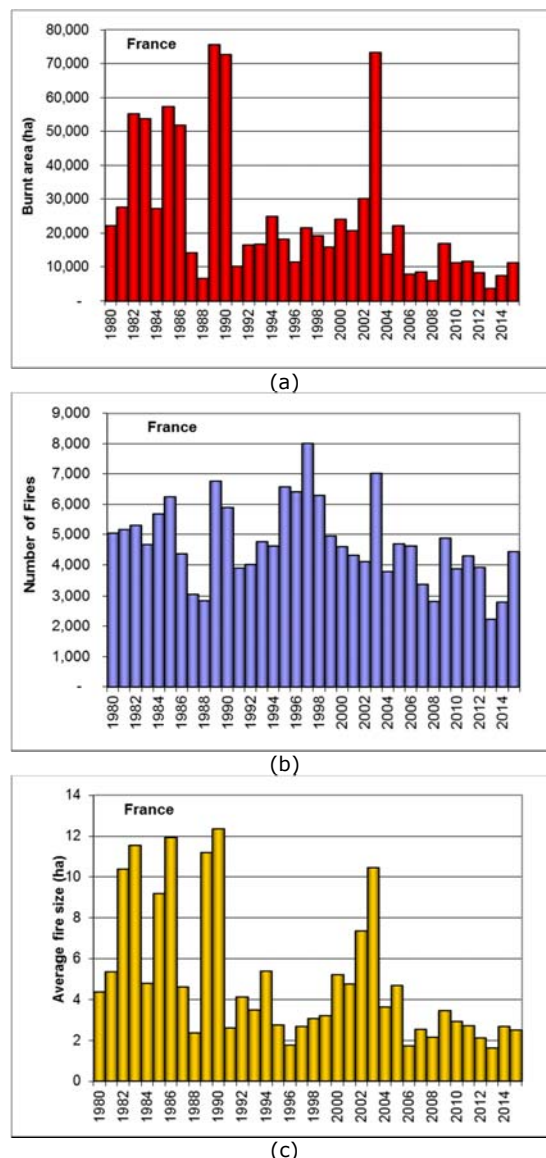


Figure 11. Burnt areas (a), number of fires (b) and average fire size (c) in France from 1980 to 2015.

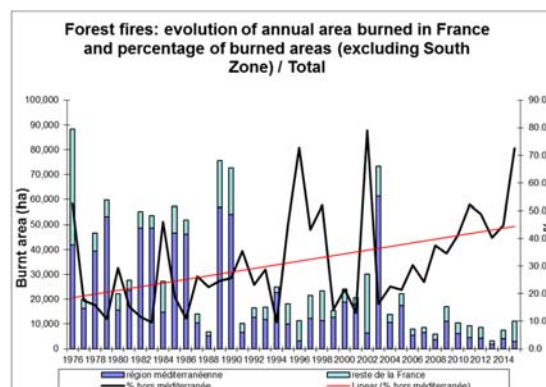


Figure 12. Proportion of fires occurring outside the Mediterranean zone.

### 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 includes numerous recommendations. Their implementation will take several years.

There is ongoing renewal of expired plans for protection of forests 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 13);



Figure 13. Example of state of vegetation monitoring August 2015.

- 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 €7.4 million of work, which received financial support from the European Union (approximately €1.38 million from EAFRD: the European Agricultural Fund for Rural Development); the State and local governments spent about €33 million for the maintenance of existing equipment (tracks, water points, etc.);

- 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](http://www.dpfm.fr)) which provides information on regulations and relays the main events and francophone articles on DFCI.

### Fire fighting means



Figure 14. Fire-fighting means deployed in 2015.



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:

- 690 military personnel of investigation and intervention of the civil protection units (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. They could thus supplement the *Centre Opérationnel de Gestion Interministérielle des Crises* (COGIC) of the Directorate General of Civil Security and crisis management 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 elements of UIISC are deployed in the most sensitive forests alongside the local fire fighters. Water bombers provide aerial reconnaissance missions, the military provide patrols alongside local actors (foresters, firefighters, members of community committees for forest fires).

Because of the meteorological conditions in 2015, activity of the national means was greater than in recent previous years. Water bombers of the Civil Security intervened 261 times compared with 198 on average during the last 10 summers. The use of air assets was particularly notable outside the Mediterranean area (South zone + Ardeche and Drôme), and 56 interventions took place in the South-West (46), South East (9) and West (1) regions against 16 on average.

Following the 2013 plan (for pre-positioning air assets in Bordeaux when the Landes forest departments are classified as severe operational risks), water bombers were put in place in Bordeaux on 34 occasions.

In total, this year the air assets conducted almost 2000 flight hours in intervention on fires and 900 flight hours during armed air lookout missions at times of very severe risks (on which occasions 90 fires were treated).

During these missions, 1 646 tons of retardant, which enhances the performance of the water-bombing aircraft, were consumed.

-The civil security military formations mobilized 555 soldiers daily during the summer and were engaged 150 times for fires and made nearly 600 ground surveillance missions in Corsica.

-Forest fire reinforcement operations were limited in the South zone (only one significant operation was conducted in southern Corsica mobilizing sixty men from 31 August to 4 September).

Other operations were carried out in the southeast area for fires in Ain, Loire and Rhone, but the most important operation was in the Gironde for the fire at Saint-Jean d'Illac, which in addition to the Southwest Zone's own resources, mobilized 4 columns from the East (1), West (1) and South East zones (2). Their contribution represented 1 250 man-days.

#### *Loss of human lives*

The measures taken to prevent and fight against forest fires were effective in protecting the population, and there were no civilian casualties, and the damage to infrastructure (residential buildings, etc.) was limited. However, a firefighter died at Cerberus in the Pyrenees-Orientales, during night-time firefighting operations.

#### *Operations of mutual assistance*

Despite the tense operating environment during July, a favourable response was given to a request for assistance submitted by the Greek authorities who had to deal with major fires. One reconnaissance aircraft and two Canadair were made available from July 18 to 21. The aircraft made 55 hours during this mission carrying 80 drops.

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

### 2.2.8 The former Yugoslav Republic of Macedonia

The Republic of Macedonia covers a total area of 25 713 km<sup>2</sup>, 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<sup>2</sup> and average sunshine period of 2450 hours per year.

#### *Fire danger in the 2015 fire season*

The fire danger in the 2015 season in Macedonia was at a minimum level. The majority of fires occurred in the late spring and during the summer months.

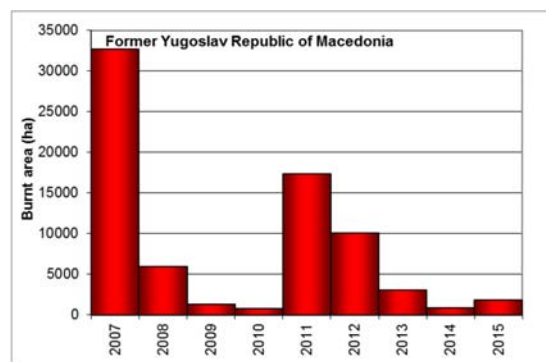
#### *Fire occurrence and affected surfaces*

During 2015 there were 386 fires, of which 106 were forest fires, affecting a total area of 3208.8 ha. The forest land affected was 1797.6 ha and 27.46 % of the total numbers of fires were forest fires. The comparative charts for burnt area, number of fires and average fire size for the years 2007-2015 are shown in Figure 15. The number of fires and burnt area according to fire type for the year 2015 are shown in Figure 16.

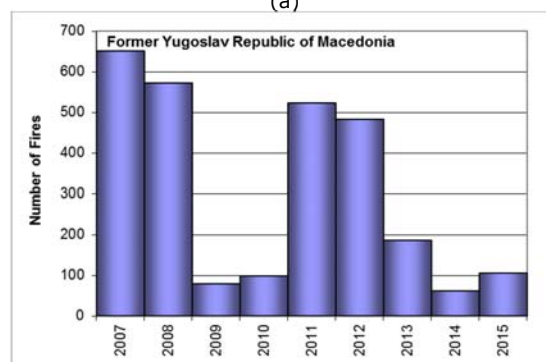
#### *Fire fighting means and information campaigns*

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

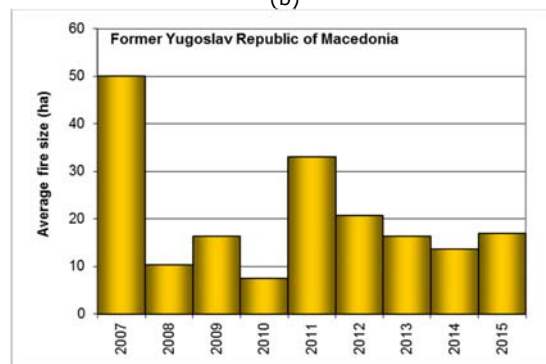
announcements on the TV and radio were organized.



(a)



(b)



(c)

Figure 15. Burnt areas (a), number of fires (b) and average fire size (c) in the former Yugoslav Republic of Macedonia from 2007 to 2015.

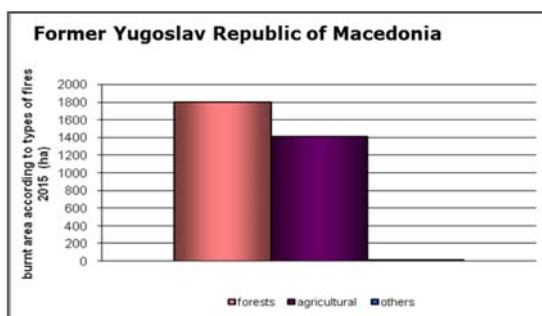
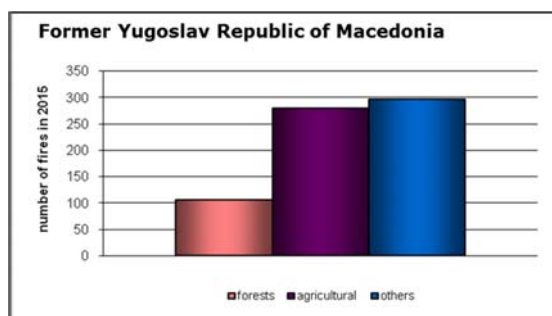


Figure 16. Number of fires (a) and burnt area (b) according to the type of fires in 2015.

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

## 2.2.9 Germany

### Fire occurrence and affected surfaces

In 2015 a total of 1 071 forest fires were reported in Germany, corresponding to a burnt area of 525.5 ha (99.4 ha in deciduous forests and 426.1 ha in coniferous forests). This is a little higher than previous few years.

By far the most affected province (Land) in 2015 was Brandenburg whose burnt area was greater than that recorded over the rest of the country put together (Table 7, Figure 17). 3 Länder (Bremen, Saarland 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, 2015

	Burnt area (ha)			Number of fires
	Coniferous forest	Broadleaves forest	Total	
<i>Baden-Württemberg</i>	5.1	5.2	10.25	57
<i>Bayern</i>	54.9	10.9	65.83	112
<i>Berlin</i>	0	0	0	1
<i>Brandenburg</i>	278.5	49.8	328.28	332
<i>Bremen</i>	0	0	0	0
<i>Hamburg</i>	0.2	0.1	0.3	2
<i>Hessen</i>	10.6	1.7	12.29	124
<i>Mecklenburg-Vorpommern</i>	5.5	3.3	8.81	31
<i>Niedersachsen</i>	14.7	8.6	23.27	82
<i>Nordrhein-Westfalen</i>	7.5	2.3	9.78	27
<i>Rheinland-Pfalz</i>	9.1	3.3	12.45	37
<i>Saarland</i>	0	0	0	0
<i>Sachsen</i>	10.8	5.7	16.45	128
<i>Sachsen-Anhalt</i>	24.8	6.7	31.44	92
<i>Schleswig-Holstein</i>	0	0	0	0
<i>Thüringen</i>	4.5	1.9	6.37	46
<b>Germany</b>	426.1	99.4	525.5	1071

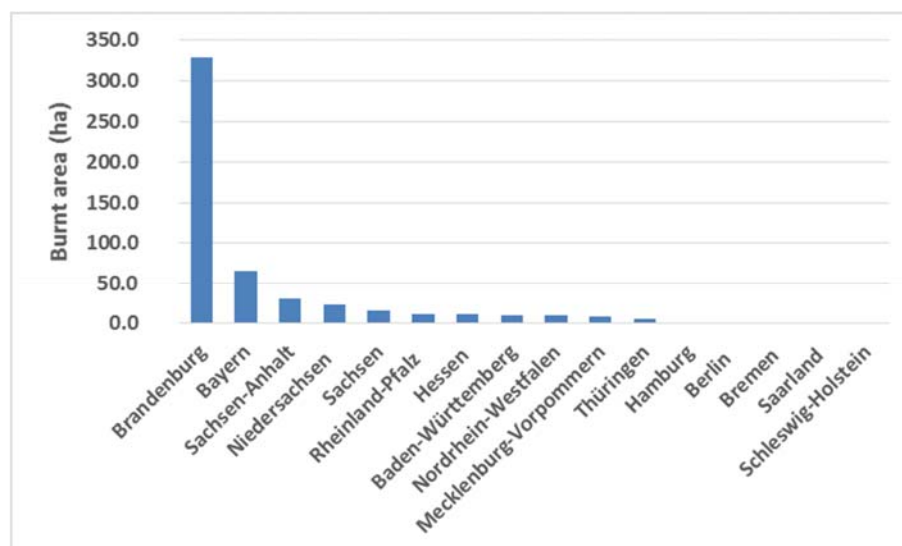


Figure 17. Burnt area in Germany in 2015 by Land.

In 2015 the majority of damage occurred in July, while the greatest number of fires were recorded in August (Figure 18).

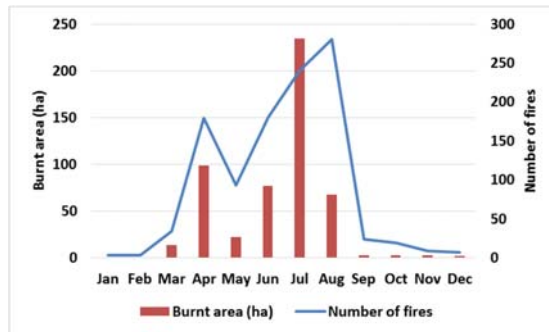


Figure 18. Number of fires and burnt area by month in Germany in 2015

The trend of the burnt areas, number of fires and average fire size in Germany for the years 1991-2015 are shown in Figure 20.

#### Fire causes and impacts

The main causes of forest fires during 2015 are shown in Figure 19. Within the category of negligence fires, the majority (147) were caused by the general public (campers, visitors, children etc.).

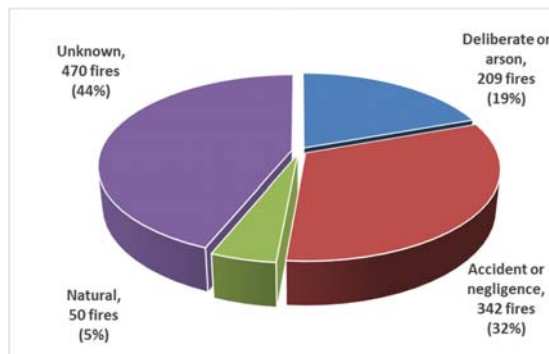


Figure 19. Causes of forest fires in 2015

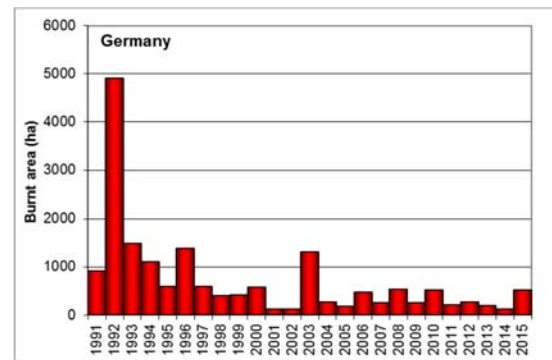
The economic damage caused by forest fires in 2015 is estimated to be 0.8 million Euro (Table 7), higher than that recorded in recent previous years, although lower than the long term average from 1991 to 2015, which is 1.8 million Euro. In 2015, approximately 2.44 million Euro were spent on prevention and control measures.

Table 8. Losses from forest fires in Germany in 2015.

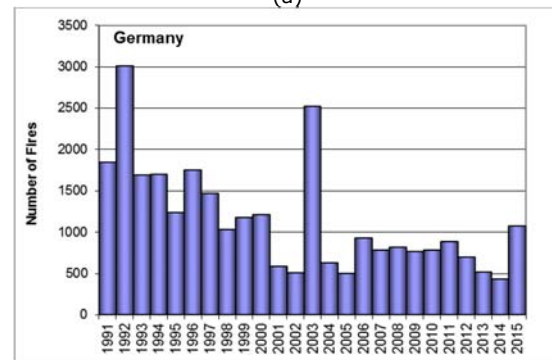
	Year 2013 2014 2015			
Total volume of non-recoverable wood (1000m <sup>3</sup> overbark)	Sawlog size	9.5	0.9	<b>2.8</b>
	Other	74.4	7.1	<b>12.6</b>
	Total	83.9	8.0	<b>15.4</b>
Total value (1000 Euro)	Wood & other tangible losses <sup>1)</sup>	474	179	<b>534</b>
	Other <sup>2)</sup>	31	23	<b>303</b>
	Total	505	202	<b>837</b>

<sup>1)</sup> Estimate of the stand expectation value less the stumpage value plus consequential costs caused by fire (additional planting cost etc.) as well as other material damage.

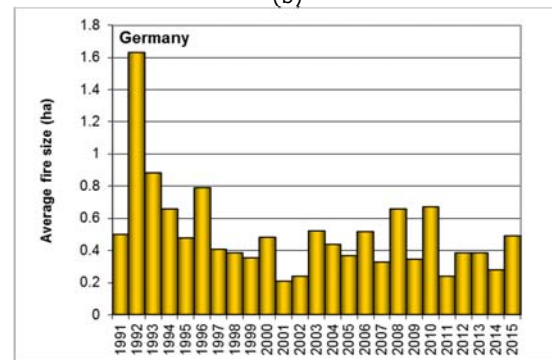
<sup>2)</sup> Other damage according to material value method (Koch) or other comparable cost estimates.



(a)



(b)



(c)

Figure 20. Burnt areas (a), number of fires (b) and average fire size (c) in Germany from 1991 to 2015.

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



## 2.2.10 Greece

### *Fire danger in the 2015 fire season*

Fire danger during the 2015 fire season remained low throughout the year and the burned area level also remained low, compared to the respective figures of the previous years. Overall, 2015 was a mild year in terms of fire danger conditions for Greece and fire weather conditions contributed in avoiding forest fire incidents. During 6-7 May 2015, a 2 day period of daily maximum temperature above average set some records over northwest Greece, fortunately without a meaningful fire incident. During 17-20 July 2015, extended forest fires occurred in many places in Greece. The most affected regions were the prefectures of Lakonia (Peloponnese) and Attica. Both fire incidents in those regions occurred on July 17<sup>th</sup>. The first one took place at Molaoi Lakonia and burned 2 941.4 ha of wooded area and the second one at the suburban forest of Mount Hymettus in Athens city and burned 792 ha of wooded area.

### *Fire occurrence and affected surfaces*

The number of forest fires and burnt area in Greece during 2015 are shown in Figure 21. The data below have resulted from the integration of data available by the local Forest Service Units. This number is still provisional and is likely to rise when compilation of fires is complete; however the number of forest fires recorded refers to the majority of the 2015 fire incidents and there is no large deviation expected.

During 2015, a number of around 510 forest fires were recorded. Compared to the previous year the number of fires was much the same, although the burned area was significantly less (7 095.75 ha), of which approximately 90% occurred in wooded areas.

The yearly trends in terms of numbers of fires and burnt areas in Greece since 1980 are shown in Figure 21 below.

Table 9. Number of fires and burned area in 2015 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	59	35	17	6	1	0	<b>328.68</b>	<b>195.52</b>	<b>133.16</b>
Epirus & Western Macedonia	27	14	9	4	0	0	<b>74.40</b>	<b>8.70</b>	<b>65.70</b>
Thessaly and Central Greece	92	71	8	11	2	0	<b>500.00</b>	<b>413.30</b>	<b>86.70</b>
Peloponnese, Western Greece & Ionian	161	126	19	14	1	1	<b>3388.31</b>	<b>3375.12</b>	<b>13.19</b>
Attica	7	1	4	1	0	1	<b>813.81</b>	<b>812.58</b>	<b>1.23</b>
Aegean (Northern & Southern Aegean)	66	43	10	9	3	1	<b>1626.42</b>	<b>1601.47</b>	<b>24.94</b>
Crete	98	85	9	3	1	0	<b>364.14</b>	<b>39.81</b>	<b>324.34</b>
<b>TOTAL</b>	<b>510</b>	<b>375</b>	<b>76</b>	<b>48</b>	<b>8</b>	<b>3</b>	<b>7095.75</b>	<b>6446.49</b>	<b>649.26</b>

\*Counts not complete

### *Fire fighting means and information campaigns*

The personnel involved in fire suppression was 15 749 persons, of which 8 709 are permanent personnel of the Fire Brigade which deals also with the structural fires, 3 842 personnel employed with five year contracts, 1 420 personnel hired seasonally just for forest fire suppression and 1 778 are volunteer fire fighters.

The Fire Brigade of Greece owns about 1 778 engines which are used in both structural fire and forest fire suppression. A few more small engines owned by Municipalities in high risk areas were involved occasionally in some incidents. Suppression efforts were also supported by volunteers assisting in different ways (e.g., filling trucks with water etc.).

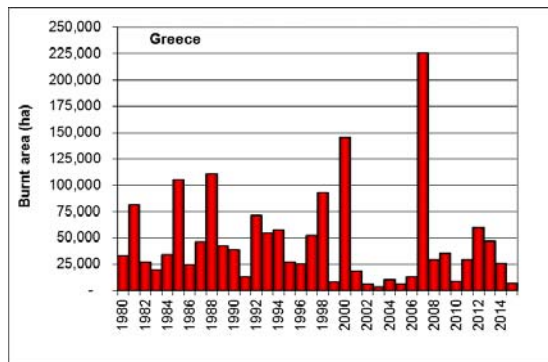
The aerial means used during the 2015 campaign are indicated in Table 10.

Table 10. Aerial means participating in the 2015 campaign

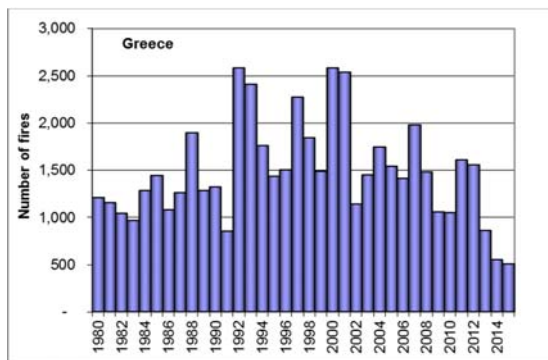
STATE OWNED MEANS			
AIRCRAFT	LARGE	CL-215	10
		CL-415	5
	SMALL	PEZETEL	17
HELICOPTERS		CHINOOK	2
		BK 117 CL	3
		AS 332 L1 SUPER PUMA	2
<b>TOTAL</b>			<b>39</b>
HIRED MEANS			
HELICOPTERS		H/P SIKORSKY 64	3
		H/P KA-32	7
<b>TOTAL</b>			<b>10</b>

Table 11. Mutual assistance in 2015 in Greece

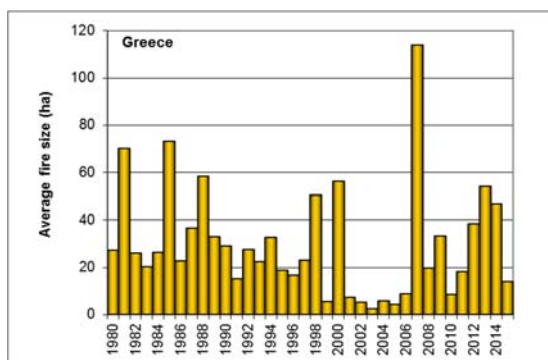
Aircraft No	Type	EU State	Date	Region of incident	No of Drops
FZBEU/EQ-42	CL-415	FR	19/07/2015	Zakinthos island & Malantreni Argolidas	19
FZBRX/EQ-34	CL-415	FR	19/07/2015	Zakinthos island & Malantreni Argolidas	19
FZBFJ-98	BEECH CRAFT	FR	19/07/2015	Neapoli, Laconia	Two (2) Risk assessment flights
FZBEU/EQ-42	CL-415	FR	20/07/2015	Asini Argolida, Kosta Argolida, Iria Nafplio	24
FZBRX/EQ-34	CL-415	FR	20/07/2015	Zakinthos island & Malantreni Argolidas	20
FZBFJ-98	BEECH CRAFT	FR	20/07/2015	Argolida area	One (1) Risk assessment flight



(a)



(b)



(c)

Figure 21. Burnt areas (a), number of fires (b) and average fire size (c) in Greece from 1980 to 2015.

### Operations of mutual assistance

During the fire campaign, the international mechanism was activated as shown in Table 11 above.

### Injuries and loss of human lives

During the fire campaign of 2015, one person (citizen) died, four (4) persons suffered from burns (1 firefighter and 3 citizens) and ten (10) persons (fire fighters) were injured.

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

## 2.2.11 Hungary

### *Fire danger in the 2015 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.

Forest fire hazard strongly depends on weather conditions. There was only one extreme weather situation in 2015. A short moderate endangered period occurred in mid March when most small fires arise. During summer there was a longer drought period when two large crown fires burnt around the same time in the Great Hungarian Plain although a fire ban was ordered by Ministry of Agricultural for whole country.

Apart from the high danger period there were some short days when the FWI values reached the "extreme" level in summer.

### *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 12.

Table 12. Number of fires and burnt areas

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

A total of 1 069 forest fires were reported with a total burnt area of 4 730 ha in 2015. The number of fires and the total burnt area have similar values compared to the previous two years, which can be seen in Table 12. The reasons can be found in climate extremes, agricultural and forest management methods and especially socio-economic circumstances.

The worst affected regions were the north part of Hungary close to agricultural areas and in the Great Plain in the centre of the country, where more than 30% of the forest fires occurred. Figure 22 shows the locations of forest fires in Hungary in endangered periods of the year.

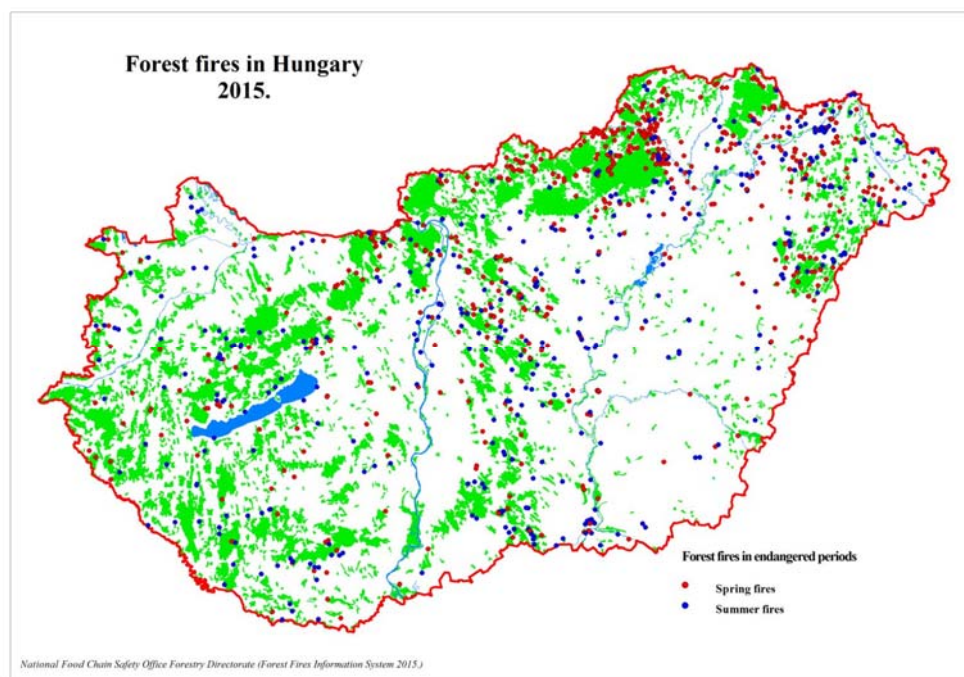


Figure 22. Locations of forest fires in Hungary in 2015.

98% of forest fires are surface fires, as shown in Table 13. Surface fires, when surface litter and other dead vegetal parts and smaller shrubs burn, have been common in Hungarian forests. They can develop at any time over the whole fire season. Canopy fires mostly develop in coniferous forests in the summer period. Ground fires are not significant in Hungary.

Table 13. Fires in Hungary 2015 by fire type

Type of forest fire	Number of fires	Total burnt area (ha)
Ground fires	2	6
Surface fires	1065	3795
Crown fires	2	929
Total	1069	4730

The average proportion of fires smaller than 1 hectare is almost 62%. Small fires are usually low intensity surface fires where dry grass and small twigs are burning. The average total burnt area was 4.4 hectares in 2015, which is similar to previous years.

In 2015 there were only 18 fire events when more than 50 hectares were burnt and six fire events where more than 100 hectares were burnt. In most cases about 30% of the total burnt area is forest stands.

Figure 23 represents the tendencies experienced in recent years that there are two most dangerous forest fire periods during the year.

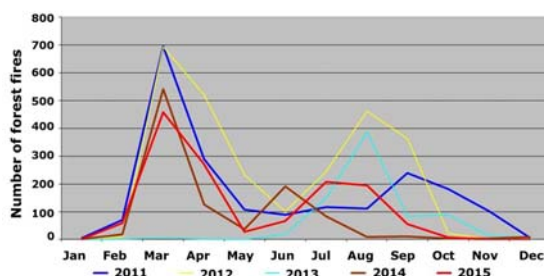


Figure 23. Number of fires per month in Hungary 2011-2015

#### 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.

“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. Though burning has lost its importance these days, it prevails as a traditional early spring grassland management method. Negligently lit and unattended grassland fire may spread to forest lands nearby. Vegetation is not green yet in this period of the year, and in addition a large amount of dry leaves and dry herbs is located on the ground, that can easily go up in flames.

Although the total burnt area reached high values in the past few years, we can say that they were only surface fires which did not cause serious damage in forests stands.

Spring vegetation fires usually burn with low or medium intensity in broadleaf forests, juvenile growth, shrubs and grasslands. Fire totally or partially consumes forests and causes serious harm. 40-45 % 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.

Studying the statistics we can see that a total of 1602 hectares of forest were burned or affected by fire during 2015. In addition, more than 2 371 hectares of grass vegetation and 757 hectares of bush vegetation were destroyed in forest fires.

Table 14. Fires by forest type

Forest type	Total burnt area (ha)
Forested land	1602
Other wooded land	757
Other land	2371
Total	4730

The yearly trends in terms of number of fires and burnt area during the last 15 years in Hungary are shown in Figure 24 below.

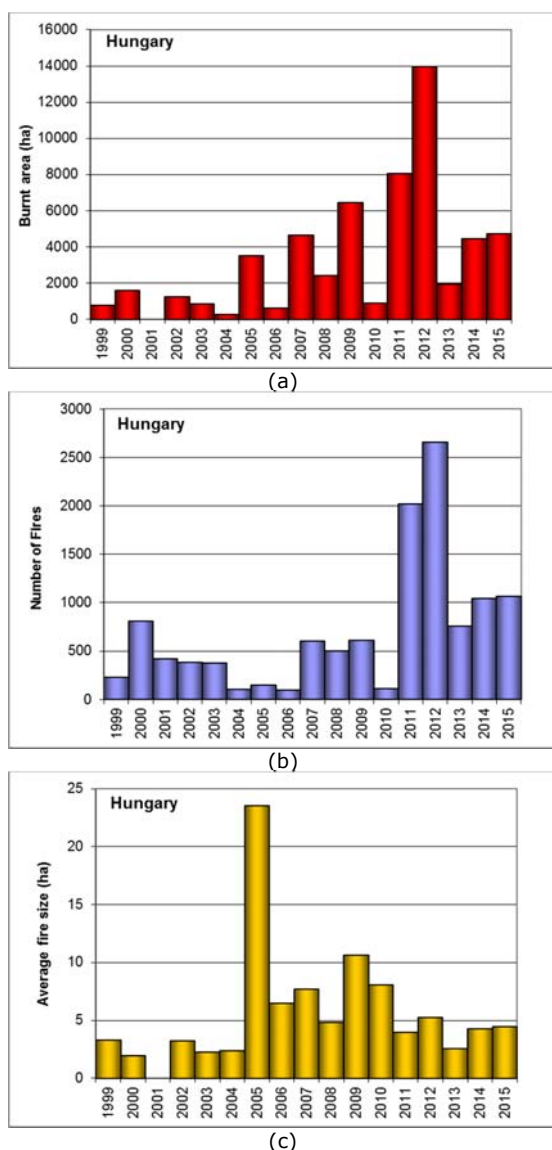


Figure 24. Burnt areas (a), number of fires (b) and average fire size (c) in Hungary from 1999 to 2015.

#### *Fire fighting 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.

#### *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 forest authority in the frame of a FIRELIFE project. Our project started in 2014 which is the first one in Hungary, which won the support of LIFE "information and

communication" programme. The project duration is 2014-2018.

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 communication campaigns helped to reach our goals through 2015:

- 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;
- participation in workshops and conferences organized for teachers, pre-school teachers and social workers, farmstead caretakers with giving presentations and short training sessions on forest fires and prevention;
- 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 use of audiovisual tools by preparing a short educational film on forest fires;
- preparation of printed publications especially for the target group of children;
- putting in place of information boards, preparatory work of A1 placards and A5/LA4 leaflets;
- building professional and mutually beneficial cooperation with professional organizations and enterprises, through which we can reach our target group.

FIRELIFE project website: [www.erdotuz.hu](http://www.erdotuz.hu).

(Source: National Food Chain Safety Office, Forestry Directorate).



## 2.2.12 Ireland

### *Introduction*

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

2015 saw increased levels of fire activity over preceding years 2012 and 2013, primarily as a consequence of prevailing Westerly High Pressure dominated weather conditions during early spring, which induced high flammability in upland vegetation most at risk from fire. Wet spring weather conditions during 2012, 2013 and 2014 has also helped moderate fire activity in comparison, during these years. In almost all cases, the ignition source for fires is thought to be human, and natural forms of ignition can be largely discounted. There is a strong correlation between the patterns of these fires and established traditional agricultural burning practice in Irish upland areas. There is little or no correlation between lightning activity and other conditions that could induce ignitions naturally.

### *Fire incidence levels*

During 2015, the area of open land affected by fire is thought to be in the region of 10 000ha, 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. Satellite based detection and monitoring of fires in Ireland is hampered by the short duration and generally subtle reflectance/thermal signature of fires occurring under typical high risk conditions, with the added frequent issue of obscuration by cloud, and the absence of geospatial capabilities within Irish Fire and Rescue Services at local level.

Arising from this fire activity, up to 300 ha of forest land are known to have been affected by fire, mainly commercial state-owned and private forestry, but including 100 ha of Native forest located on National Park Lands. In some cases, particularly where young commercial forestry is concerned, the destruction and losses are total, while mature Native woodland sites appear to be largely unaffected to date by the passage of fire through surface vegetation in these stands, notwithstanding the impacts on local level forest ecology.

Table 15. Estimated burnt area in 2014 and 2015.

<b>Total losses (estimated)</b>	<b>Forest</b>	<b>Non-Forest land</b>
2014	100 ha	< 5000 ha
2015	300 ha	10 000 ha

### *Fire prevention activities*

Following from previous years, Forest Fire prevention activities by DAFM Forest Service and partner agencies continued throughout 2015, with a major element of European cooperation involved at various points.

The DAFM Forest Service Fire Danger Rating system was developed further and was operational by early March 2015. Experience from previous years has shown that the widely used FWI (Canadian Model) is not an accurate risk index under typical Irish conditions in early spring, but that an accurate assessment of risk can be gained via the use of the Fine Fuel Moisture Code (FFMC) component of this model, and by discounting the soil-based moisture indices. Under Irish conditions in early spring, only surface fuels - typically grasses, calluna and shrubs like Ulex are liable to burn while the soil is saturated or waterlogged, especially peat soils, and not liable to burn. This aspect is likely to also apply in other Northern European conditions where similar fuels and ecosystems are concerned. Using these principles, it was found that the FFMC component can give an accurate risk rating. On this basis, five Fire Risk Warning Circulars were issued to the Irish Forest Sector during 2015, and the warnings are also presented on advisory websites:

[www.teagasc.ie/forestry](http://www.teagasc.ie/forestry)

[www.agriculture.gov.ie/forests-service/firemanagement](http://www.agriculture.gov.ie/forests-service/firemanagement)

### Policy development

A call for research proposals, intended to address current knowledge shortcomings, was put forward by DAFM in October 2015, but received no responses or proposals to the funding call from Irish research interests.

A number of Irish officers attended the UK wildfire Conference held in Glasgow, Scotland in December 2015 which provided an enormously useful networking, exchange and learning opportunity to Irish services involved in fire management activities.

### Fire Detection

In addition to the EFFIS system, Irish Authorities began an evaluation of the South African AFIS (Advanced Fire Information System) for near-real time analysis of fire activity and detection under Irish conditions. The range of satellite detection data used means a greater number of fires can be detected and classified under Irish conditions, paving the way for more accurate burned area assessments based on these initial detections. Two previously unreported active fires had initial detection and reporting via the AFIS system. Further evaluation will continue through 2016.

### Prescribed Fire Development

In February 2015, 17 Irish Fire Officers, Land Use Advisors and Academics travelled to Catalonia for prescribed fire training facilitated by the Pau Costa Foundation, DAFM Forest Service and the Catalan Fire service (GRAF). The adoption of a structured prescribed fire programme in Ireland is severely constrained by the current short open season for burning in Ireland, which makes spring burning almost impossible to implement legally, given prevailing wet weather conditions during the winter months. Legislative measures including public consultation, intended to address the open season issue were commenced by the Irish Government in early 2015. This issue has proved highly contentious with concerted public campaigns against the extension of the season and concerns raised by Environmental NGO's during the remainder of 2015. In the absence of an extended season, development of strategic prescribed burning programmes for protection of high liability locations such as National parks and key NATURA sites has been severely limited.

Despite these constraints DAFM oversaw and facilitated a number of prescribed fire demonstrations at various locations during 2015 on behalf of farming interests, and a number of local Fire and rescue Services.

A major fire incident on April 9-10<sup>th</sup> 2015 highlighted the need for structured prescribed burning programmes for agriculture, where fire is currently used in an ad-hoc and illegal manner that is conducive to wildfires; and the need for strategic prescribed burning on NATURA designated upland sites where fuel development and accumulation is now a liability to both habitat development and fire management objectives.

### *Injuries and loss of human lives*

There were no injuries, deaths or structural losses as a consequence of wildfire reported to emergency authorities in 2015.

### **Killarney Fire**

On the evening of 9<sup>th</sup> of April, 2015 a fire was reported at the southern perimeter of Killarney National Park, in Southwest Ireland. By this time, a condition Orange Fire warning had been in place for the preceding week due to warm dry weather and the fire spread rapidly through upland grass tussocks in remote terrain. Over the next 24 hours, this fire traversed a large open upland area of the park, and burned over 1 500 ha of land, including 100 ha of native oak woodland.

The location of the park, and its importance to the local environment and tourism economy resulted in a Major Emergency being declared by the Local Authority, and a variety of means were utilised to contain and extinguish the fire. Aerial means were provided by the defence forces and Kerry Fire and Rescue Service deployed up to seven units of the Fire service, along with resources from forestry, National Park Service, Coastguard and other Emergency Services. Previous interagency cooperation in relation to fire prevention enabled a high level of cooperation and interaction on the ground.

Following the fire, an interagency post-fire investigation took place, led by An Garda Síochána (the National Police Service). A request was made to JRC in relation to a rapid burned areas assessment and a request was also made to the European Forest Institute for expert assistance via the experimental EFI FRISK-Go Programme. FRISK-GO facilitated expert forensic evaluation of the fire site by Dutch Forensic fire Specialists, and it was possible to locate the source of the fire using these means; however, despite these efforts, and the expertise involved, it was still not possible to attribute culpability on a particular individual or individuals to the standard required for criminal prosecution under Irish law.

### Lessons learned

The Killarney fire investigation, while providing key information towards the criminal investigation, also provided important 'lessons learned' in relation to fire management policy and practice in Ireland.

1. Traditional criminal law enforcement methods provide limited outcomes where wildland fire is concerned. Efforts and resources required for investigations may be better utilised on fire prevention and mitigation measures, and administrative rather than criminal sanctions may have a more direct influence on landowner behaviour in this regard.
2. The use of post fire forensic investigation techniques can provide important information regarding fire development and behaviour that can be valuable in designing future fire prevention measures such as fuel reductions or changes to land management practice.
3. Large incidents such as the Killarney Fire cannot be contained using current structural fire suppression resources and approaches, as currently configured, unless additional protective fuel reduction measures are implemented prior to fire risk periods.
4. Irish wildfires occur at a lower and more subtle level than fires in other fire prone jurisdictions, but still have the capacity to affect large areas where conditions permit, particularly in remote areas. Remote sensing based detection and display systems need to be calibrated to take account of these subtleties, and be augmented by ground based detection measures capable of detecting fires under Irish weather conditions for faster responses by Fire Services.
5. Given the scale and configuration of fire services in Ireland, strategic land management approaches offer the best opportunity to mitigate against fire spread and impacts on extensive conservation land bases in Ireland. However these types of approaches require a good understanding of previous fire history, behaviour and outcomes, if measures are to be targeted effectively. They also require a more flexible approach to the use of prescribed burning, than is currently available under Irish Legislation, and this matter needs to be addressed as a matter of urgency by the relevant national Authorities.

### **Acknowledgements**

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Fire and Emergency Management Directorate,  
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National Parks and Wildlife Service, Ireland.

Joint Research Centre, European Commission.

Northern Ireland Fire and Rescue Service.

Kerry Fire and Rescue Service, Ireland.

Pau Costa Foundation.

Graf Bombers, Generalitat Catalonia, Spain.

Mr. Winand Sitsen, Dutch National Police.

Mr. Henrik Zeevalkink, Fire Service,  
Netherlands.

Mr. Alex Held, European Forest Institute.

Scottish Wildfire Forum, UK.

Teagasc (State Agricultural Advisory Agency),  
Ireland.

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



## 2.2.13 Italy

### Fire occurrence and affected surfaces

In 2015, throughout the country there were 5 442 forest fires that burnt a total area of 41 511 hectares, of which 25 867 were wooded and 15 644 non-wooded.

Compared to the 2000-2014 period these results were lower than the average both for the number of fires (-18%) and the total areas affected by fire (-46%); wooded areas accounted for 62% of the burnt area total of the year, compared to a long-term average of 48%.

Table 16. Trend compared with 2014.

Year	Num. fires	Burnt area (ha)			
		Forest	Non-forest	Total	Av. fire size
2015	5442	25867	15644	41511	7.6
2014	3257	17320	18805	36125	11.1

Table 17. Trends over the period 2010-2014.

Year	Num. fires	Burnt area (ha)			
		Forest	Non-forest	Total	Av. fire size
Av 2010-2014	5506	32619	30283	62902	11.0
2014	3257	17320	18805	36125	11.1
2013	2936	13437	15639	29076	9.9
2012	8274	74532	56267	130799	15.8
2011	8181	38447	33526	71973	8.8
2010	4884	19357	27180	46537	9.5
Variation (%)					
2015 vs 2014	67%	49%	-17%	15%	-31%
5 year mean	-1%	-21%	-48%	-34%	-31%

Compared to 2014, which together with the previous year 2013, were well below historical averages for forest fires, the total number of fires increased significantly in 2015 (+67%) and with it also the wooded areas affected (+49%), although the total burnt areas were on the whole rather small (+15%) in relation to the large increase in fire events, thanks to a decrease of those occurring in non-wooded land (-17%). The average fire size also shows a significant decrease (-32%) from 2014, a sign of a good overall efficiency in enforcement actions, active combat and control from the firefighting organisation in its land and air components, as well as the action taken at investigation level against the perpetrators of criminal fires in accordance with Article 432bis of the penal code.

The total number of fires is however lower (-37%) than the long-term average of the time series from 1970, which is estimated at about 8 700 events per year.

The total burnt area is also at values well below the 40-year long-term average (-60%), which is about 100 000 ha.

The average area per fire was about 7.6 ha and is also significantly lower (-37%) than the average of 12 ha.

Approximately 64% of the fires occurred in the Southern regions and the two largest islands, Sardinia and Sicily, while the remainder is divided approximately equally between the Centre (19%) and North (17%). In terms of total areas covered by fire, the highest concentration was also in the South and in the islands where it reached 63% of the total, while central regions accounted for 20% and the north 16%.

The regions most affected by fire were Campania (994 fires), Calabria (864) and Sicily (830), followed by Lazio and Puglia, between them accounting for 65% of events and almost 70% of the total burnt area nationwide.

The most significant proportion of forest areas affected by fire is found in Lazio (20%), where, with some 450 fires and a burnt area of about 6 000 ha, there was also the highest average fire size (13ha), almost twice the national average.

Table 18. Number of fires and burnt area in Italy by region in 2015.

Year 2015	Num. fires	Burnt area (ha)			
		Forest	Non-forest	Total	Av. fire size
PIEMONTE	180	1807	1075	2882	16.0
VALLE D'AOSTA	14	4	10	14	1.0
LOMBARDIA	225	785	1689	2474	11.0
TRENTINO - A.ADIGE	89	26	2	28	0.3
VENETO	57	52	19	71	1.2
FRIULI V.GIULIA	76	24	67	91	1.2
LIGURIA	226	979	78	1057	4.7
EMILIA ROMAGNA	51	119	39	158	3.1
TOSCANA	328	207	230	437	1.3
UMBRIA	58	82	55	137	2.4
MARCHE	26	24	15	39	1.5
LAZIO	456	5164	784	5948	13.0
ABRUZZO	84	500	584	1084	12.9
MOLISE	70	481	379	860	12.3
CAMPANIA	994	4606	1247	5853	5.9
PUGLIA	420	1302	1807	3109	7.4
BASILICATA	146	1088	480	1568	10.7
CALABRIA	864	4901	1680	6581	7.6
SICILIA	830	2234	4313	6547	7.9
SARDEGNA	248	1482	1091	2573	10.4
<b>TOTAL</b>	<b>180</b>	<b>1807</b>	<b>1075</b>	<b>2882</b>	<b>16.0</b>

NORTH	918	3796	2979	6775	7.4
CENTRE	1022	6458	2047	8505	8.3
SUD+ISOLE	3502	15613	10618	26231	7.5
<b>ITALIA</b>	<b>5442</b>	<b>25867</b>	<b>15644</b>	<b>41511</b>	<b>7.6</b>

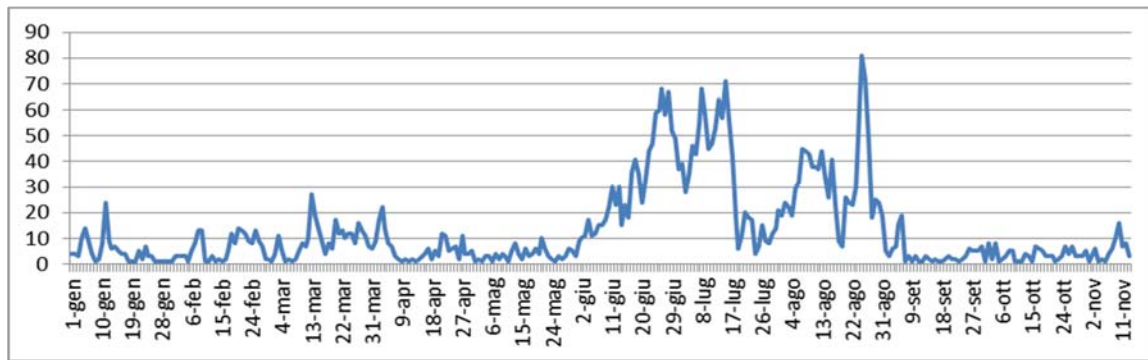


Figure 25. Number of fires per day in 2015.

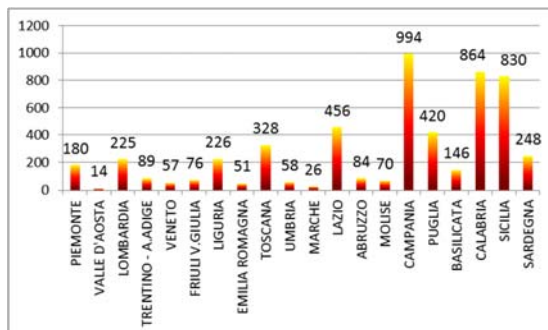


Figure 26. Number of fires by region in Italy in 2015.

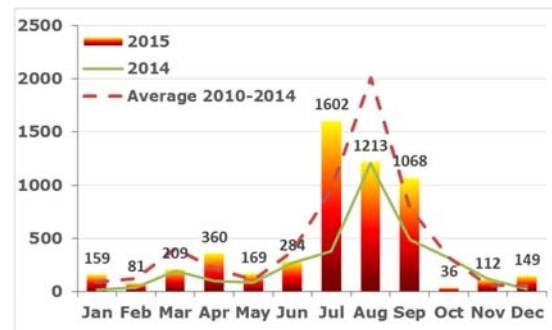


Figure 28. Number of fires per month in 2015.

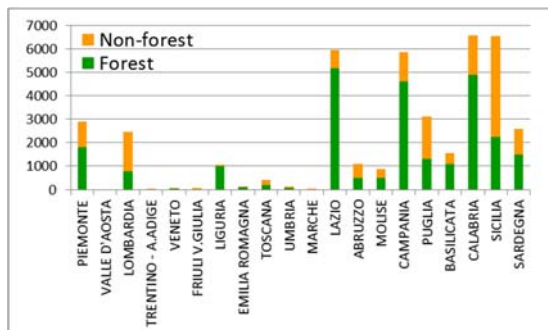


Figure 27. Burnt area by region in Italy in 2015.

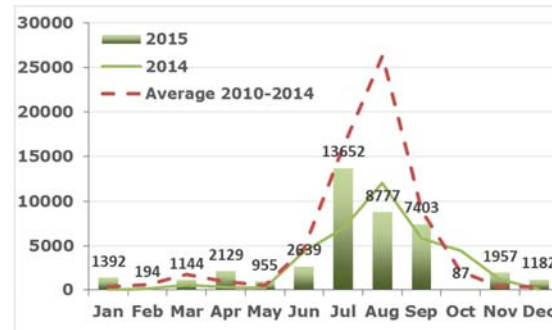


Figure 29. Burnt area per month in 2015.

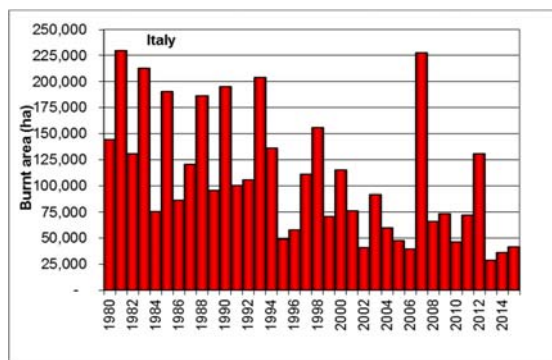
Table 19. Number of fires and burnt area by month.

Year 2015	Num. fires	Burnt area (ha)			Av. fire size
		Forest	Non-forest	Total	
January	159	633	759	1392	8.8
February	81	130	64	194	2.4
March	209	875	269	1144	5.5
April	360	1123	1006	2129	5.9
May	169	676	279	955	5.7
June	284	1194	1445	2639	9.3
July	1602	8380	5272	13652	8.5
August	1213	6165	2612	8777	7.2
September	1068	4689	2714	7403	6.9
October	36	57	30	87	2.4
November	112	1545	412	1957	17.5
December	149	400	782	1182	7.9
<b>TOTAL</b>	<b>5442</b>	<b>25867</b>	<b>15644</b>	<b>41511</b>	<b>7.6</b>

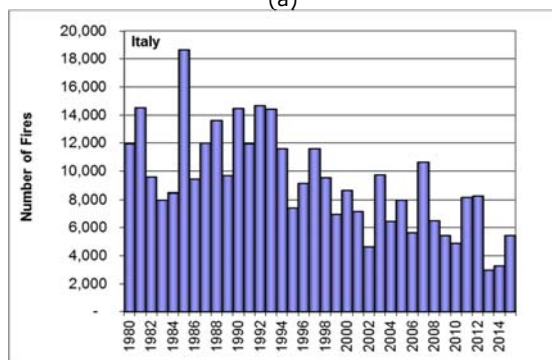


Figure 30. Map of fires in mainland Italy in 2015.

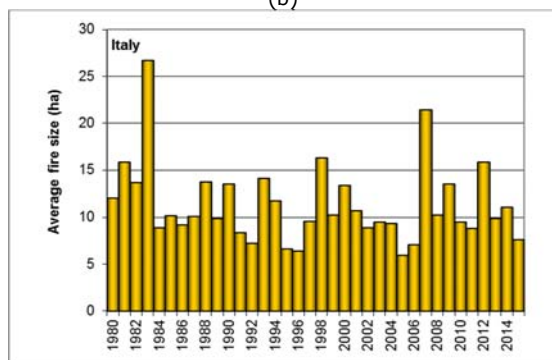
The yearly trends in terms of numbers of fires and burnt areas in Italy since 1980 are shown in Figure 31.



(a)



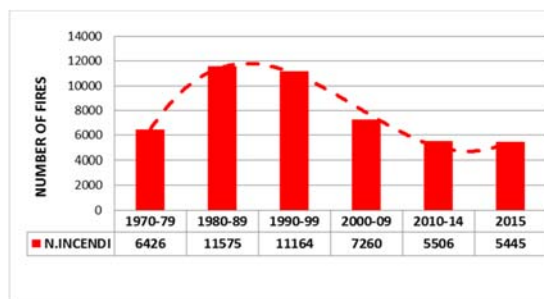
(b)



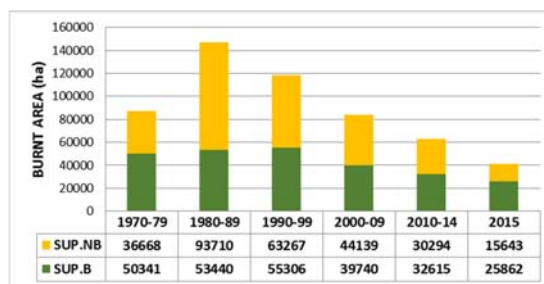
(c)

Figure 31. Burnt areas (a), number of fires (b) and average fire size (c) in Italy from 1980 to 2015.

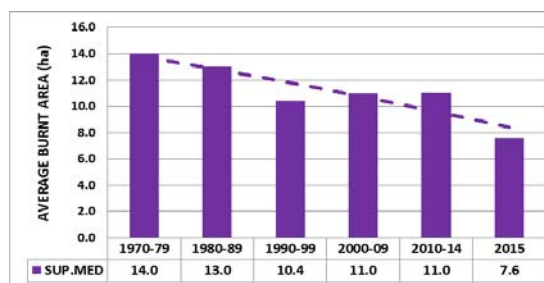
The complete archive of data on forest fires collected by the *Corpo Forestale dello Stato* (Italian forest Corps) is available from 1970 to present. The number of fires increased in the 1970s, then remained less than 10 000 per year until 1978, when there were over 11 000 fires, to remain consistently high in the 1980s and 1990s. Between 2000 and 2007 the average number of fires has dropped by one-third compared to the previous two decades.



The burnt wooded area has been consistent since the early 1970s and has remained above the 50 000 hectare mark as an average value over the last three decades, dropping below 40 000 ha only in recent years since 2000. The burnt non-wooded area was relatively low in the first decade, with an average of 36 000 hectares per year; it reached its maximum in the period 1980-89 with over 93 000 hectares per year and decreased in the third decade, with an average of over 63 000 hectares, falling further to around 44 000 ha in recent years from 2000 and finally to around 30 000 ha from 2010 onwards.



The average burnt area per fire has decreased progressively over the decades, from around 14.0 ha in the 1970s, to 13.0 in the 1980s, and 10.4 for the period 1990-1999, with a slight rise in the years 2000-2009 and from 2010 to 11 hectares.

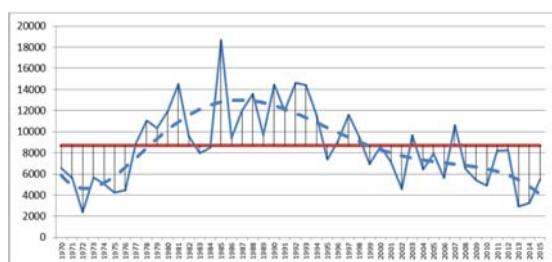


The most critical situations were recorded in 1985 for the number of fires (18 664), in 2007 for forest area affected by fire (116 602 hectares) and in 1981 for total burnt area (229 850 ha).

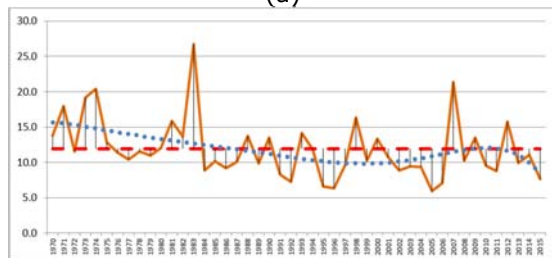
The long term trends in number of fires and average fire size are shown below in Table 20 and Figure 32.

Table 20. Long term averages by decade for number of fires and burnt area.

DECADE	Num. fires	Burnt area (ha)			
		Forest	Non-forest	Total	Av. fire size
1970-79	6426	50341	36668	87009	14.0
1980-89	11575	53440	93710	147150	13.0
1990-99	11164	55306	63267	118573	10.4
2000-09	7260	39740	44139	83878	11.0
2010-14	5506	32615	30294	62909	11.0



(a)



(b)

Figure 32. Long term trends in (a) number of fires and (b) average fire size from 1970-2015.

### Fire prevention activities

The Italian forest Corps, on the activity of prevention and suppression of arson crimes, has given impetus to both the central organization and outstations, through the *Nucleo Investigativo Antincendi Boschivi* (NIAB). This was established in 2000 by the Inspectorate general, which operates throughout the national territory, with the exception of special administrative regions and the autonomous provinces.

The *Nucleo* is responsible for coordination and direction of information-investigation and analysis in relation to forest fires and provides operational, investigative and logistical support to the territorial offices of the Italian forest Corps, also through the research of evidence collected at the scene of fires and the analysis of residues of explosives and triggers.

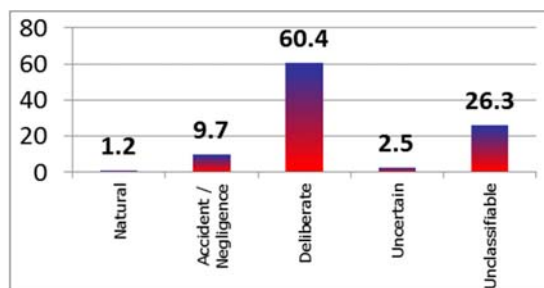


Figure 33. Fire causes in Italy in 2015.

Actions against forest fire offences made by the territorial Italian Forest Corps in 2015, made it possible to report 239 people to the Judicial Authority, including 232 for negligence fires and 7 for arson.

In total, over the period 2000-2015, 5 684 people have been reported to the Judicial Authority for forest fire offences, of which 181 were arrested in the act or were subjected to custodial measures.

### *Innovative technologies of CFS in the AIB sector: The Forest Fire Simulator FFAS*

In 2015 the State Forestry Corps equipped itself with a unique and innovative technological tool: the first immersive simulator of forest fires, the Forest Fire Area Simulator (FFAS), developed at the National Centre of Education of Castelvoturno in Campania. Through its use it will be possible to integrate and improve the preparation of personnel for law enforcement purposes against environmental emergencies and eco-crime.

This is the only project of its kind, realised with European funds from the National Operational Program (P.O.N.) - 2007-2013 Convergence objective. This has led to the development of a fire algorithm, which was built through a collaboration between the Department of Agriculture of the University of Naples "Federico II", and other Italian companies specialized in the sector.

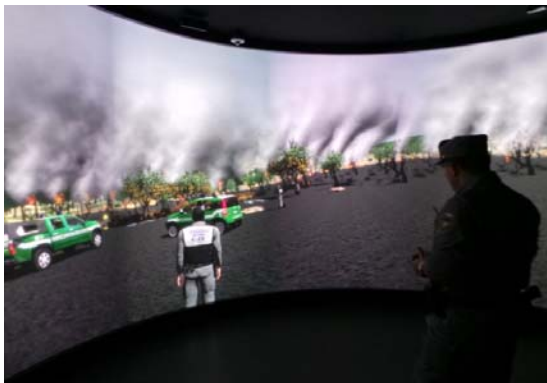
The platform, where you learn by doing, not just studying, employs 3D simulation scenarios that faithfully reproduce threatened ecosystems in an interactive virtual reality environment, according to scientifically validated mathematical algorithms. The simulator allows you to immerse yourself in a realistic way in a virtual environment in which players can interact dynamically in different environmental scenarios, employing systems and equipment routinely used in real operations. The purpose is to educate and train professionals employed to counter the effects of the various types of eco-crimes, from forest fires, to the natural and



environmental disasters that often damage the territory and the Italian landscape. The simulator also provides the students an emotional and sensorial impression in addition to the usual didactic concepts given with traditional courses. This training is absolutely innovative: it comes from the typical scenarios of "serious games" of military origin.



Whoever uses it enters an interactive virtual environment of simulations that have the appearance of a real video game, although with serious purpose, made for the technical-investigative training of the operators: the player, or the trained operator, becomes the protagonist of a virtualization where all their choices and actions are executed by their avatars, which plays out on a screen of 8 metres in circumference.



The work arose from the will of the State Forestry Corps to support the process of modernization and revision of the costs of public administration in a critical sector such as environmental crimes, and particularly in that of forest fires that, each year, consumes huge financial resources, and for which it is not practical to think of setting up real-life training scenarios to instruct staff for the fight and repression of this phenomenon.

At the moment fires are the first type of crime that are the subject of the FFAS, but other modelling and virtualization scenarios are

under development, concerning hydrological instability, waste and pollution. This is assured through the multi-purpose nature of the system that enables it to adjust and expand its training framework for a variety of environmental emergencies. The system makes it possible to relive the operations that staff of the Fire Fighting Investigative Unit (NIAB) perform every day in the work of post-event investigation.

The simulator provides instruments for applying the Method of Physical Evidence, a scientific methodology developed to identify the trigger points of the fire and to hone investigative techniques in order to identify the authors of the criminal forest fire.

The FFAs system consists of an "Immersive Room" of 24 square meters, by a "Decision Room" and about 20 workstations from which you can interpret all the roles in the chain of actions in defence of threatened ecosystems. The "Debriefing rooms" complete the environments available for planning and monitoring the results of simulations and the level of learning acquired by the operators.



The system makes it possible to train the staff in a dedicated training room, located in a space that allows, in addition to training people for the optimal management of activities involved in extinguishing forest fires and those of the manager of the Unified Control Room of Civil Protection, also support for the technical and investigative activities of judicial police officers.

This simulation system is a candidate to be the focus for the education and training of all the DOS (*Direttore delle operazioni di spegnimento*) of the Regions to standardize languages, procedures and behaviours, which are currently still very diversified.

(Source: Italian Ministry of Agriculture, Food and Forest Policies, Italian Forest Corps, Italy).

## 2.2.14 Latvia

### *Fire danger in the 2015 fire season*

In 2015 the forest flammable period was set from 25<sup>th</sup> of April and continued until September 21.

### *Fire occurrence and affected surfaces*

In total, 704 forest fires were discovered and extinguished in 2015 during which 615 hectares were burnt. Of these, 315 hectares of forest, 181 hectares of young stands and 119 hectares of other wooded land were affected. Table 21 shows the distribution of numbers of fires and burnt areas by month during the fire season, and Figure 34 shows the locations of the fires in 2015.

In 2015 the highest number of forest fires was in the vicinity of two of Latvia's biggest cities - Riga and Daugavpils (312 fires, 358.67 hectares affected area, and 128 fires, 28.77 hectares.)

Table 21. Number of fires and burnt areas by month

Month	Number of forest fires	Burnt area (ha)
February	3	1.47
March	108	140.37
April	72	241.25
May	57	74.3
June	141	44.61
July	62	32
August	169	77.16
September	20	1.33
October	43	2.38
November	21	0.18
December	8	0.04
<b>Total</b>	<b>704</b>	<b>615.09</b>

The yearly trends in terms of number of fires and burnt area during the last 23 years in Latvia are shown in Figure 35.

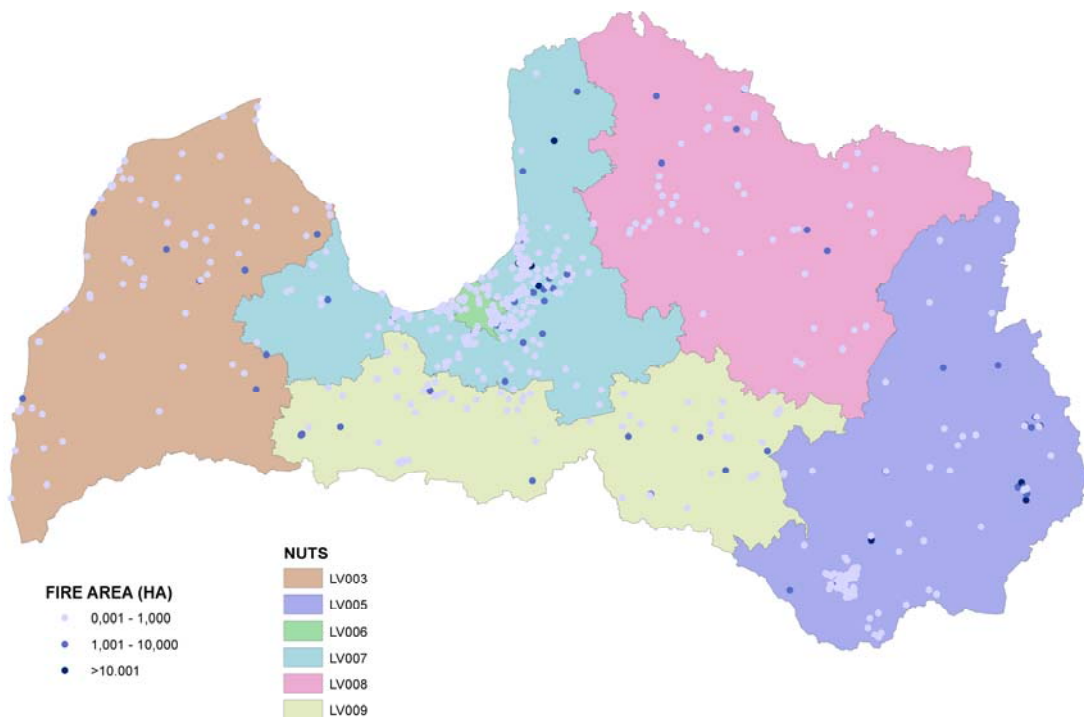
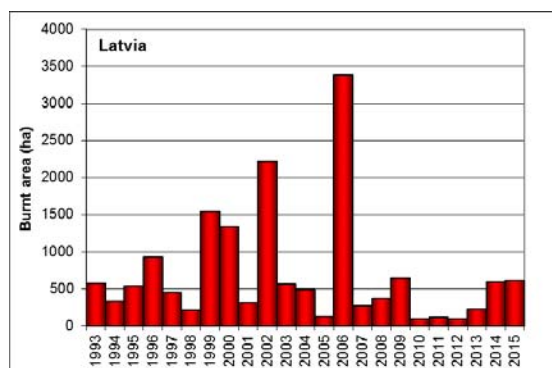
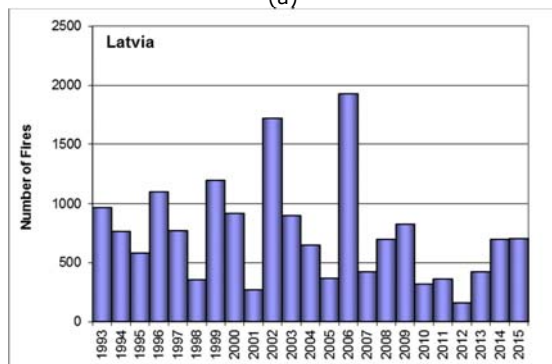


Figure 34. Map of forest fire locations in Latvia in 2015.

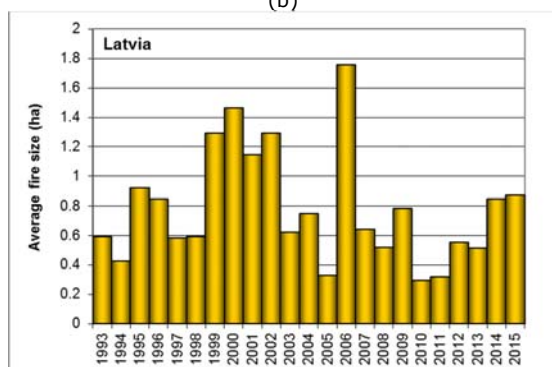




(a)



(b)



(c)

Figure 35. Burnt areas (a), number of fires (b) and average fire size (c) in Latvia from 1993 to 2015.

#### Preventive measures

Under the acts of law, fire prevention measures are imposed on forest owners (managers). In 2015 joint stock Company "Latvian state forests" (1.59 million hectares) spent 95 700 Euro on fire preventive measures, and Ltd. Company "Riga city forest" which manages forests belonging to Riga municipality (66.5 thousand hectares) spent 3 500 Euro (Table 22).

Table 22: Expenditure on fire prevention measures in Latvia in 2015

Title	Costs, EUR
<i>Latvian State forest</i>	
Creating new fire breaks, 2 km	450
Existing fire break cultivation, 3550km	73414
Water point, warning sign renovation	18712
<b>Total</b>	<b>92576</b>
<i>Riga City Forest</i>	
Creating new fire breaks, 0 km	1474
Existing fire break cultivation	
Fire-fighting	2026
<b>Total</b>	<b>96076</b>

#### New equipment

In 2015 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" At the moment each of the 10 State Forest service heads of forestry have 15 new fire trucks.



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

## 2.2.15 Lithuania

### *Fire danger in the 2015 fire season*

Forest fires during the year 2015 in Lithuania settled at a low level. The amount of wildfires and the total burnt area was low. The first fire in 2015 was recorded in March, 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 2015, according to the data of the Directorate General of State Forests, 247 forest fires occurred and damaged 71 ha of forest. Only 8 forest fires were bigger than 1 ha. The highest number of forest fires occurred in August (38% of fires and 58% of burnt area). The total damage was estimated to be 44 235 euro. The yearly trends in terms of number of fires and burnt area during the last 26 years in Lithuania are shown in Figure 36 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 Lithuanian Hydrometeorological 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 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 1 900 thousand EUR from their own funds in 2015, 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 25 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.

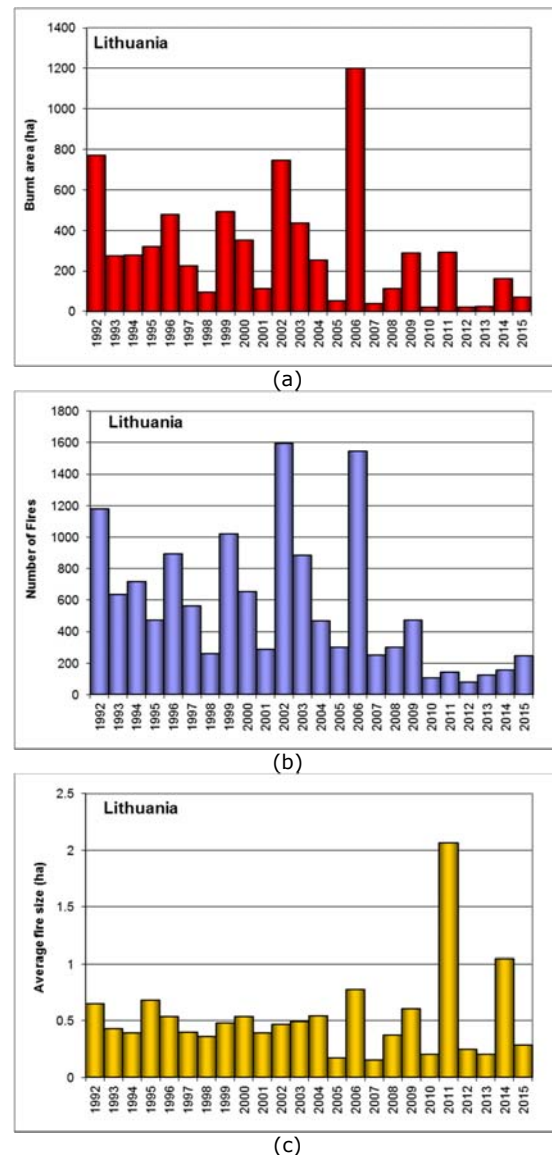


Figure 36. Burnt areas (a), number of fires (b) and average fire size (c) in Lithuania from 1992 to 2015.

### *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 2015.

(Source: Directorate General of State Forests of Lithuania, Forest department, Ministry of Environment of Lithuania).

## 2.2.16 Norway

### *Fire danger in the 2014 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 2015 was 1.8°C above the normal and precipitation was 125 % of 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:

- Monitoring the forest by air (plane);
- Information campaigns;
- Prohibit fire dangerous activity in periods with high Fire Index.

The Governmental Authorities are responsible for the following activities:

- Provide information on the forest fire index through the internet (The Norwegian Meteorological Institute);
- Provide information through television (Forecast) when the forest fire index is high (The Norwegian Meteorological Institute);
- 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 2014 there were only 29 forest fires recorded in Norway; 2 ha of productive forest and 141 ha of other wooded land (wildland). There were 466 fires recorded in brushes and grass (non-forest).

The trends regarding both the number of fires and burnt areas over the last 16 years (2000-2015) are shown in Figure 5.

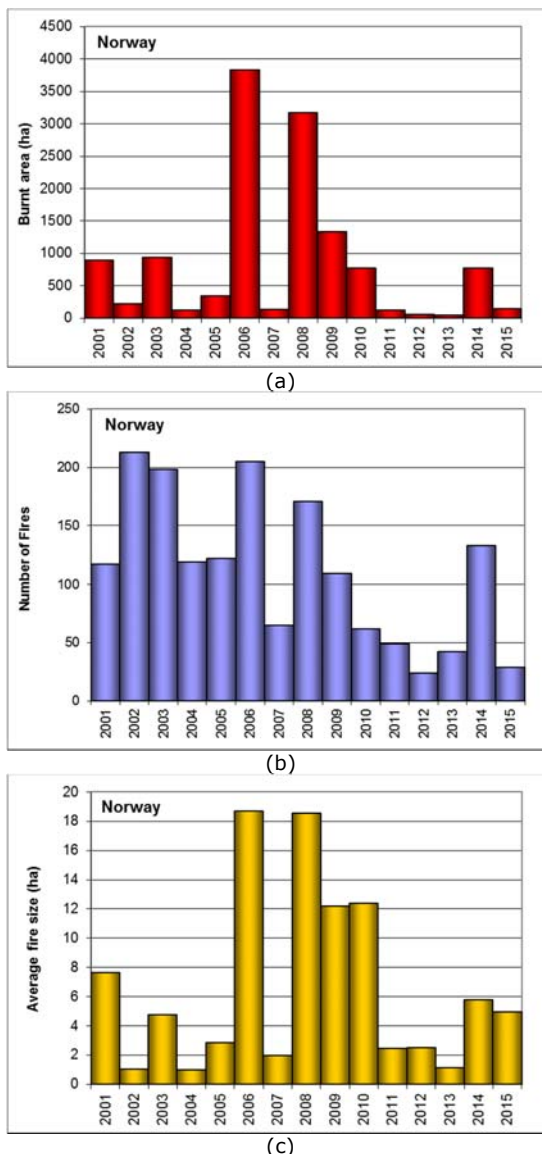


Figure 37. Burnt areas (a), number of fires (b) and average fire size (c) in Norway from 2001 to 2015



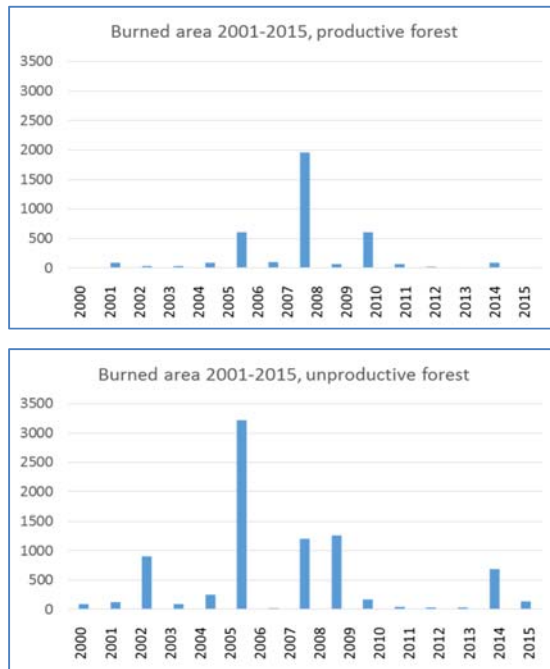


Figure 38. Burnt area of productive/unproductive forest in Norway 2001-2015

#### *Fire fighting means and information campaigns*

The Directorate for Civil Protection and Emergency Planning has an agreement with a private helicopter company for a Bell 214 with

a 3000 litres bucket. This helicopter is available for Fire Services in the period from 15 April to 15 September (24/7).

In 2014, the helicopter(s) were used in 7 fires with around 17 hours in the air. The total use of helicopters came to 40 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 2015.

#### *Operations of mutual assistance*

None.

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



Photo credit: Dag Botnen

## 2.2.17 Poland

### *Fire danger in the 2015 fire season*

The weather conditions mainly decided the forest fire danger risk and in effect the occurrence of fires in 2015. As a result of the especially conducive weather conditions in Poland, the number of forest fires was noted to be close to record values from the last years of the 21<sup>st</sup> century. The diagrams (Figure 39-Figure 43) 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 2015 fire season. They also present the number of fire outbreaks.

The mean monthly air temperatures were higher by about 0.5°C than the long-term mean values in the entire country (2001-2010) and at 9 a.m. reached 16.5°C and 21.6°C at 1 p.m. However April was the coolest month, compared not only with the last years, but also with the mean monthly air temperatures for this month within the decade 2001-2010.

In April the mean monthly air temperature reached 8.9°C at 9 a.m. and 13.9°C at 1 p.m. May similarly was cool, because the mean monthly air temperature values reached 14.7°C at 9 a.m. and 18.8°C at 1 p.m. and they were lower not only than the long-term mean values, but also than those noted in May in the years 2011-2014.

In June and July air temperatures were close to the long-term mean values and reached 18.3°C and 22.2°C at 9 a.m. and at 1 p.m. in June, and 20.9°C and 25.2°C in July. Exceptionally warm, in comparison to years 2001-2014, was August in which fell the record of the mean monthly air temperature both in terms of the observation, reaching 22.3°C in the morning (the long-term mean was 19.1°C) and up to 29.4°C in the afternoon (the long-term mean was 24.3°C).

The maximum temperature was 36.5°C at 1 p.m. and 28.9°C at 9 a.m. on 8th of August. There were 25 days in which the air temperature at 1 p.m. exceeded 25.0°C.

In September the air temperature decreased, but the monthly values were higher than the long-term mean values and reached 13.9°C at 9 a.m. and 19.9°C at 1 p.m.

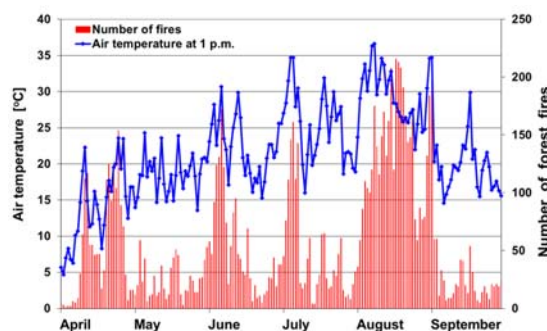


Figure 39. Air temperatures and numbers of forest fires in fire season 2015

The average precipitation level in the fire season was 1.5 mm and was the lowest value noted in the 21<sup>st</sup> century. In comparison to the average of the period 2001-2010 it was about 1.2 mm lower, and 0.6 mm lower than the average of years 2012-2014. The average daily precipitation in April was on the level of the last year's (2013-2014) and reached 1.3 mm. It rained almost every day, but the amounts of rainfall did not exceed 1 mm. The highest rainfall was on 1st of April (10.0 mm) and this was at the same time the maximum value for the 2015 fire season. In May it rained a little more, with the monthly average amounting to 1.5 mm, but in comparison to May from the years 2013-2014 the amount of rainfall was about 1.3 mm less. In May days with rainfall less than 2.0 mm dominated (together 21 days).

In June the average daily precipitation decreased to 1.4 mm, and most days the rainfall did not exceed 1.0 mm daily (17 days). In July the average precipitation level increased to 2.1 mm, but as in previous months, most days had less than 2.0 mm daily rainfall. August was exceptionally dry, with the monthly average rainfall 0.7 mm, which was five times lower than the average for August in years 2001-2010. In September the average precipitation level increased to 1.8 mm, but still was lower in comparison to the long-term mean value.

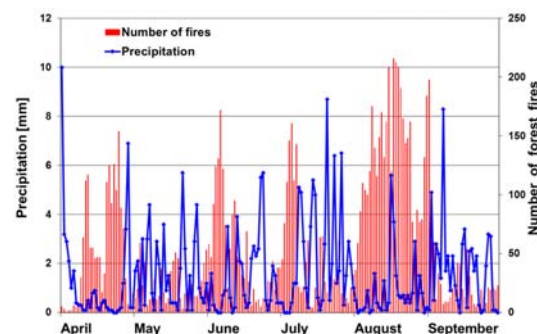


Figure 40. Precipitation and numbers of forest fires in fire season 2015



Mean pine (*Pinus sylvestris* L.) litter moisture values (the reference fuel type in Poland's condition) for the fire season were close to values from previous years and to the long-term mean. They reached 29% at 9 a.m. and 23% at 1 p.m. Similar values of litter moisture with tight limits of 28-34% were noted at 9 a.m. and 23-29% at 1 p.m. in all months, except August. In this month, for the especially favourable weather conditions, record low values of forest fuel moisture were measured. At 9 a.m. the mean litter moisture was 19%, and only 14% at 1 p.m. They were up to 13% less than the long-term mean values, not only for this month, but also for the fire season, exceeding clearly the security level in respect of fire.

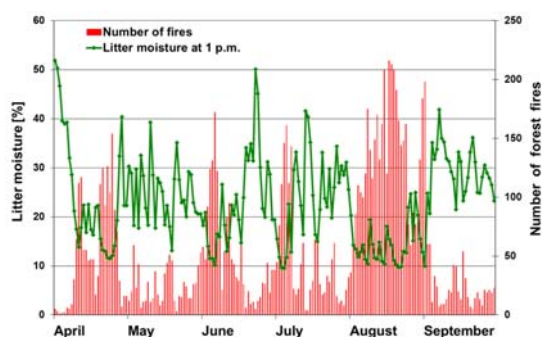


Figure 41. Litter moisture and numbers of forest fires in fire season 2015

The mean relative air humidity for the fire season 2015 was lower than the long-term values and reached 71% at 9 a.m. and 51% at 1 p.m. In April relative air humidity was close to the long-term values in both observation times and reached 73% at 9 a.m. and 52% at 1 p.m. In May-July the mean relative air humidity values were similar, but about 6% lower than the long-term values. At 9 a.m. and at 1 p.m. in May they reached 69% and 52%, in June 68% and 53%, in July 68% and 51%. However in August the relative air humidity reached the lowest values, properly 63% at 9 a.m. and only 40% at 1 p.m. In September relative air humidity returned to the values from previous years and reached 87% at 9 a.m. and 60% at 1 p.m.

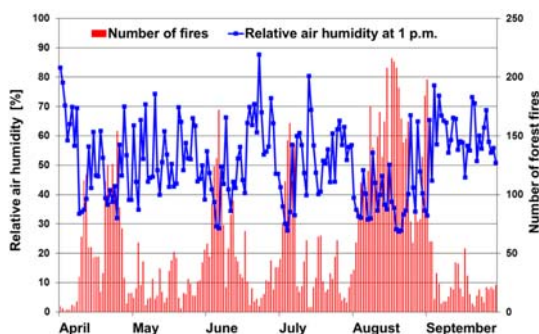


Figure 42. Relative air humidity and numbers of forest fires in fire season 2015

The 2015 fire season was characterized by high forest fire risk, because the average national degree of forest fire danger (NDFDR) was 1.8 for that whole area of the country at both observation times, while the long-term value was 1.6. Only in September the forest fire danger risk was low and reached 1.0 at 9 a.m. and 1.3 at 1 p.m. Very high forest fire danger risk was in August, when NDFDR reached record values of 2.4-2.5 (regardless of the time of observation), exceeding the long-term average by about 0.8-0.9 degree. This high degree of forest fire danger risk was contributed to the record number of forest fires in August. In the remaining months (April-July) high forest fire danger risk was observed, because NDFDR reached values of 1.8-2.0 at 9 a.m. and 1.7-1.9 at 1 p.m.

The share of occurrence in the third level of forest fire danger for the fire season was 34% on average, which was high compared with the long-term period. The greatest share, amounting to 64-67% in both observation times was in August, but the lowest was in September in tight limits 7-9%.

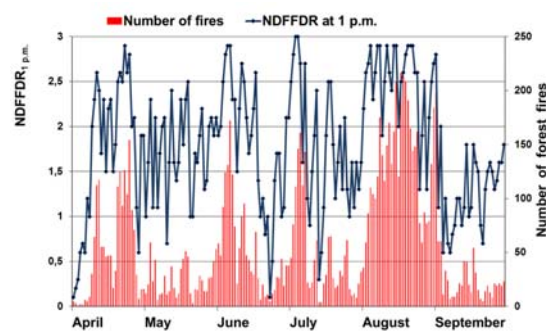


Figure 43. The National Degree of Forest Fire Danger Risk and numbers of forest fires in fire season 2015

#### Fire occurrence and affected surfaces

In 2015 in Poland, a total of 12 257 fires broke out (8 292 forest and 3 965 other non-wooded natural land), over 7 012 more than in 2014 (5 245 fires), with a surface area of 5 510 ha (3 766 forest and 1 744 ha other non-wooded natural land), over 2 820 ha more than in 2014 (2 690 ha) - Table 23 and Figure 45.

The greatest proportion of fires occurred in August (33.7%; i.e. 4 129) - Figure 44. August was followed by April (12.9%), June (12.7%) and July (12.0%). The lowest number of fires in the fire season (April - September) occurred in May (6.2%) and September (6.9%). 84.4% of fires occurred in the fire season.



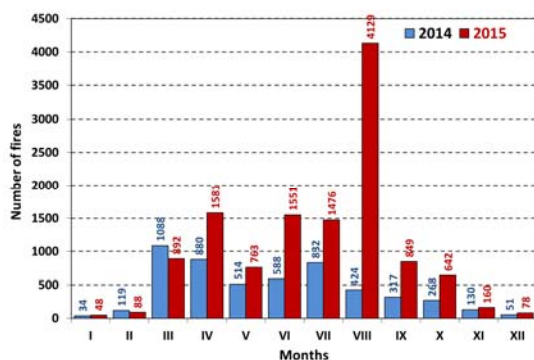


Figure 44. Distribution of number of forest fires by months in 2014 and 2015 in Poland

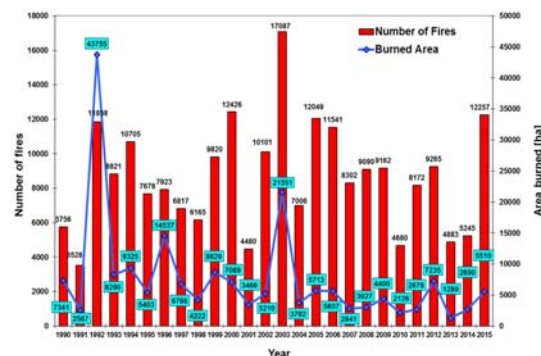


Figure 45. Total number of fires on high forest and area burned in Poland in the period 1990-2015

The largest number of fires in 2015, similar to last year, occurred in Mazowieckie Province (29%; i.e. 3 559 fires).

The lowest number of forest fires occurred in Opolskie Province (258) and Warmińsko-Mazurskie Province (337).

The largest burnt forest areas were recorded in:

- Mazowieckie Province (1 531 ha)
- Podkarpackie Province (698 ha)
- Podlaskie Province (552 ha)

The smallest area was in Zachodniopomorskie Province (48 ha) and Pomorskie Province (67 ha). These data are illustrated in Figure 47 - Figure 49.

Fires with a surface area of between 1 ha and 10 ha represented 10.5% of the burnt area, with their number representing only 7%.

In addition there were 28 large fires representing 2.5% of the burnt area, and 4 very large fires which represented 3.2% of the burnt area.

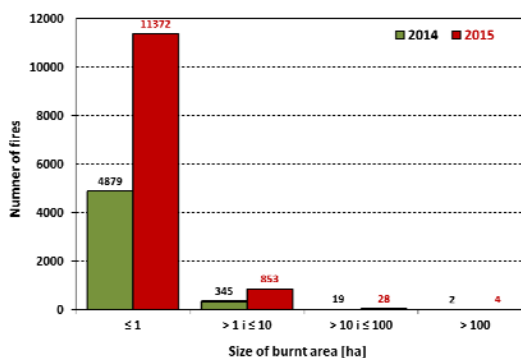


Figure 46. Distribution of the number of forest fires by size of burnt area in the years 2014 and 2015 in Poland

Table 23. Forest fires in Poland in the period 2007-2015

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

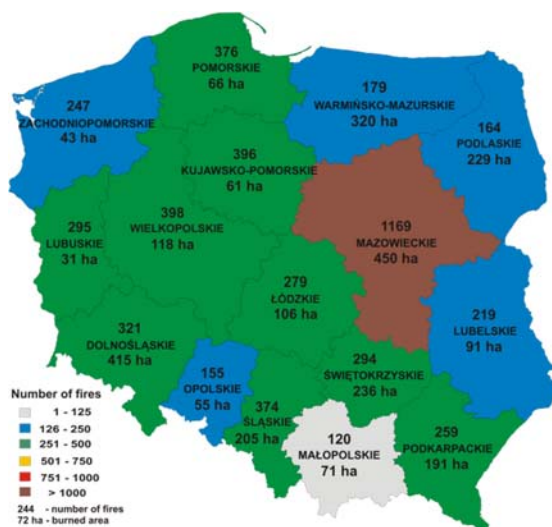


Figure 47. Number of forest fires and burned areas by provinces (NUTS2) in 2014.

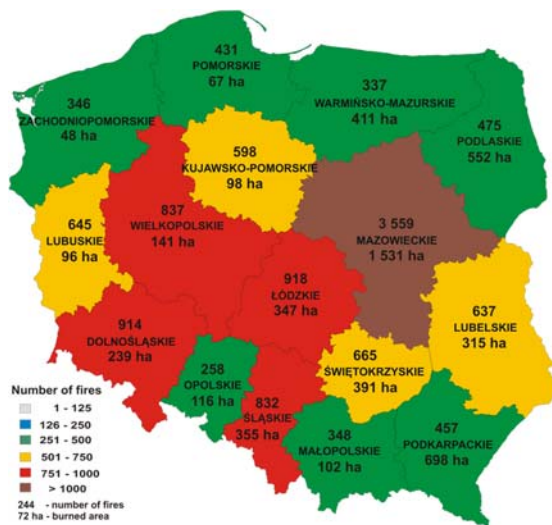


Figure 48. Number of forest fires and burned areas by provinces (NUTS2) in 2015.

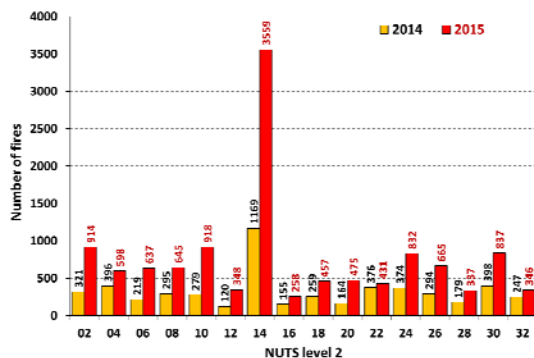
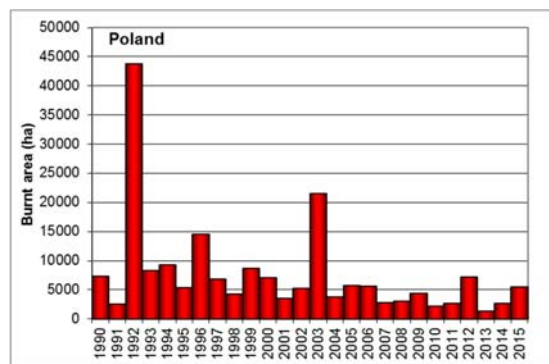
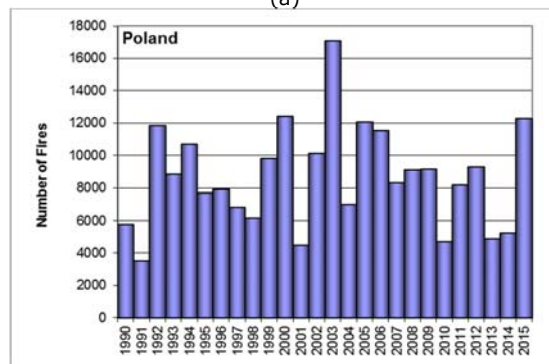


Figure 49. Distribution of the number of forest fires by province (NUTS2) in 2014 and 2015 in Poland.

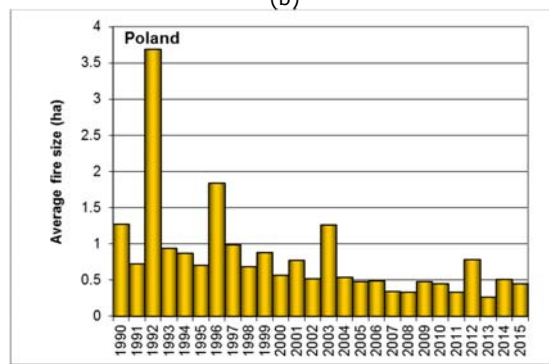
The burnt area, number of fires and average fire size for the years 1990-2015 are shown in Figure 50.



(a)



(b)



(c)

Figure 50. Burnt areas (a), number of fires (b) and average fire size (c) in Poland from 1990 to 2015.

### Fire causes

Human activity was the main cause of forest fires; specifically arson represented almost half of the fires (42.58%), followed by negligence (29.45%) and accident (7.93%), whereas unknown causes accounted for 18.22% (Figure 51).

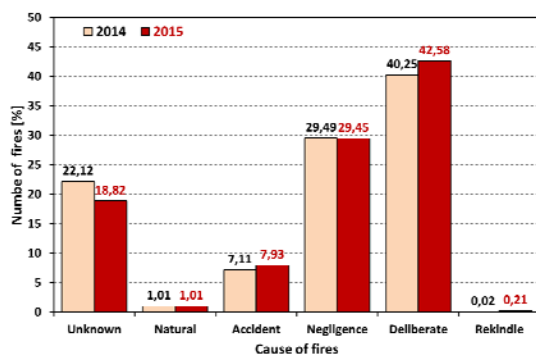


Figure 51. Distribution of the number of forest fires by causes in 2014 and 2015 in Poland.

### *Fire fighting means and information campaigns*

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

- 27 fire suppression airplanes and 6 helicopters,
- 362 patrol and fire suppression vehicles,
- 12 medium and heavy vehicles,
- 252 portable pumps.

These means were used to extinguish 4% 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 2015, as part of their information and promotion activities, the following measures in the State Forests NFH were taken:

- more than 13 thousand lectures in schools and youth camps;
- About 450 communications were provided in the mass media on fire danger and the principles of safe behaviour in forests;
- more than 132 thousand posters, information leaflets and calendars related to forest fires were disseminated;
- more than 9.5 thousand information boards were erected.

### *Fire prevention activities*

In forest areas managed by the State Forests Holding (State Forests NFH), works were carried out to prevent the conditions for fire outbreaks and to reduce their spread, by repairing 4 765 km of fuel breaks and building 36 km of new fuel breaks; in addition, forests were cleaned over a surface area of 21.1 thousand ha, by reducing the quantity of flammable biomass.

The observation system of the State Forests NFH consisted of:

- 669 fire protection lookout points, including 255 (38.12%) equipped with a system of TV cameras;
- 6 patrol airplanes,
- 362 ground patrols.

The effectiveness rate of fire detection by fire protection lookout points was 32%, airplanes detected 1.5% of fires and civilians notified of 61%. The other 5.5% of fires were detected by fire protection patrols.

The communication and alarm network in the State Forests NFH consisted of: 7 095 radio-telephones, including 1 450 base sets, 2 451 mobile sets and 3 133 hand held sets, as well as 61 converters to the frequency band used by the State Fire Service.

Water supply for fire suppression purposes was provided by 11 888 water supply points, including over 4.5 thousand natural points and over 2.5 thousand artificial ones. Moreover, water was supplied by more than 4.7 thousand hydrants located in the vicinity of forests.

In 2015, the fire protection costs incurred by the State Forests NFH amounted to 86 million PLN.

Information on Poland's National Forest Fire Information System can be found on:

[http://bazapozarow.ibles.pl/ibl\\_ppoz/faces/index.jsp](http://bazapozarow.ibles.pl/ibl_ppoz/faces/index.jsp).

Poland's Forest Fire Danger Map, which is updated daily from March to September (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).

## 2.2.18 Portugal

### *Fire danger in the 2015 fire season*

In 2015 the burnt area was 64 443 ha. The burnt area represents 62% of the average of the previous decennium which was 104 249 ha. Regarding forest fires, there was in 2015 a total of 15 851 fires which represents a decrease of 25% when compared to the average of fires in the last decennium and an increase of 55% compared with 2014.

These outcomes had high impact mostly on shrublands, 63% of the burnt area, rather than on forest stands (wooded land), which accounts only for 37% of the total burnt surface.

In Região Autónoma da Madeira, there was a total of 76 forest fires (76% < 1ha and 24% ≥ 1ha), responsible for the burning of 468 hectares (339 ha wooded land and 129 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 2015 (Figure 52).

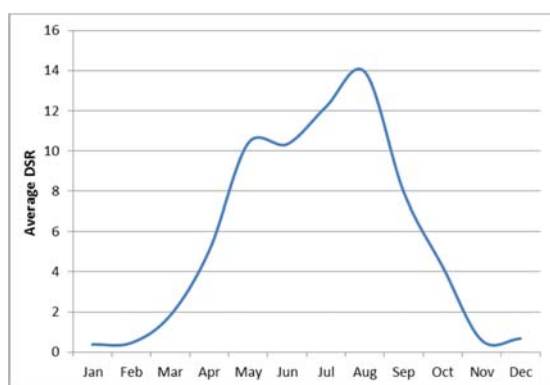


Figure 52. DSR variation in 2015.

### *Fire occurrence and affected surfaces*

In 2015 Portugal registered a total of 15 851 forest fires (79% < 1ha; 21% ≥ 1ha), responsible for the burning of 64 443 ha (Figure 53). Forest fires affected mainly shrubland (63%). *Pinus pinaster*, and *Eucalyptus globulus* plantations were the forest cover most affected by fires.

42% of the occurrences (6 673) were reported between January and June; they burned about 19 129 ha (30% of the total burned area), as seen in Table 24;

8 218 forest fires (52% total forest fires) occurred in the summer period (July-September), which consumed approximately 43 733 ha (68% total burnt area).

In 2015, the most critical month was August, with 3 330 forest fires (21% total forest fires) and 29 594 ha (64% total burnt area).



Figure 53. Burned areas in 2015, provisory data (Portugal).

Source: EFFIS/JRC, 2015

Table 24. Forest fires in Portugal (monthly distribution).

Month	Number of Fires	Burnt Area (ha)		
		Wooded land	Shrub land	Total
January	195	17	185	202
February	237	57	446	503
March	1924	1383	3432	4815
April	1352	3911	2881	6792
May	1204	1964	520	2484
June	1761	2187	2146	4333
July	3091	4607	5302	9909
August	3330	8156	21438	29594
September	1797	1276	2954	4230
October	602	134	1245	1379
November	150	7	56	63
December	208	47	92	139
<b>TOTAL</b>	<b>15851</b>	<b>23746</b>	<b>40697</b>	<b>64443</b>

Fire occurrence prevailed mostly in the urban districts, such as Porto (Northern region), Braga (Northern region) and Viseu (Centre Region), which registered 45% of the total number of fires (mainly very small fires). The Northern and Central regions of Portugal were the most affected by forest fires (60 437 ha – 94% total), Table 25. In these regions are concentrated the main area of Eucalyptus and Pine stands and mountainous areas.

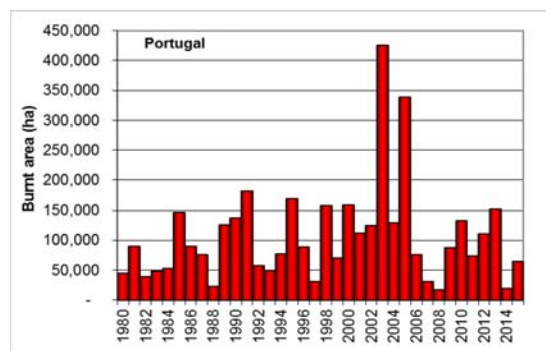
Table 25. Number of fires and burned area in Portugal (NUTSII - 2015).

NUTS II Region	Number of fires			Burnt area (ha)		
	≥ 1ha	< 1ha	Total	Shrub land	Wooded land	Total
Norte	2380	7623	10003	23212	11660	34872
Centro	664	2939	3603	15994	9571	25565
Lisboa	125	1261	1386	547	78	625
Alentejo	136	525	661	523	2431	2954
Algarve	19	179	198	421	6	427
<b>TOTAL</b>	<b>3324</b>	<b>12527</b>	<b>15851</b>	<b>40697</b>	<b>23746</b>	<b>64443</b>
Região Autónoma da Madeira	Number of fires			Burnt area (ha)		
	≥ 1ha	< 1ha	Total	Shrub land	Wooded land	Total
	18	58	76	129	339	468

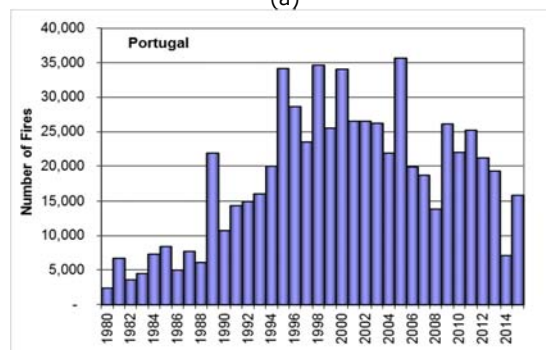
Portugal registered 97 large fires ( $\geq 100$ ha), which corresponded to 63% of the total burned area.

There were 23 fires larger than 500 ha, which burned 26 944 ha. The largest fire of 2015 occurred in Guarda district, burning 4 661 ha on 22nd August.

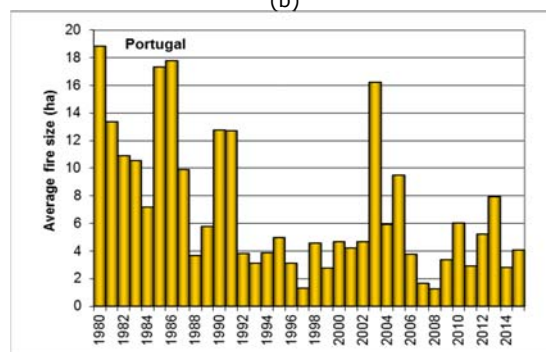
The analysis of the yearly trends in the number of fires and burnt areas in Portugal is shown in Figure 54.



(a)



(b)



(c)

Figure 54. Burnt areas (a), number of fires (b) and average fire size (c) in Portugal 1980-2015.

#### Fire causes

Of 15 851 occurrences registered in 2015, the National Guard proceeded with the investigation of causes for 12 114 forest fires (76%), of which 3 872 were of unknown origin (Figure 55).

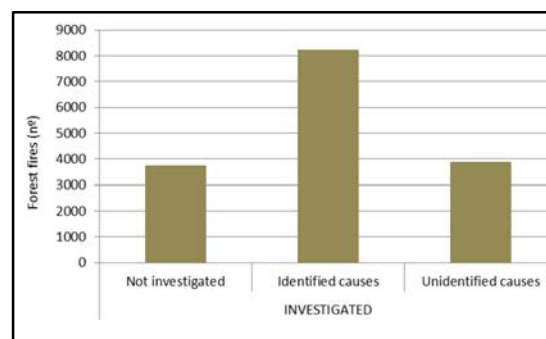


Figure 55. Criminal forest fires 2015 investigation.



Amongst those fires with determined cause, intentional acts corresponded to 34% and accidents or negligence were present in the ignition of 47% of the total number of fires (Figure 56). The use of fire for renewal of shrub pastures in mountain grazing areas, still has a strong impact on the burnt areas.

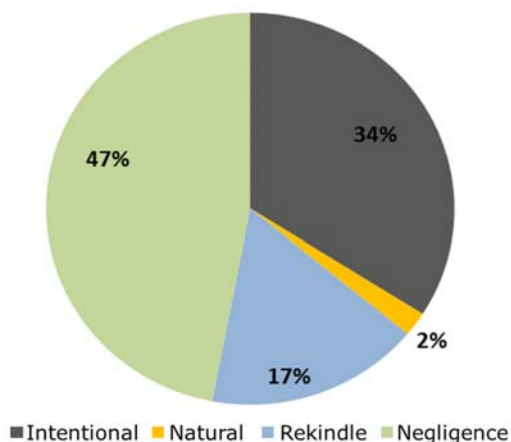


Figure 56. Main causes of forest fires in 2015

#### *Fire fighting 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 2015, 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 2015. 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 9 721 human resources, 2 050 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 26, a resume of all the fire-fighting resources distributed by engagement phases can be seen:

Table 26. Fire-fighting means available per phase

Phases	Elements	Vehicles	Aerial Means
Alfa (< 15MAY)	Means available on demand		2 - 7
Bravo (15MAY-30JUN)	6 583	1 499	34
Charlie (1JUL-30SEP)	9 721	2 050	49
Delta (1OCT-31OCT)	5 517	1 286	24
Echo (> 31OCT)	Means available on demand		2 - 7

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

- 36 Helis for initial attack;
- 5 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 2015 there were 267 municipal forest technical offices established and 272 municipal plans for forest fire prevention (133 under review and 139 already approved) and 142 municipal operational plans 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 27 149 ha was managed, of which 1 159 ha were with prescribed burning.

### **Water points**

During 2015, 706 water points were renovated.

### **Forest roads**

In 2015, 10 958 kilometres of forest roads were managed.

### **Policy measures**

In 2015, the publishing of *Portaria* [Ministerial Order] n.º 180/2015, 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 2015**

#### Operations Management System - Order and Pocket Guide

Decree-Law No. 134/2006 of 25 July, as amended by Decree-Law No. 72/2013 of 31 May, establishing the SIOPS – Integrated System of Relief Operations - and establishing also an operations management system and respective symbols, whose development will be effected by order of the President of the National Civil Protection Authority (ANPC). This Order was published in April 2015 (Order n.º 3551/2015) defining the organization of the theatres of operations and command posts, clarifying the skills and consolidating operational doctrine. In parallel, ANPC produced a pocket aid to support all civil protection agents and cooperative entities, under the DECIF.

#### Reinforcement of DECIF (terrestrial (EIP and ECIN teams) and aerial means)

Terrestrial means - reimbursed teams (ECIN): reinforcement with more 17 teams for forest fire fighting;

Terrestrial means-Permanent Intervention Teams (EIP): reinforcement with more 3 teams in Viana do Castelo district;

Aerial means of enlarged attack – These aircrafts were contracted for 3 years, which made it possible to consolidate the DECIF.

#### *Loss of human lives in the 2015 fire campaign.*

There was no loss of Human lives during the 2015 fire season. Some fire fighting vehicles were destroyed after being caught by forest fires.

#### *Operations of mutual assistance*

No assistance was required during the 2015 fire season.

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

## 2.2.19 Romania

### *Meteorological characteristics of Romania during 2015*

In 2015, the mean annual national temperature (10.5°C) was +1.3°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 almost every month, ranging from 0.3°C (June) to 2.9°C (December). Exceptions were April and October, when the mean monthly national temperature ranged below the standard climatological normal by 0.5°C (Figure 57).

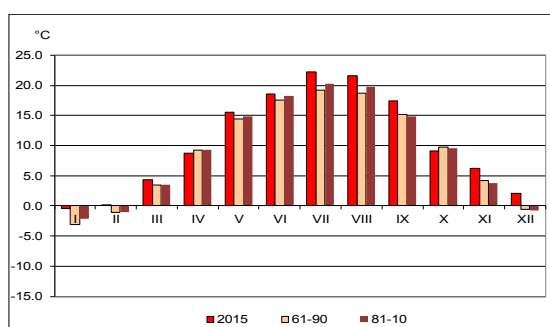


Figure 57. Mean monthly temperature over Romania in 2015 compared to the climatological normals (old normal: 1961–1990; new normal: 1981–2010).

The annual precipitation total across Romania (630.1 mm) was less than 1% smaller than the standard climate normal (1981–2010). Deviations were positive from January through March and from September through November, ranging from 10% in February, to 77% in November, whereas negative deviations ranged from 11% in June, to 88% in December (Figure 58).

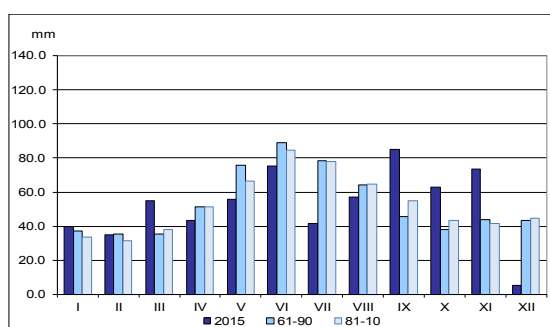


Figure 58. Monthly average precipitation recorded during 2015, compared to the climatological normals (old normal: 1961–1990; new normal: 1981–2010).

The soil water deficit began to manifest in April 2015, spanning over large areas in the northern regions of the country. In May and June, pedological drought of various intensities (moderate, strong and extreme) continued to cover southern, western and eastern areas of Romania. In July and August, the soil water deficit covered most of the country. At the beginning of the year, as well as over the last months, the soil moisture reserve registered optimal or close to optimal values.

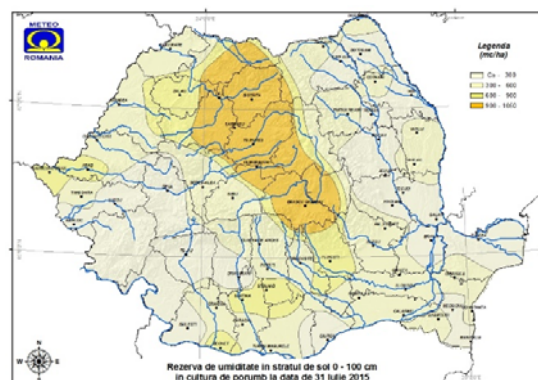


Figure 59. The soil moisture reserve (m³/ha) in the first 1m layer on July 31st, 2015.

### *Fire occurrence and affected surfaces*

After a "silent" year in 2014, in 2015 a total of 250 forest vegetation fires was recorded at national level, affecting 1671.17 ha, of which:

- 246 fires occurred on 1639.92 ha in the national forest;
- 4 fires occurred on 31.25 ha in forest vegetation, located on land outside the forest.

As a result of the fires, an estimated damage of 392.9 thousand Euros occurred, burning a total of 511 thousand seedlings of plantations and natural regenerations plus 30 cubic meters of standing or under operation timber.

A special case was an ameliorative area in Martinis, where, in 40 ha, over 197 thousand seedlings burnt.

A comparison for the period 1986–2015 of the affected area and number of fires, is presented in the charts below.

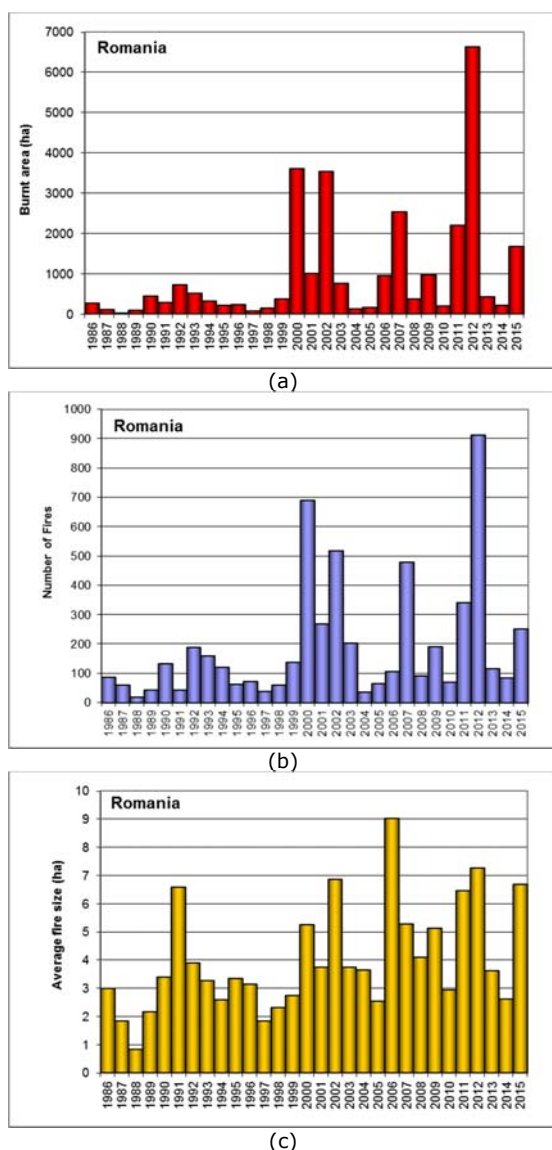


Figure 60. Burnt area (a), number of fires (b) and average fire size (c) in Romania from 1986 to 2015.

The periods with a high number of fires occurred in spring (in the period between March 17 – April 27 were 115 fires on 514 ha, from which: in March 26 – 11 fires; in April 13 – 10 fires) and also in summer (in the period between July 15 – August 15 were 58 fires on 272.8 ha) with the principal cause being the fire propagation from pastures and farming land.

#### *Fire fighting means*

Fire fighting actions involved a total of 5,848 people, of which:

- - Forest rangers - 1502 people
- - Military and civilian fire-fighters - 2071 people
- - Policemen and gendarmes - 225 people
- - Citizens – 2050 persons

#### *Causes of forest fires*

For the forest vegetation fires produced in 2015, the following classification is presented:

##### **a) Causes of forest fires:**

1. Unknown (EFFIS code 100)  
70 fires on 610.84 ha
2. Lightning (EFFIS code 210)  
5 fires on 24.02 ha
3. Electrical power (EFFIS code 310)  
4 fires on 4.5 ha
4. Vehicles (EFFIS code 330)  
1 fire on 0.2 ha
5. Vegetation management (EFFIS code 411)  
140 fires on 932.81 ha
6. Agricultural burnings (EFFIS code 412)  
23 fires on 87.1 ha
7. Cigarettes (EFFIS code 422)  
5 fires on 7.5 ha
8. Mental illness (EFFIS code 521)  
1 fire on 4 ha
9. Children (EFFIS code 522)  
1 fire on 0.2 ha

##### **b) Nature of the affected property:**

1. State public property  
154 fires on 1243.9 ha
2. Communities public property  
36 fires on 131.47 ha
3. Private property  
60 fires on 295.8 ha

##### **c) Type of fire:**

1. Litter fires  
230 fires on 1369.5 ha
2. Mixed fires (litter, canopy)  
20 fires on 301.67 ha

In 2015 no important forest fires were recorded: only 4 forest fires lasted 1-3 days and 1 fire lasted 7 days.

*(Source: Ministry of Environment and Forests, Romania).*

## 2.2.20 Russian Federation

### *Fire danger in the 2015 fire season*

Forest Fire Danger Rating based on weather conditions in the Russian Federation is determined by Nesterov's technique and is characterized by the corresponding class of fire danger (KPO) on a scale from 1 to 5 (the main criteria: quantity of rainless days, humidity of air, temperature). There was extreme fire danger rating in Central and East Siberia during the fire season (Figure 61).

The fire season started in January in the Irkutsk region on peat lands, and forest fires were also registered later in April in Zabaikalski krai (Chita region).

### *Fire occurrence and affected surfaces*

There were 12 238 forest fires in total in the Russian Federation in 2015, and the area burned was 2 875 350 ha.

41.5% of the total number of forest fires and 86.6 % of total area burned took place in four regions of Siberia (Figure 62):

- Irkutskaya oblast (499 000 ha, 15.0%)
- Zabaikalski krai (941 000 ha, 34.4%)
- Republic Buriatia (890 000 ha, 32.6%)
- Republic of Tyva (125 000 ha, 4.6%)

### *Fire causes*

Human activity was a cause of 85 % of the total number of fires. Lightning was the cause of the other 15 % of fires.

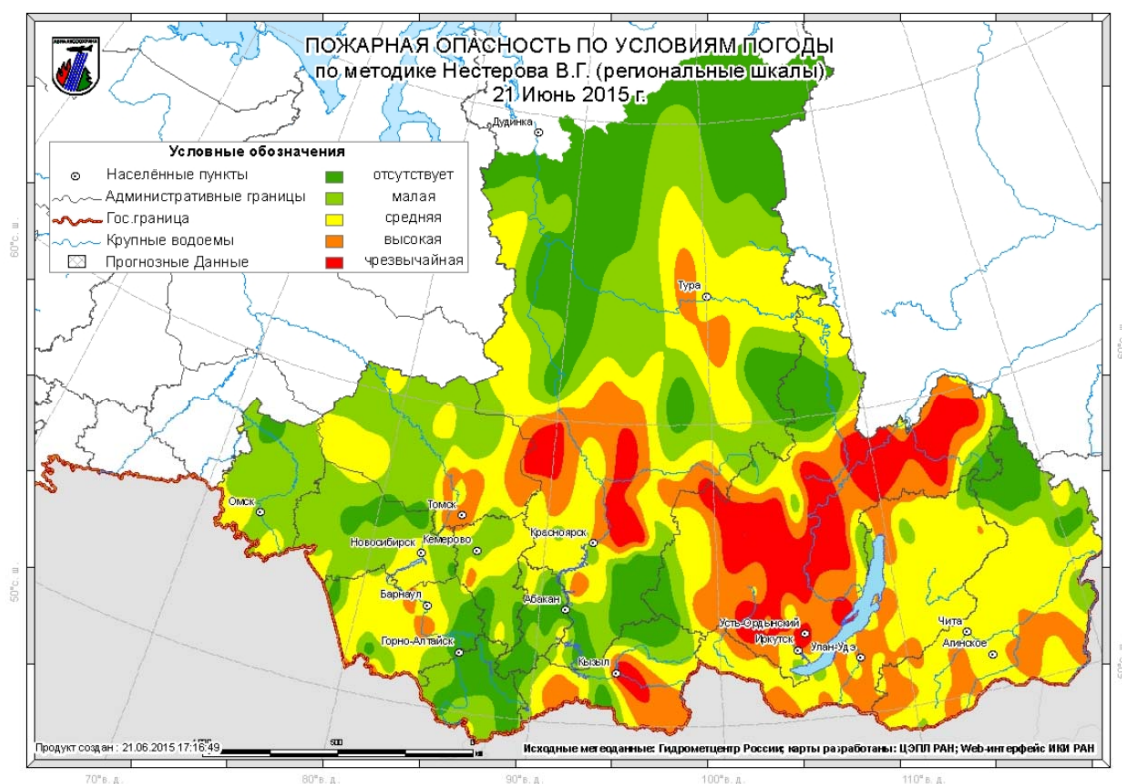


Figure 61. Fire danger rating on June 21, 2015.

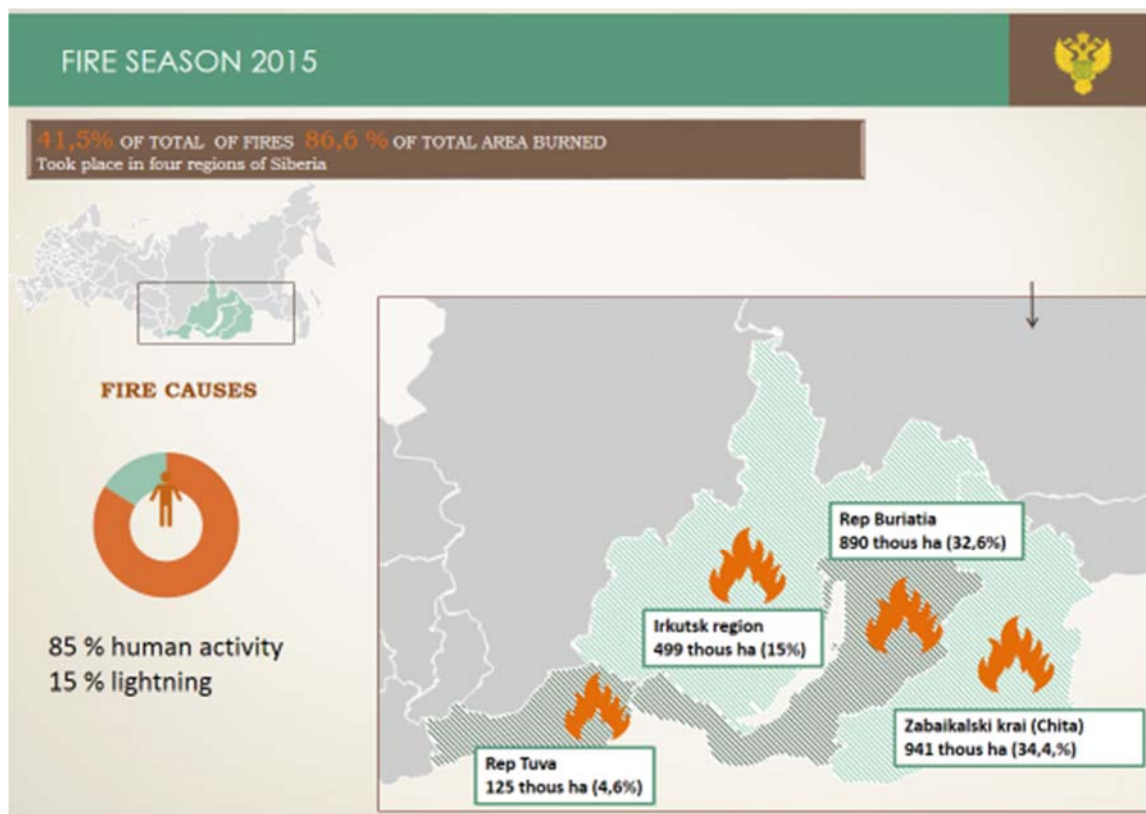


Figure 62. Summary of the main regions affected by fire in 2015.

#### *Fire prevention activities*

In the Russian Federation, forest fire prevention activities and preparations belong to the regional authorities in the forest sector and include:

- training of firefighters, and other personnel;
- fire-prevention work in the forests (construction, reconstruction of the forest roads, maintenance of observation towers, building of preventive fire lines; creation of fire-prevention water reservoirs, etc.);
- providing acquisitions of fire-fighting equipment and engines, communication systems, etc.;
- providing fire management publicity for use in the mass media;
- preparations of fire management plans of forest units and regional resources;
- preparations of interregional and interagency agreements on fire management;

In the Russian Federation as part of the preparation for the Fire Season of 2015 the following main fire prevention activities were undertaken:

- Construction of roads for forest protection needs: 4 967 km;
- Reconstruction and maintenance of forest roads for fire-prevention and fire management appointment: over 9 268 km;
- Construction of fire-prevention mineralized lines and barriers: over 205 857 km;
- Care of the fire-prevention mineralized strips, barriers: over 635 512 km;
- Prescribed burning : 804 868 ha.

There were 84 interregional assistance operations organised, including 3166 firefighters in time delivered to the critical regions.

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



### 2.2.21 Slovakia

#### *Fire danger in the 2015 fire season*

The 2015 fire season was not critical from the point of view of fire danger. The count of wildfires decreased and the average size was almost the same size as in previous years.

The number of fires was influenced substantially by the weather, the number of days with rain and the human factor (negligence, particularly) in spring and summer.

#### *Fire occurrence and affected surfaces*

A total of 242 forest fires were reported in Slovakia in 2015, corresponding to a total burnt area of 353 ha. The average burned area per fire was 1.46 ha.

Figure 63 and Figure 64 show 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 1999–2015 are shown in Figure 65.

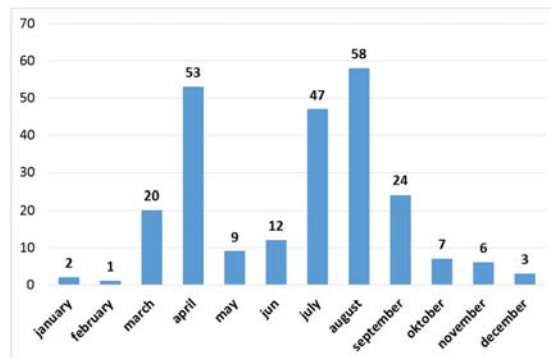


Figure 63. Fire frequency by month in 2015.

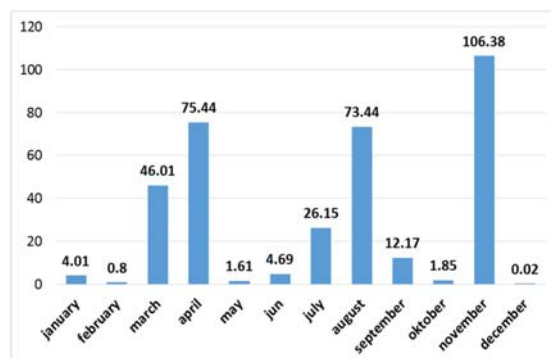
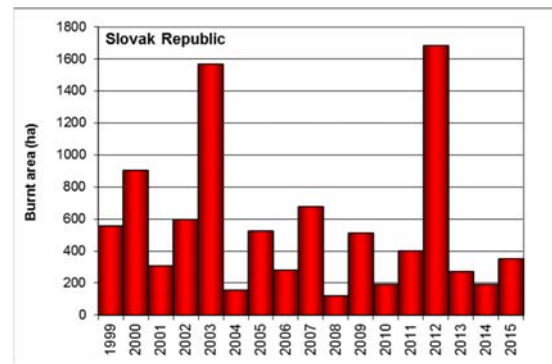
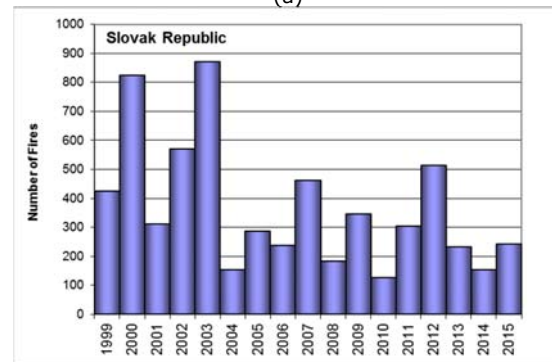


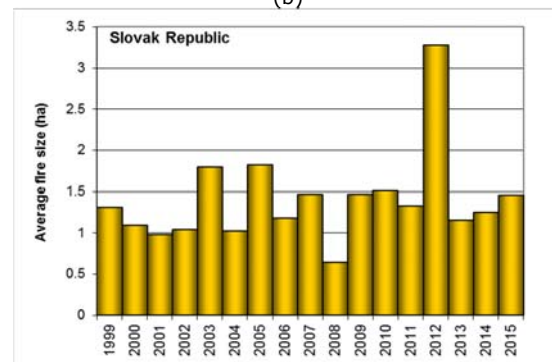
Figure 64. Burnt area by month in 2015.



(a)



(b)



(c)

Figure 65. Burnt areas (a), number of fires (b) and average fire size (c) in the Slovak Republic from 1999 to 2015.

#### *Injuries and loss of human lives*

One injury was reported in Slovakia during the fire season of 2015.

#### *Fire causes*

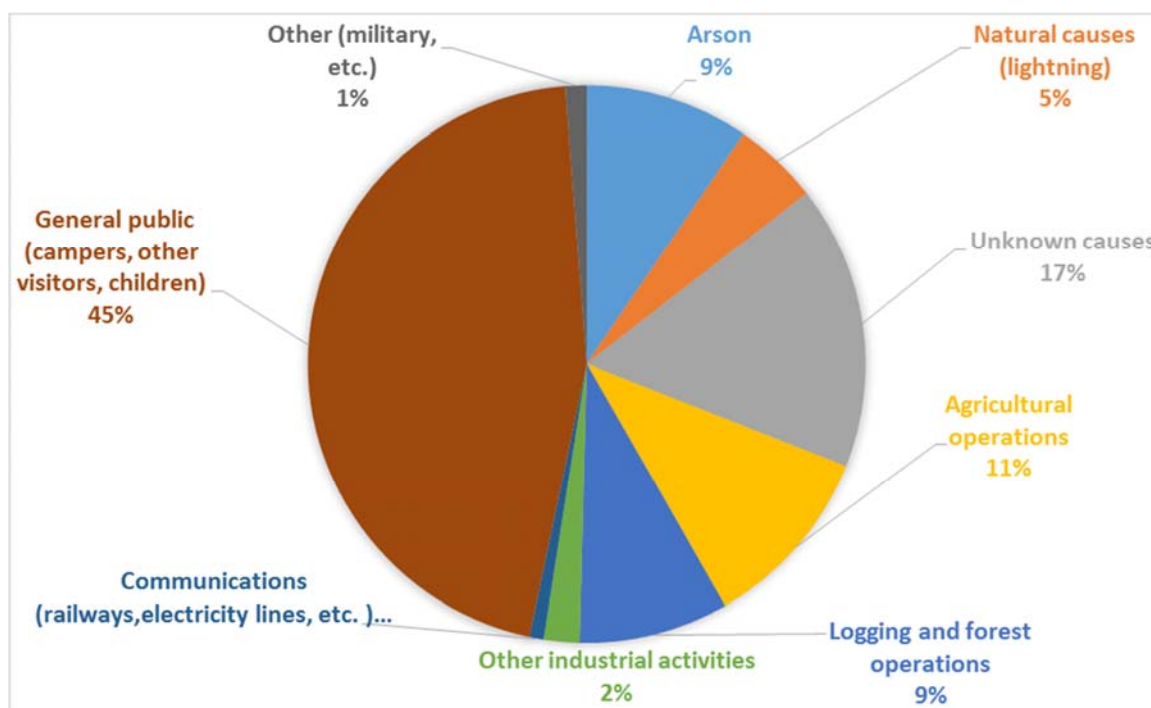
Forest fire causes in 2014 are shown in Figure 66, and causes for the years 2005–2015 are shown in Table 27.



Table 27 Fire causes in Slovak Republic in 2005 – 2015 (number of forest fires).

	Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>Basic information</b>	Total fires	286	237	463	182	347	123	303	517	233	153	242
<i>Known causes (Human)</i>	Arson	7	8	11	7	18	6	8	42	33	26	23
	Negligence (see also B below)	261	201	416	154	286	94	244	409	177	112	167
<i>Known causes (Natural)</i>	Lightning	2	3	6	1	3	2	1	8	4	2	12
<i>Unknown causes</i>	Unknown	16	25	26	20	40	21	50	58	19	13	40
<b>B: Supplementary information: Total negligence</b>	Agricultural operations	91	22	110	25	51	25	59	135	26	24	26
	Logging and forest operations		10	23	19	52	25	21	56	15	18	21
	Other industrial activities	1	3	2	20	12	5	0	1	7	1	5
	Communications (railways, electricity lines, etc.)	2	2	3	3	7	2	1	7	3	1	2
	General public (campers, other visitors, children)	163	163	278	81	161	66	222	208	125	67	110
	Other (military, etc.)	4	1	0	6	3	0	0	2	1	1	3

Figure 66. Causes of forest fires in 2015.



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

## 2.2.22 Slovenia

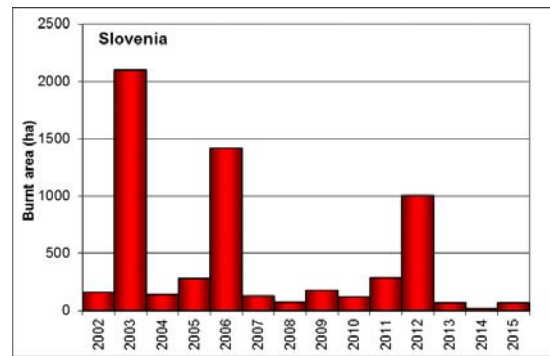
In 2015, according to the data of the Forest Service, 93 forest fires were reported, with a total burnt area of 64.7 ha, of which 46.7 ha were in forest land (Table 28). The number of fires is almost three times that reported in 2014, although this translated into only a slight increase in total burnt area. There were 15 fires over 1 ha during the year, and the average fire size was 0.7 ha. Figure 67 shows the trends in terms of number of fires and burnt area during the last 12 years in Slovenia.

Table 28. Number of fires and burnt area in Slovenia in 2015

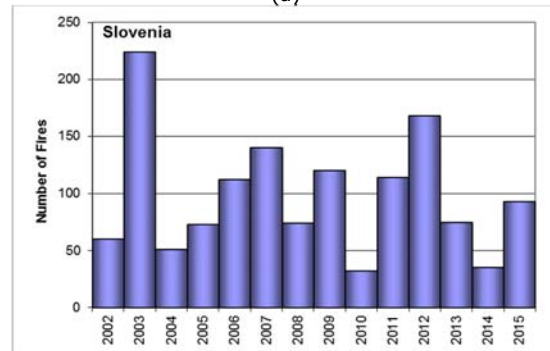
<b>Number of fires</b>	< 1 ha	78
	≥ 1 ha	15
	≥ 100 ha	0
	≥ 500 ha	0
	<b>Total</b>	<b>93</b>
<b>Burnt area</b>	Woodland	46.75
	Bushes	1.23
	Non woodland	16.73
	<b>Total</b>	<b>64.71</b>

As was the case in previous years, the worst affected region was Sežana, in which 58% of the fires (45% of burnt area) occurred (Table 29).

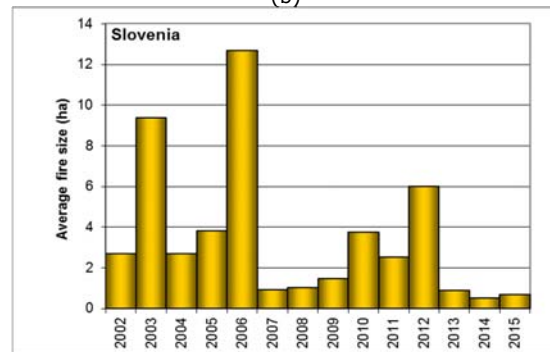
Most of the known causes (50 fires) were reported as negligent (agricultural operation, train lines, etc.). 3 were reported as natural causes and 4 were deliberately started. The remaining 36 fires were of unknown cause.



(a)



(b)



(c)

Figure 67. Burnt areas (a), number of fires (b) and average fire size (c) in Slovenia from 2002 to 2015.

Table 29. Number of fires and burnt area by forest management unit in Slovenia in 2015.

Region	Number of fires			Burnt area (ha)			
	<1 ha	≥1 ha	Total	Forest	Scrub	Non wooded	Total
Tolmin	1	2	3	1.54	1.22	0	2.76
Bled	0	1	1	3.23	0	0.06	3.29
Kranj	3	0	3	0.22	0	0	0.22
Ljubljana	9	1	10	1.82	0	0.73	2.55
Postojna	0	0	0	0	0	0	0
Kočevje	0	0	0	0	0	0	0
Novo mesto	6	0	6	0.16	0.01	0	0.17
Brežice	2	0	2	0.28	0	0.03	0.31
Celje	1	1	2	1.87	0	0.05	1.92
Nazarje	1	0	1	0	0	0	0
Slovenj Gradec	8	0	8	0.32	0	0.98	1.3
Maribor	1	1	2	20.89	0	1.92	22.81
Murska Sobota	1	0	1	0.36	0	0	0.36
Sežana	45	9	54	16.05	0	12.96	29.01
<b>Total</b>	<b>78</b>	<b>15</b>	<b>93</b>	<b>46.74</b>	<b>1.23</b>	<b>16.73</b>	<b>64.7</b>

(Source: Ministry of Agriculture and the Environment, Slovenia).

## 2.2.23 Spain

### Number of fires and affected surfaces

In 2015, both the number of fires and the areas burned by forest fires were below the average for the last 10 years, ranking 6th in the series. The number of fires decreased by 17% with respect to the average of the last decade. The number of fires smaller than 1 ha and those larger than 1 ha decreased by 18% and 16%, respectively with respect to the average of the last decade.

Table 30. Number of fires in 2015 compared with 10 year average

	Average 2005-2014	2015
Number of fires <1ha	9.539	7.755
Number of fires ≥1ha	4.950	4.173
<b>Total</b>	<b>14.489</b>	<b>11.928</b>

There was a 7% reduction in the forest burnt area and a 5% reduction in total burnt area as compared to the mean of the decade. Figures for the number of fires in 2015 are similar to those in 2013 and 2010, which were among the lowest values for the decade. However, in terms of areas burnt by those fires, the values are not the lowest of the decade, although still below the average.

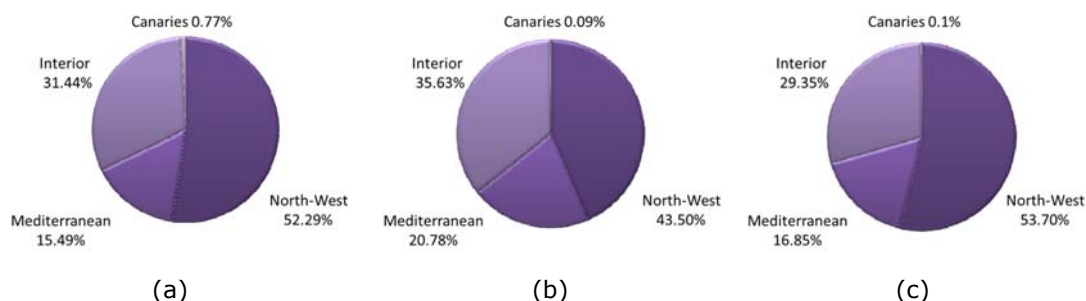


Figure 68 (a) Number of fires; (b) burnt area of forests (ha); (c) burnt area of other wooded land in 2015 by geographic region.

### Large fires

According to the provisional statistics compiled by the relevant departments in the Autonomous Regions, there were 15 large fires (those with burnt areas larger than 500 ha) in 2015. These occurred in the summer months and accounted for 38.76% of the total burnt area in the country and represented 0.12% of the total number of fires. Most of the large fires occurred in inner regions of the country, where 33% of these fires took place burning 44% of the total area affected by all the large fires, which was 39 474.91 ha. Table 32 gives the location, date and forested burnt area of large fires.

Table 31. Burnt area in 2015 compared with the 10 year average.

	Average 2005-2014	2015
Burnt area other wooded land (ha)	35 615.47	33 494.55
Burnt area forest (ha)	108 493.59	103 199.96

The distribution of the total number of fires by geographical area is shown in Figure 68 below. It shows that highest number of fires occurred in the North-western region, with 52.29%, followed by the interior communities, with 31.44% and the rest were in the Mediterranean region and the Canary isles. In terms of burnt areas, most of the burnt forest areas were in the North West (43.5%), followed by the interior communities (35.6%), the Mediterranean regions (20.78%) and the Canary Isles (0.09%). Other wood land areas were mainly burnt in the North West (53.7%) followed by the Interior Communities (29.35%), the Mediterranean regions (16.85%) and the Canary Isles (0.10%).

Table 32. Large fires in 2015

Province	Municipality of origin	Start date	Burnt area (ha)
<b>Alicante</b>	Vall d'Ébo	14-05	1715.05
<b>Zaragoza</b>	Luna	04-07	8400.00
<b>Jaén</b>	Quesada	05-07	9060.66
<b>Granada</b>	Gualchos	08-07	1463.14
<b>León</b>	Quintana del Castillo	15-07	2124.00
<b>Toledo</b>	Navalcán	16-07	940.00
<b>Zamora</b>	Trabazos	21-07	878.02
<b>Barcelona</b>	Odena	26-07	1059.40
<b>Leon</b>	Lucillo	26-07	1113.00
<b>Soria</b>	Burgo de Osma	28-07	528.08
<b>Asturias</b>	Tineo	27-07	553.14
<b>Cáceres</b>	Acebo	06-08	6830.98
<b>Cáceres</b>	Logrosán	10-08	776.20
<b>Ourense</b>	Cualedro	30-08	1478.24
<b>Asturias</b>	Boal	19-12	2554.00
<b>Total burnt area</b>			<b>39474.91</b>

The yearly trends in terms of numbers of fires and burnt areas during the last 36 years in Spain are shown in Figure 69.

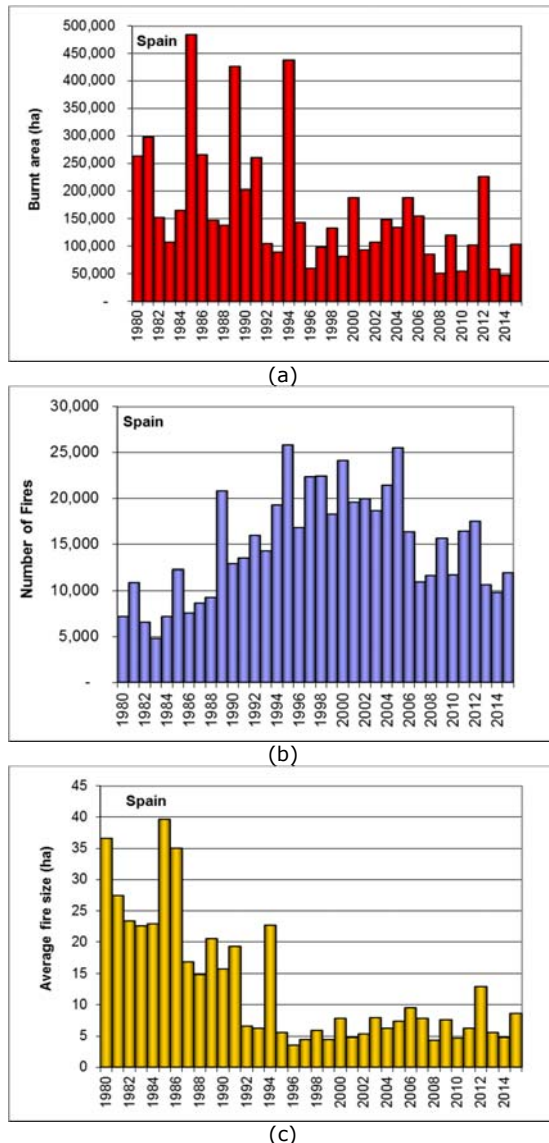


Figure 69. Burnt areas (a), number of fires (b) and average fire size (c) in Spain for the last 36 years.

#### *Prevention measures*

##### Training in fire management

During 2015 MAGRAMA organized courses on the following topics:

- Forest fire prevention
- Chief operations
- Chief firefighting operations
- Implementation of the new web application for fire field data collection (23 courses)
- Safety and investigation of firefighting accidents
- Team work training for emergency services for forest fires.

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

EPRIFs were operational from Jan. 12<sup>th</sup> to May 29<sup>th</sup> and from Nov. 2<sup>nd</sup> to Dec. 11<sup>th</sup>, totalling 6 months of work for the year. These groups organized training sessions and meetings with interested communities in the fields such as ranchers, farmers, hunters and local administrations with the aim of enhancing forest fire prevention. They also implemented prescribed burning in 274 interventions on 1 888 ha helping to reduce the risk of wildfires by reducing fuel and creating discontinuities in vegetation while also achieving other objectives such as improved pastures, favouring the habitat of various species, improving accessibility, etc. On several occasions, for the implementation of prescribed burnings, the EPRIF in Huesca, Tabuyo (Leon), Cangas de Narcea (Asturias), Pola de Lena (Asturias) and Gredos (Avila) received support from the Preventive Works Brigades of MAGRAMA with bases close to the operation sites.

##### Preventive Work Brigades (*Brigadas de Labores Preventivas*)

The Preventive Works Brigades of MAGRAMA acted, in collaboration with the Autonomic Administrations, in operations of fire prevention on more than 1 530 ha of forest areas implementing activities of thinning, shrub removal and tree pruning. Once the fire campaign was finished, fire prevention work started again up until mid-December. The work involved more than 400 workers organized into 10 brigades.

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

The MAGRAMA deploys five BRIF teams during the winter-spring campaign in the north and west of the Peninsula and ten during the summer campaign across the country.

In the summer season BRIF consists of three teams each formed by two supervisors and 14 specialists under the command of 1 technician. For transport and support for fire extinction they have two helicopters with 1 500 litre capacity. The BRIF-B brigade, located in the Puerto Pico (Ávila) region, is smaller and its composition the same as that of the winter campaign brigades (BRIF-i), consisting of teams of 7 specialists, 1 foreman and 1 technician with a 1 500 litre capacity helicopter.





Figure 70. BRIF Laza working from a hovering helicopter during the fire in Allande (Asturias).

These highly specialised helicopter transport personnel units can operate anywhere in the country where they are needed. The BRIF personnel receive continuing education and training to enable them to perform in the most demanding situations and the most complicated fires. The use of all fighting techniques including back-burning is essential in its operation.

In the 2015 campaign, BRIF teams worked for a total of 1 937 hours in 362 fire interventions and extinguished a front length of 284 762 metres.

The BRIF team with the highest activity during this campaign was in and Laza (Ourense) with a total of 88 interventions counting both summer and winter season.

#### Aerial means

During 2014, the aerial means of MAGRAMA were involved in 1 717 in support of the means of the Autonomous Communities. They flew for a total of 4 786 flight hours, making 23 026 discharges over forest fires.



Figure 71. Amphibious aircraft working in Riofrio de Aliste (Zamora).

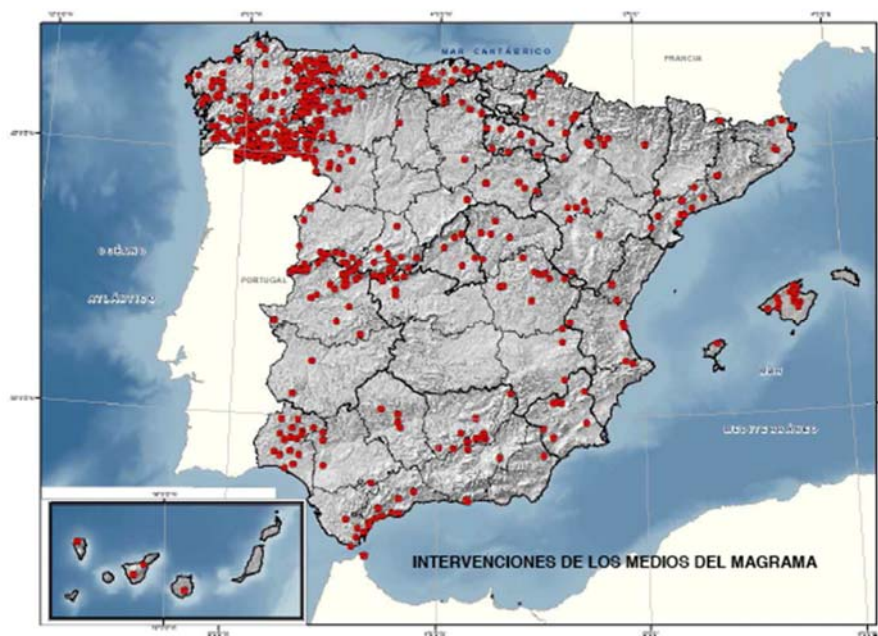


Figure 72 Location of air intervention actions made in 2015.

(Source: Ministerio de Medio Ambiente y Medio Rural y Marino, Área de Defensa Contra Incendios Forestales, Spain).



## 2.2.24 Sweden

### *Fire danger in the 2015 fire season*

The grass fire risk period started early in February (Figure 73). The forest fire risk was low in general but increased for some days in August with a possible high risk level for burning (Figure 74). It was a year with a lot of rain during the summer. The fire season of 2015, similar to the years 2010 to 2012, had fewer fires and less burned area than the mean of the last 10 years. Most of the fires in 2015 took place in April, normally affecting the old grass from the year before. The low number of forest fires and less affected burned forest area can also be an effect of the memory from the season before with the major forest fire in Västmanland, and the effect it may have given to the public to be careful and other actors with the fire suppression.

### *Grass and forest fire risk 2015*

The grass fire risk period continued for rather a long period in 2015. It was already at high risk level in early February and for more than five months some part of the country was affected by the risk. The forest fire risk was very low in general, and only during two

weeks in August the danger level was high enough to register a high risk for spreading fire. During these weeks prescribed environmental fires were carried out (Figure 77).

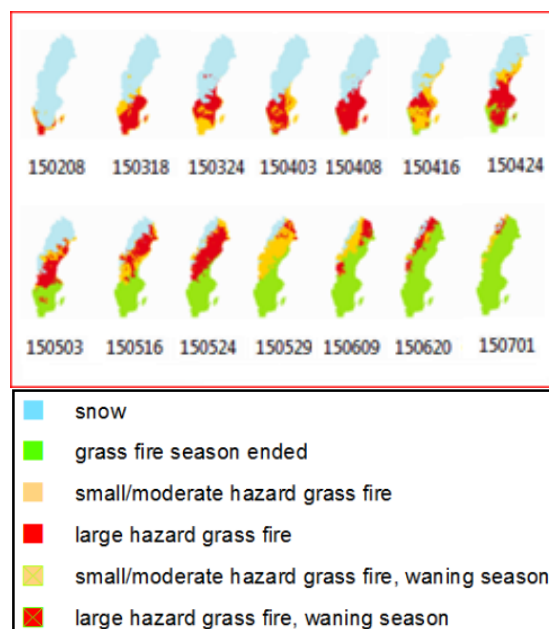


Figure 73. Maps of grass fire risk season 2015 shows the long period of risk.

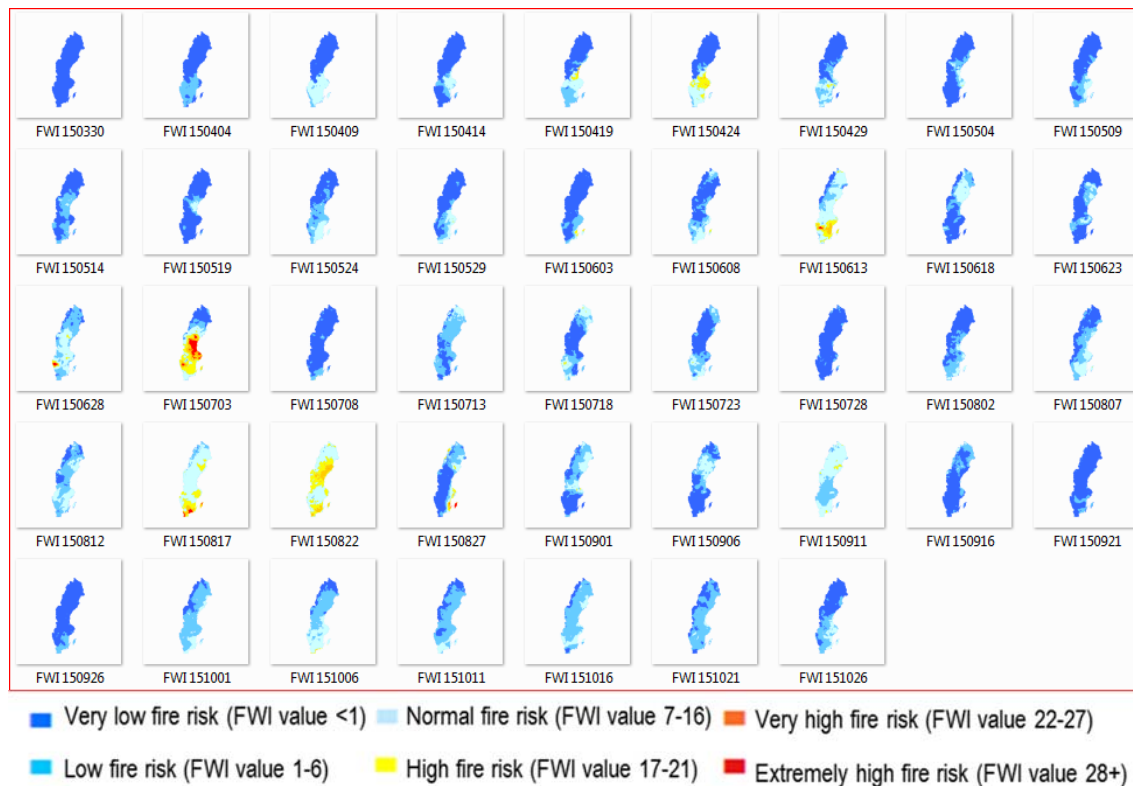


Figure 74. Maps of Forest fire risk shows the low fire risk season 2015 from the FWI-index (Swedish normalised index)

### Fire occurrence and affected surfaces

During 2015 the number of fires recorded was 2 700, burning 255 ha of forest land, 96 ha of other wooded land and 243 ha of other land.

The largest fire which was recorded started on the 9th of April. In this fire, about 50 ha of forest burned. The second largest fire started on the 18th of August and affected about 45 ha of forest. These fires were in the middle and north part of Sweden.

The burnt area, number of fires and average fire size for the years 1998-2015 are shown in Figure 76.

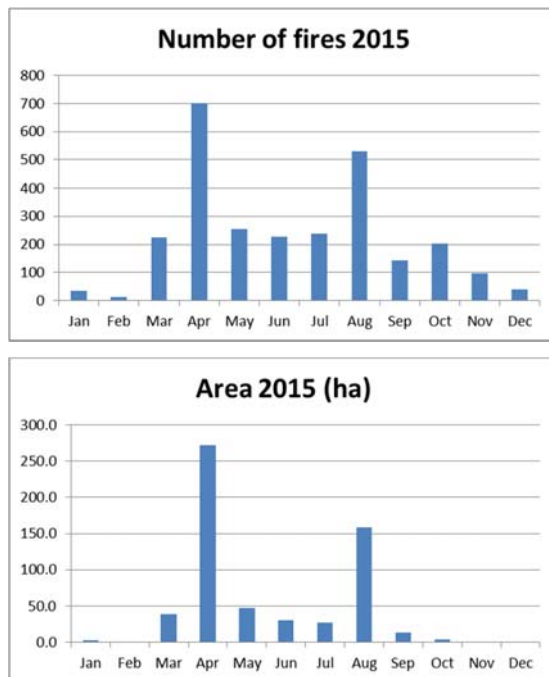


Figure 75. Total number of fires and burnt area (ha) by month in 2015.

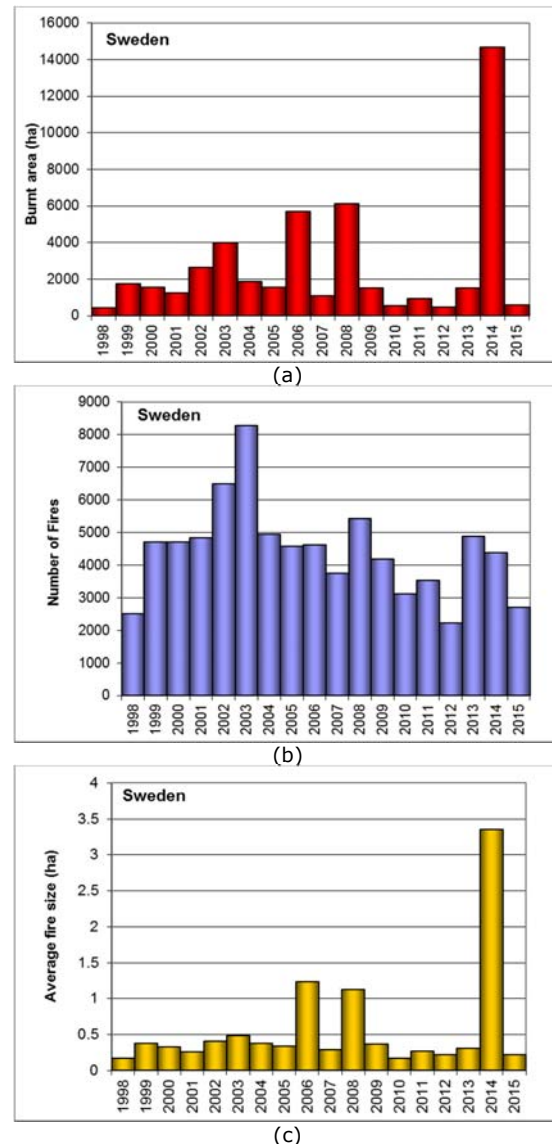


Figure 76. Burnt areas (a), number of fires (b) and average fire size (c) in Sweden from 1998 to 2015.



Figure 77. Prescribed environmental burning in August in the region of Värmland. photo: Leif Sandahl

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

## 2.2.25 Switzerland

### *Weather conditions and state of the forests 2015*

After record breaking mean temperatures in 2011 and 2014, 2015 has been the warmest year since the introduction of instrumental meteorological measurements in 1864 in Switzerland.

Mean precipitation was under the 1981-2010 average in most parts of the country. Winter 2014/2015 has been overall mild and snowfalls were registered only from mid-January onward. Snowless winters imply high fire danger in spring until the "greening phase" starts, especially at lower elevations and on southern exposed slopes. Snowfall was significant even at low elevations only in southern Switzerland. March and April were rather wet on the northern slopes of the Alps, despite some warm and sunny spells. In the South, Favonio situations (northern warm wind) led to dryness, so that fire danger increased remarkably. At the end of April and in May, severe rainfall led to critical situations with local flooding in western Switzerland. Some lakes reached critical levels and there were flooding in the Three Lakes Region.

June started with summer temperatures rising above 30-33°C until heavy thunderstorms reached the country on the 14<sup>th</sup> of June, causing floods in eastern Switzerland between Winterthur and Lake Constance. However, a heatwave started straight after those events and temperatures were very high for Swiss conditions, reaching a remarkable 33-36°C. There was then a short spell with 3 days of normal Summer temperatures (about 25°C) as from July 8<sup>th</sup>, before a second heatwave started, with temperature rising between 34-36°C again. Some thunderstorms at the end of July and in August brought some moisture, but the lack of precipitation was so significant, that they did not have a significant reducing impact on the drought situation, especially with temperature rising up to 31-34°C again throughout August.

Summer 2015 has been the second warmest ever measured in Switzerland after the summer of 2003. During the Summer 2015, evapotranspiration rates were significant due to the very high temperatures. The "moisture capital" within the forests was used rapidly and drought reached the ground. After the litter layers, the lack of moisture reached the humus and organic layers affecting trees in their root systems, so that, especially on limestone with thin organic grounds in the

Jura regions, some trees died. This is probably due to a combination of harmful organisms and intense drought.

September and October were cold with snowfall at mid-elevations. The precipitation rates remained low, especially in eastern Switzerland. Combined with the Summer conditions, bark beetles increasingly affected pine forests in parts the Midlands and the Jura. November and December were very mild and dry again. Despite some fog situations in the midlands, November was the 3<sup>rd</sup> warmest ever measured and December the warmest since the beginning of measurements, so that hazelnuts and spring flowers blossomed already. In December only about 30% of normal precipitation occurred in northern Switzerland. In southern alpine areas, an aridity record was broken with 0.8mm cumulated precipitation in Locarno for both November and December.

### *Fire occurrence and affected surfaces*

For 2015, fires from Canton Baselland, Berne, Jura, Neuchâtel, Grisons, Lucerne, Obwalden, Sankt-Gallen, Schaffhausen, Solothurn, Ticino, Valais and Zurich were recorded in the database. A total of 162 forest fires were registered in 2015 (as reported by May 2016), burning 44.9 hectares, which corresponds to a low occurrence compared to the yearly average since 1980. Average fire size was 0.3 ha. Fire often started outside the forests. 41% of the fires happened during the winter season (November to April), when 81% of the burned surface occurred.

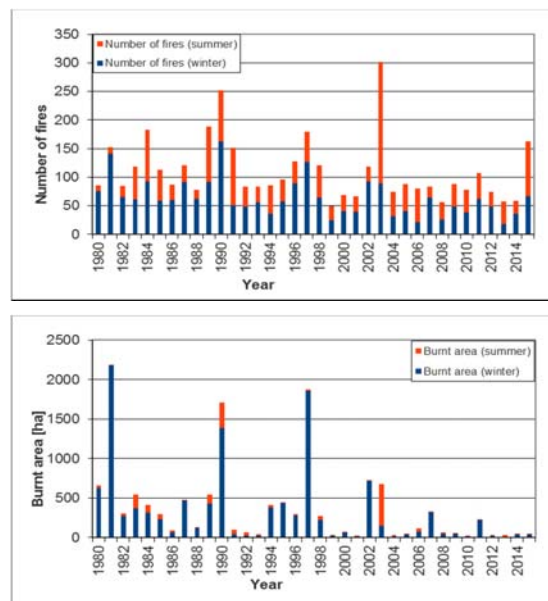


Figure 78. Number of fires and burnt area for winter and summer fires.

The yearly trends in terms of number of fires and burnt area during the last 35 years in Switzerland are shown in Figure 79.

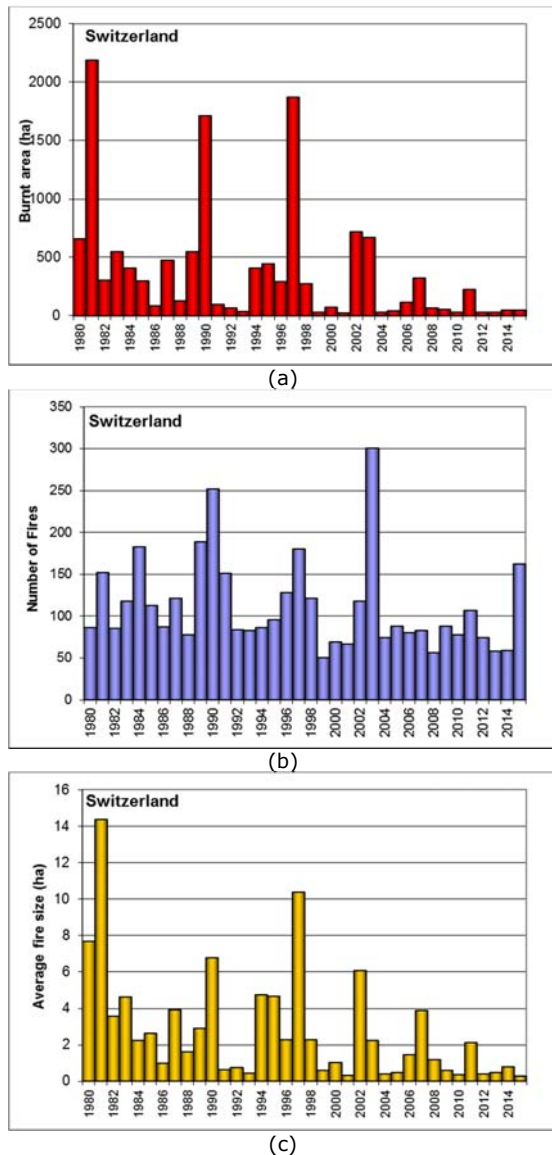


Figure 79. Burnt areas (a), number of fires (b) and average fire size (c) in Switzerland from 1980 to 2015.

#### Fire prevention activities

Prevention and information are in the focus of the federal forest fire prevention strategy in Switzerland, that is built on the close collaboration of the Cantons with the Confederation (Federal state). In accordance with the weather conditions, 2015 was a rather "busy" year for fire prevention.

After a mild beginning of Winter, fire bans were decreed in the south of Switzerland from the beginning to mid-January. A second significant fire danger episode occurred in Spring in southern alpine areas, which is

considered as normal. Local authorities informed the population accordingly and decreed fire bans for one month (April).

The heatwave from mid-June 2015 onwards implies that local authorities rapidly implement protective measures for forests. As from mid-June, active information and press releases were issued. Fire bans were issued especially during the Summer holidays as from the beginning of July, lasting beyond the National day, with restrictions or special regulations for fireworks in some regions. With the exception of Schaffhausen, Thurgau, St-Gallen, both Appenzell inner and outer Rhodes, and Zurich, where the population was invited to take care during outdoor activities and avoid when possible lighting fire in or near the forests, all other 20 Cantons issued fire bans in and near the forest, which lasted for over 30 days. Some cantons issued absolute bans to light fires outdoors.

The lack of precipitation throughout the year led authorities to actively inform the population about fire danger again in November. The situation became critical at the end of the year in southern Switzerland so that fire bans were decreed again in December in Ticino and Grisons. These bans were lifted only in January 2016.

The implementation of an automatic online transmission of fire danger ratings and measures from the Cantons to the Federal state in spring 2015 enabled simplifications in the information processes from regional to national levels. The system enabled an efficient and simple nationwide information (map and table) informing about the measures in force anywhere in the country

Information about fire danger and forest fires has been increasingly present in the media, raising awareness within the population. The national website [www.forest-fire-danger.ch](http://www.forest-fire-danger.ch) by the Federal office for the environment FOEN was launched in March 2015 and has registered a very high number of visits, indicating the need for such platforms for the population and the media. The small occurrence of forest- and wildland fires in general in 2015, is probably linked to the intensive information campaigns and fire restriction measures issued by the Cantons and the Confederation.

The main cause of fires in Switzerland remain neglect. No loss of life or major damages to buildings were reported in 2015.

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



## 2.3 Comparison of Southern EU Countries with longer time series (1980–2015)



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.

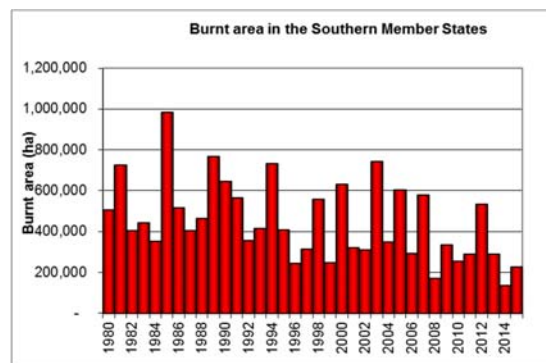
After an unusually light year in 2014 (which resulted in the lowest burnt area across the 5 countries since the 1980s), 2015 reverted to more typical values. The total burnt area was 227 410 ha (Figure 80a), which is still well below long term averages, even though it was nearly twice the amount recorded in 2014.

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 2015, the total number of fires was 38 171, around 50% higher than 2014, but below long term averages (see Table 33 and Annex 1 for details).

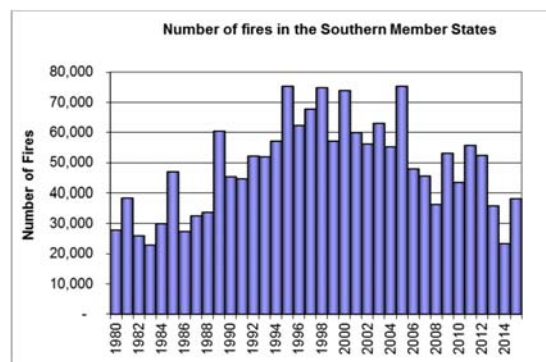
Figure 80c shows the yearly average fire size in the 5 countries since 1980. There is a clear difference in average fire size before and after 1990.

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.

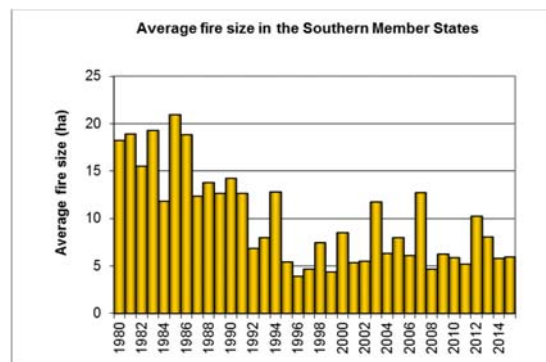
In 2015 the average fire size was very close to the values of 2014, and is slightly below the average of the last 2 decades.



(a)



(b)



(c)

Figure 80. Burnt area (a) number of fires (b) and average fire size (c) in the five Southern Member States for the last 36 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 2010-2015 with the figures for 2015. It shows each of the 5 countries separately and also their total. Overall 2015 was a low year for fires with respect to the past average values.

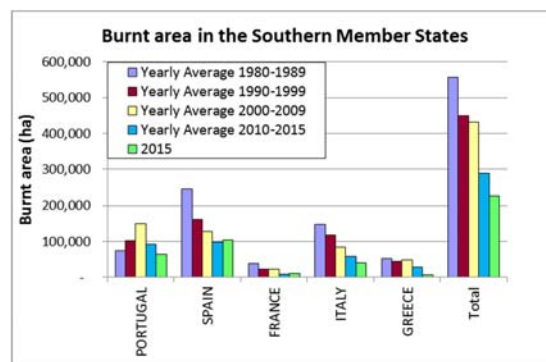
Table 33 gives a summary of the burnt areas and number of fires for the last 35 years, the average for the 1980s, the 1990s and the 2000s, and the average for the last 5 years, together with the figures for 2015 alone.

In 2015 the total of 227 410 ha burnt was nearly twice that of the previous year but close to the average of the last 5 years and lower than in previous decades (Table 33, Figure 84). In terms of the five individual countries, Spain was the most affected for burnt area, accounting for just under half the total burnt area (Figure 82).

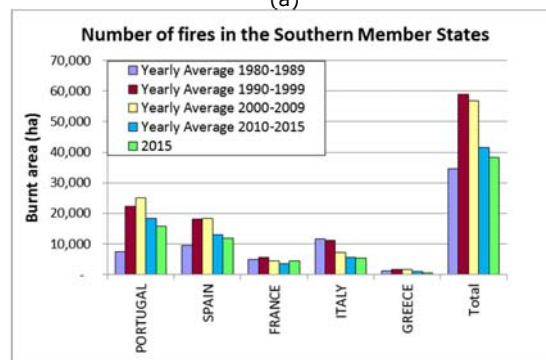
The number of fires was also similar to the average values for previous decades for all 5 countries. Portugal was the country with the greatest number of fires with 42% of the recorded total, but as the fire size was relatively low this translated to only 28% of the total burnt area (Figure 82).

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 2015.

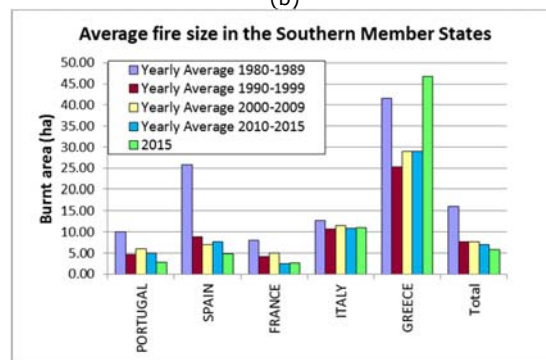
Since the area of each country is different, and the area at risk within each country is also different, the comparisons among countries cannot be absolute. It should also be borne in mind that since 2009 the figures for numbers of fires in Greece are incomplete and are therefore an under-representation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



(a)

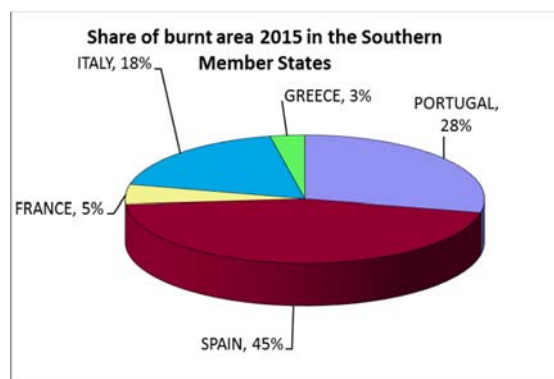


(b)

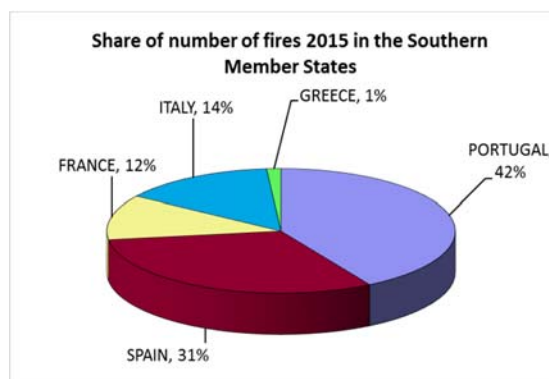


(c)

Figure 81. Burnt areas (a), number of fires (b) and average fire size (c) in the five Southern Member States in the year 2015 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 State for 2015.

Table 33. Number of fires and burnt area in the five Southern Member States in the last 36 years.

<i>Number of fires</i>	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE(*)	TOTAL
<b>2015</b>	<b>15 851</b>	<b>11 928</b>	<b>4 440</b>	<b>5 442</b>	<b>510</b>	<b>38 171</b>
% of total in 2015	42%	31%	12%	14%	1%	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 2010-2015	18 439	12 994	3 587	5 492	1 025	41 536
Average 1980-2015	18 234	15 953	4 727	9 248	1 478	48 641
TOTAL (1980-2015)	656 437	538 318	170 177	332 929	53 206	1 751 067

<i>Burnt areas (ha)</i>	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
<b>2015</b>	<b>64 443</b>	<b>103 200</b>	<b>11 160</b>	<b>41 511</b>	<b>7 096</b>	<b>227 410</b>
% of total in 2015	28%	45%	5%	18%	3%	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 2010-2015	92 377	98 660	8 947	59 345	29 609	288 937
Average 1980-2015	105 893	164 592	24 895	107 002	45 424	447 807
TOTAL (1980-2015)	3 812 148	5 925 323	896 216	3 852 072	1 635 277	16 121 036

(\*) Numbers of fires are incomplete since 2009

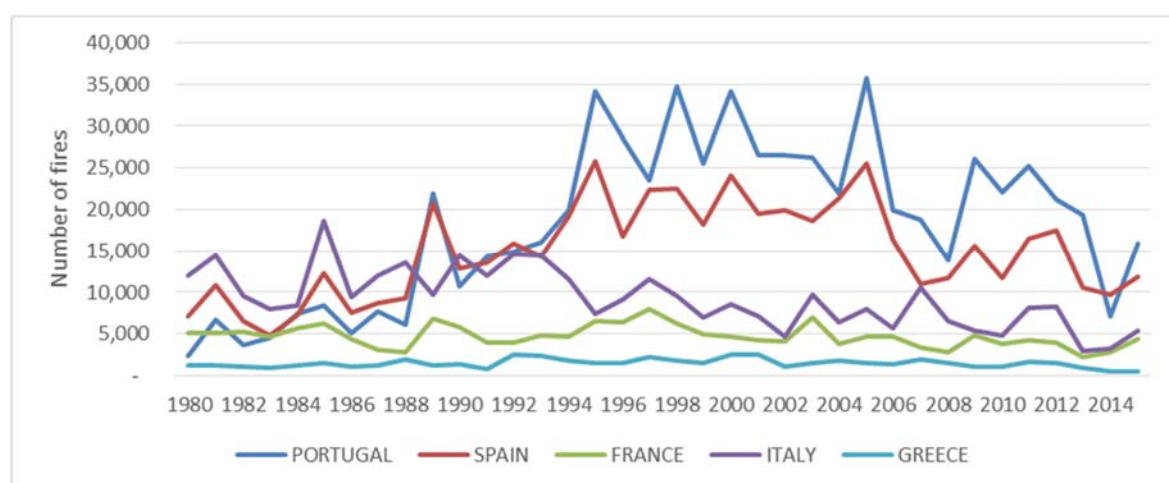


Figure 83. Historical comparison of number of fires in the 5 Southern Member States.

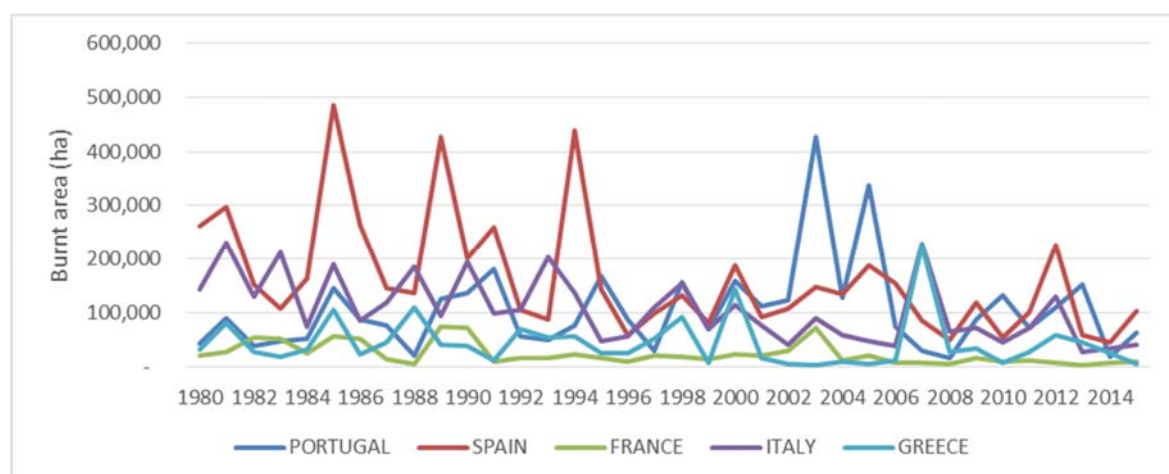
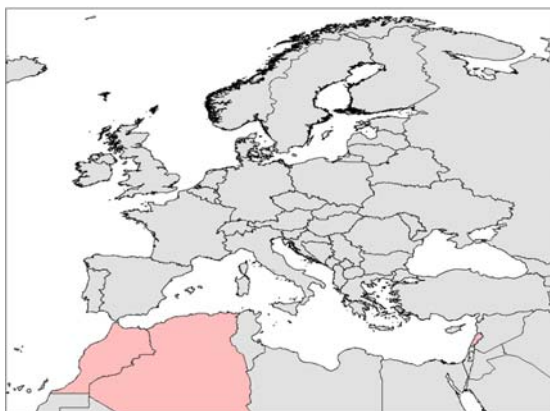


Figure 84. Historical comparison of burnt area in the 5 Southern Member States

## 2.4 Middle East and North Africa Countries



### 2.4.1 Algeria

#### Introduction

Algeria is an integral part of the Mediterranean, one of the regions in the world where natural resources (flora, soil, vegetation) have experienced significant degradation from multiple human actions: in particular, fire, overgrazing, forest clearing and the expansion of cultivated lands. As a consequence, a significant decline in these natural areas has been observed in recent decades.

Because of this, logical and intelligent management is more essential than ever in order to protect forests in Algeria, which play an important protective role in environmental terms particularly regarding the maintenance of biodiversity, the fight against climate change, flood prevention and the fight against desertification.

In addition, other means of making use of the forest assets must be explored further in Algeria through the development of new income-generating activities for rural populations, such as the effective use of forest products; for example the cork sector, aromatic and medicinal plants and even the field of ecotourism, which will contribute more to the provision of added value to the national economy.

#### Fire danger in the 2015 fire season

The season of summer 2015 was generally characterized by relatively mild temperatures for a long period. A few hot cycles were observed during the interval from the end of July and beginning of August, where the fire risk for forests reached a relatively high level

in some areas, and most of the large fires were recorded during this period.

Furthermore, it should be noted that after the year 2012 (which was the most destructive for Algerian forests due to the scorching heatwaves that characterized its summer, in addition to inadequate preventive arrangements against forest fires), particular vigilance was observed through the establishment of new forecasting, organizational and operational measures, particularly in sensitive and heavily wooded areas, which contributed to the remarkable reduction in the average area burned by fire since 2012, as shown in Figure 85.

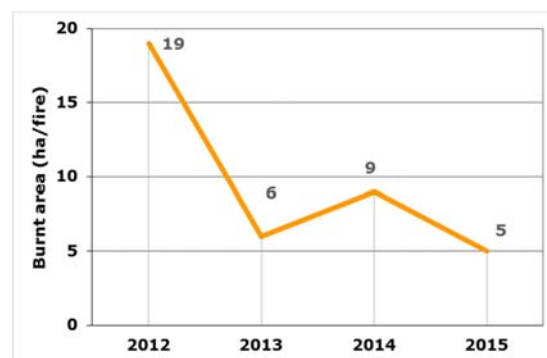


Figure 85. Average burnt area per fire for the last 4 years (ha/fire)

#### Fire occurrence and affected surfaces

The total area of forests, scrub and bushes affected by fire during the 2015 season is estimated at 13 010 hectares, caused by 2 383 fires. This is significantly lower than the burnt area recorded during the last four years.

The distribution of the area burned by vegetation type (Figure 86) shows that forest lands were the most affected with 44% of the total area burned.

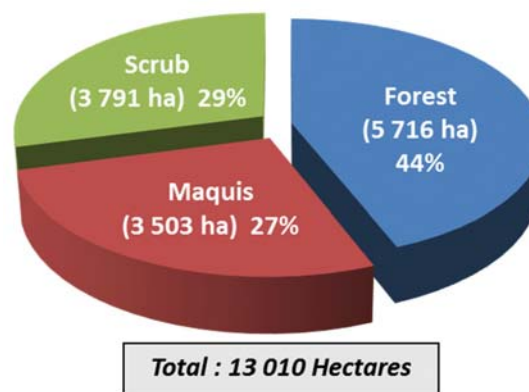


Figure 86. Burnt area classified by vegetation type

However, the total area of burned forest remains lower than that of 2012 and 2014, as shown in Figure 87 (forest areas affected by fire in the last four years).

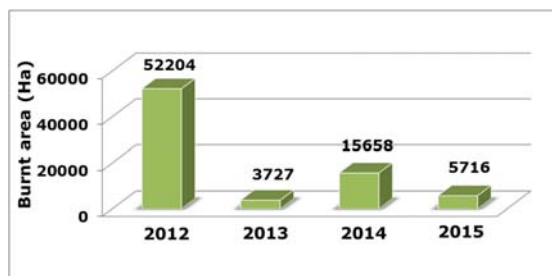


Figure 87. Burnt area of forests in the last 4 years (2012-15)

Comparing the area burned by region of the country (EAST, CENTRAL and WEST) during the 2015 campaign (Figure 88), the WEST region on the country (12 wilayas) is the most affected by fire, with a burnt area of 8 498 ha for all vegetation types, although the highest number of fires was recorded in the wilayas of the CENTRE region with 1 138 fires.

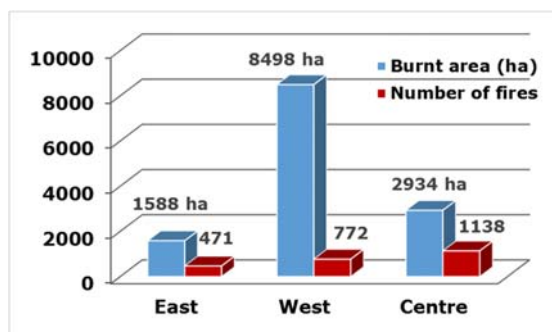


Figure 88. Number of fires and burnt area by region in 2015.

The other two regions EST (15 wilayas) and CENTRE (13 wilayas) recorded lower areas affected by fire, even though these two areas of the country are more forested.

The monthly distribution of the burnt area (Figure 89), shows that, unlike the previous year, July 2015 was the month when the largest burnt area was recorded with an average of 9 ha/fire, following the short heatwaves observed during this month which favoured the rapid spread of fires.

The highest number of outbreaks was recorded during the month of August with 1 040 fires, but the total area burned during that month was less than that of July.

The other months experienced less damage and the areas affected by fire were lower, especially during June and October when most fires burned areas of less than one hectare.

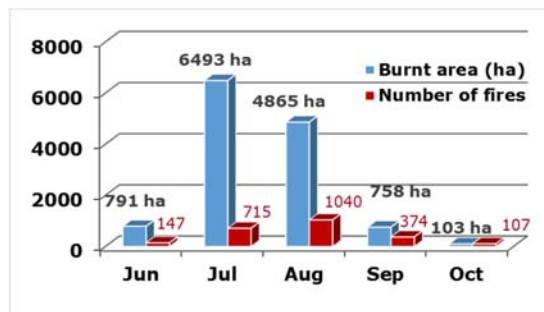


Figure 89. Number of fires and burnt area by month in 2015.

The distribution of the 2383 recorded fires by hour of the day (Figure 90) shows that most fires were reported during the time slot 12h-16h where weather conditions were very conducive to triggering fires.

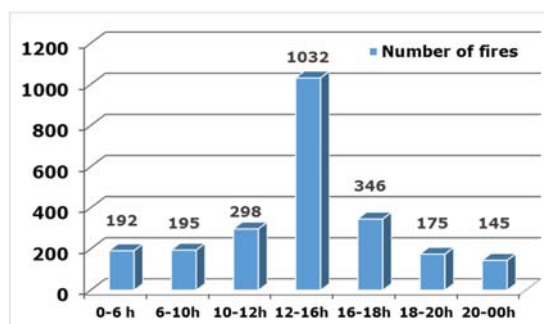


Figure 90. Number of fires by hour of the day in 2015.

During the 2015 season, not many fires were recorded with large burned areas (Figure 91).

Approximately 80% of the fires covered less than 5 hectares, which can prove the effectiveness of preventive teams deployed near sensitive areas for detection and rapid response to fire outbreaks.

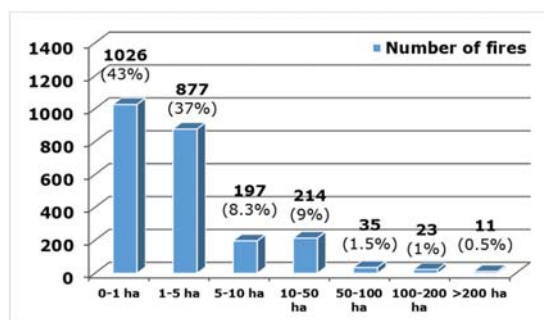


Figure 91. Number of fires by fire size (ha) in 2015.

### *Forest fire prevention*

The prevention campaign against forest and bush fires started in the early months of 2015 and a number of actions were carried out, including preventive work against fire, information and awareness campaigns for citizens and updates to the organizational procedures:

#### Preventive work

- Maintenance of firebreaks, forest tracks and water points in forests, and the construction of some new trails.
- Brush clearing from road verges and railway tracks through the forests.
- Clearance of undergrowth around the farms neighbouring onto forests.
- Maintenance of clearings under high-voltage power lines through forests.

#### Awareness campaigns

- Conferences in several educational institutions.
- Organization of exhibitions and open days for citizens and distribution of leaflets and posters on forest fire risk, including preventive measures against fire.
- Organization of tours to the remote rural areas to raise awareness among local residents on precautions to prevent the outbreak and spread of forest fires.
- Broadcast of numerous television and radio programs on national and local channels in connection with the theme of forest fire.

#### Organisational matters

- Updated "forest fire" plans setting out the implementation of preventive measures and the mobilization of control measures for the 40 wilayas affected by this risk.
- Installation of operational committees responsible for coordinating control operations, both nationwide and at the level of wilayas, daïras and communes.
- Set up local committees composed of farmers and citizens, who play an important role in fire prevention and first intervention because of their proximity to forests.
- Organization of several coordination exercises on the theme "forest fire interventions" with the participation of all stakeholders.
- Organization of simulation exercises on "operation command for forest fires" for the benefit of the civil protection officers.

- Regular use of the "EFFIS" weather and forecast data on forest fire risk to disseminate warnings to relevant wilayas.

#### *Monitor, alert, and response reinforcement*

Monitoring, alert, and first response was provided by forest services located in lookouts and small mobile brigades assigned within the forests. However, the major interventions on forest fires were handled by civil protection, from intervention units neighboring to forests and the "Mobile Column" reinforcement means, in those cases where the fire increased in size.

In addition, during the 2015 campaign, civil protection regularly mobilized preventive resources and fire-fighting equipment close to large areas of crop fields at harvest-time and near recreational forests frequented by citizens.

Below is an illustrative diagram (Figure 92) of the overall system deployed to support the campaign against forest fires in 2015.





## 2.4.2 Lebanon

### Analysis of past seasons 2008-2010

Lebanon's forest fire reports for the years 2008 throughout 2015 have been completed within the framework of a collaborative work between the Ministry of Environment (MOE) and the Land and Natural Resources Program (formerly Biodiversity Program), Institute of the Environment, University of Balamand (LNR-IOE-UOB). The present information is based on the recently developed fire report of the year 2015 (MOE/UOB, 2016) and it reflects reported fires only.

### Fire season

The calculated start date of the fire danger season for 2015 was May 9th, 2015 and the calculated end date was September 29th, 2015. The peak month (in number of fires) was August (comprising 49 fires and 311.1 ha of affected vegetated lands). Overall, a total of 107 fires were reported, affecting a total area of 752.85 ha (Figure 93).

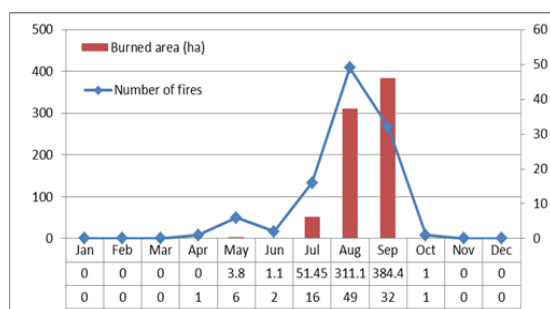


Figure 93. Monthly distribution of fire occurrence and fire affected areas in 2015 (source: MOE/UOB, 2016). NB. When the number of fires is different from zero and the corresponding burned area is equal to zero in the graph, it indicates that the data about the burned area is not available (N/A).

### Land use type

The land use of fire affected areas (Figure 94) comprised forests/woodlands (74.3%), agricultural land (18.28%), and grassland (5.62%).

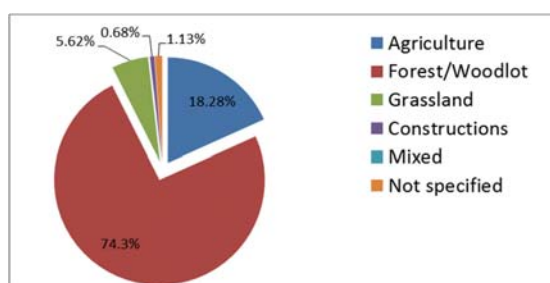


Figure 94. Land use of fire affected areas (source: MOE/UOB, 2016)

### Affected fuel type

Almost 50% of affected fuel types (Figure 95) was needle forests, followed by broadleaved forests (33%) and mixed forests (4.5%).

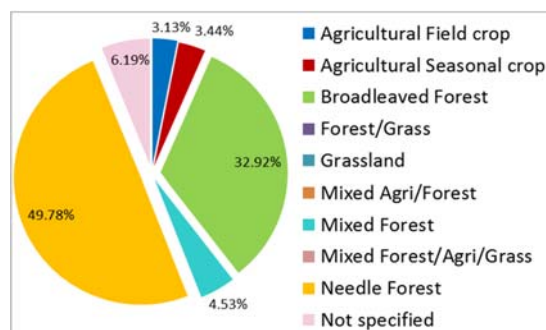


Figure 95. Distribution of fuel type affected by fires (source: MOE/UOB, 2016)

### Causes of fire

The main fire causes were unknown (66.8%). This is mainly attributed to the lack of comprehensive investigations about forest fire causes. Negligence was attributed to 13.72% of the reported fire events. Furthermore, 9.12% of causes were associated with human activities in nature. Landfill and agricultural practices represented 6.24% and 3.98% respectively, of the total fire causes; whereas arson fires were insignificant (Figure 96).

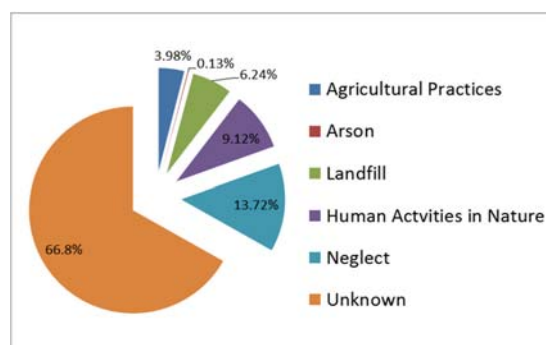


Figure 96. Distribution of main fire causes (source: MOE/UOB, 2016)

### Intervention time

It was observed that 55.14% of first interventions in fire suppressions occurred within the first 20 minutes after the reporting time, while 17.76% of interventions happened after 20 minutes and before 1 hour from the reporting time. Only 1.87% of interventions in fire suppression happened after one hour and a half from the reporting time (Figure 97).

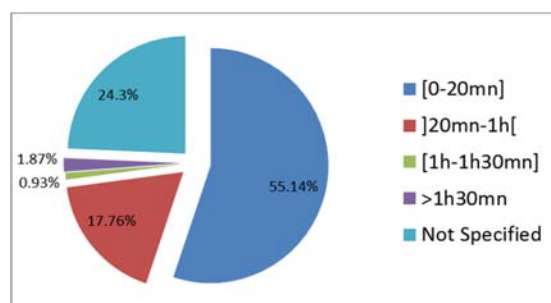


Figure 97. Times for intervention after reporting fires (source: MOE/UOB, 2016)

#### Fire duration

The largest number of fires lasted between 1 and 2 hours (48.6%). A total of 22.43% of fires lasted between 2 and 5 hours, and 12.15% of fires lasted between 5 and 12 hours. It was also observed that 3.74% of fires lasted between 12 and 24 hours. Finally, 3.74% of fires lasted more than 24 hours (Figure 98).

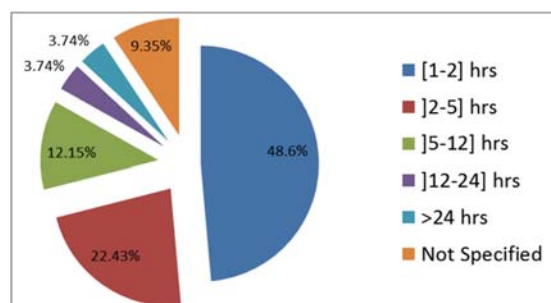


Figure 98. Fire duration (source: MOE/UOB, 2016)

#### Resources employed in fire suppression

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

Table 34. Human and technical resources involved in fire control throughout 2015 (source: MOE/UOB, 2016)

	Number				Lebanese Army helicopters (interventions)
	Small Cars	Water Tanks	Other Cars	Human Resources	
Civil Defense	70	229	34	495	
Army	50	8	7	362	14
Internal Security	57	8	2	268	
NGO	10	2	1	83	
Local Resident	0	0	0	400	
<b>Total</b>	<b>187</b>	<b>247</b>	<b>44</b>	<b>1608</b>	

#### Forest fire initiatives and campaigns

Public agencies such as the Ministries of Environment, Agriculture, Interior and Municipalities, the National Disaster Risk Management Unit and the National Council for Scientific Research have been involved in developing initiatives to monitor and report risk of forest fires at the National level.

Also, the University of Balamand has been involved in developing an advanced fire danger forecast for all Lebanon taking into account for the first time both fire hazard and vulnerability in addition to weather forecast. This initiative is implemented within the framework of a project funded by USAID-PEER. Also, it comes in lines with the provisions of Lebanon's National Strategy for forest fire management.

The Association for Forests, Development and Conservation (AFDC) in partnership with the ministries of Environment, Agriculture, and Interior and Municipalities, started a new awareness campaign in May 2015 to prevent forest fires during the summer season. Also, the Ministry of Agriculture has recently managed to acquire new shredding machines to process combustible material from cleaning and pruning of vegetated lands. At the local level, a cooperation initiative between the Water Authority and the Directorate of Civil Defense centers in Batroun (North Lebanon) was launched to secure water outlets across the district to facilitate fire suppression activities.

The Lebanon Reforestation Initiative (LRI), a project launched in 2010 by the United States Forest Service (USFS) office of International Programs (IP) through the support and funding of the United States Agency for International Development (USAID), has been involved in empowering local communities to manage forest fire risk at the local level following practices adapted from the US-based Firewise approach.

#### Reference:

MOE/UOB, 2016. State of Lebanon's wildfires in 2015. Beirut, Lebanon.

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

### 2.4.3 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 99), and are distributed among the different bioclimatic zones, from semi-arid to humid.

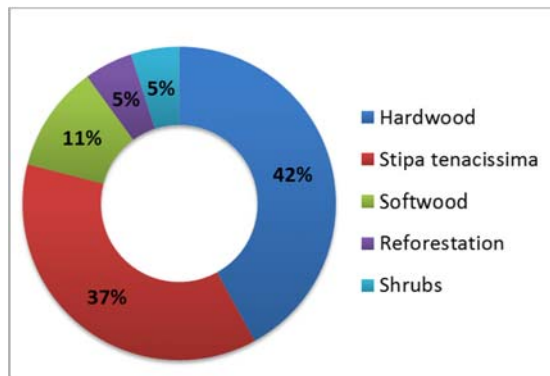


Figure 99. Composition of forest land in Morocco

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 2014

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 100) 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 100).



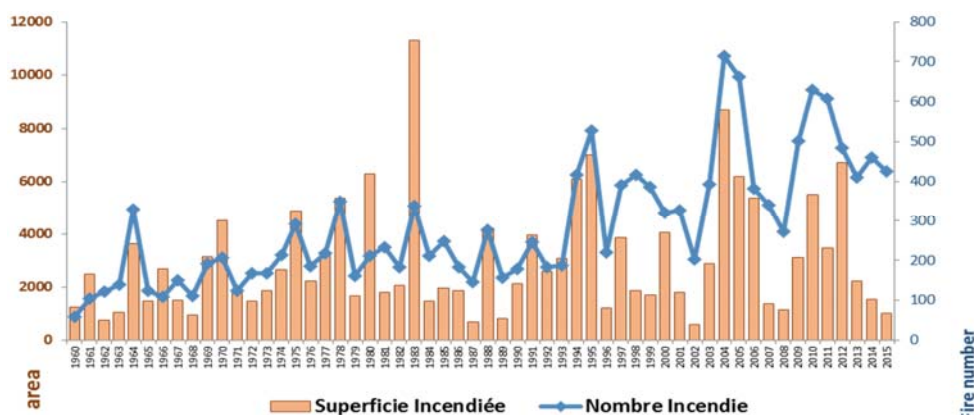


Figure 100. Evolution of forest fire number and burnt area from 1960 to 2015 (HCEFLCD, 2015)

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 100).

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.

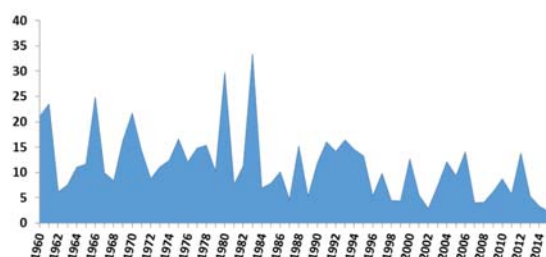


Figure 101. Evolution of the area affected per fire from 1960 to 2015

### 2015 fire season

During 2015, there was recorded a total of 425 fires affecting an area of 991 ha, an average of 2.33 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 10% and 73% respectively (Figure 102 and Figure 103).



Figure 102. Evolution of the number of fires in 2015 compared to the last decade.

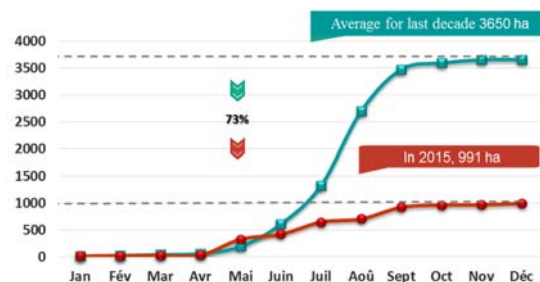


Figure 103. Evolution of burnt area in 2015 compared to the last decade.

The distribution of fires recorded in 2015 (Table 35), based on the type of vegetation affected, is as follows:

- For wooded land, an area of 346 ha (34% of the total area burned) was affected by 99 fires (23% of the total number of fires);
- The shrub and herbaceous covers were affected by 326 fires that covered an area of 645 ha, equivalent to 77% respectively of the total number of reported fires and 65% of the total area burned.
- For wooded stands, *Pinus* species (*Pinus halepensis*, *Pinus canariensis*, *Pinus pinea*) are in first place with an area of 178 ha affected, equivalent to 18% of the total area burned in this category, followed by the oak trees (Zeen oak, Tauzin oak, holm oak and cork oak) with an area of 110 ha affected (11%).



Table 35. Distribution of fires based on the type of vegetation affected in 2015

Category	Species	Area (ha)	% Area	Number	% Nbr
broadleaves	Acacia tannin	0.01	0.01	1	0.24
	eucalyptus	41.76	41.76	7	1.65
	olive	0.04	0	1	0.24
	Zeen Oak	0.91	0.09	1	0.24
	Tauzin Oak	18.15	1.83	2	0.47
	holm oak	8.01	0.81	9	2.12
	cork oak	82.29	8.3	15	3.53
S/ Total		<b>151.17</b>	<b>15.24</b>	<b>36</b>	<b>8.47</b>
Coniferous	Fir tree	5	0.5	1	0.24
	Atlas cedar	5.01	0.51	21	4.94
	oxycèdre	0	0	1	0.24
	red cedar	2.24	0.23	1	0.24
	juniper thunifère	0.1	0.01	1	0.24
	Pines	177.79	17.93	32	7.53
	thuja	5.25	0.53	6	1.41
S/Total		<b>195.38</b>	<b>19.7</b>	<b>63</b>	<b>14.82</b>
Others	Alfa	29.34	2.96	17	4.00
	Secondary species	455.38	45.92	97	22.82
	grass cover	160.36	16.17	113	26.59
S/Total		<b>645.08</b>	<b>65.05</b>	<b>326</b>	<b>76.71</b>
Total		<b>991.64</b>	<b>100</b>	<b>425</b>	<b>100.00</b>

The data relating to the distribution of fires according to size classes of affected areas are represented in the table below (Table 36). Indeed, 92% 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 1 fire (0.24% of the total number of fires) affected an area of over 100 hectares, representing over 14% of the total area burned.

Table 36. Distribution of fires according to size classes of affected areas

Size Class (ha)	Number		Area (ha)	
	Count	%	Area	%
0-5 ha	393	92.47	238.58	24.06
5-10 ha	16	3.76	120.76	12.18
10-20 h	8	1.88	114.67	11.56
20-50 ha	4	0.94	133.63	13.48
50-100 ha	3	0.71	244.00	24.61
>100 ha	1	0.24	140.00	14.12
Total	<b>425</b>	<b>100</b>	<b>991.64</b>	<b>100</b>

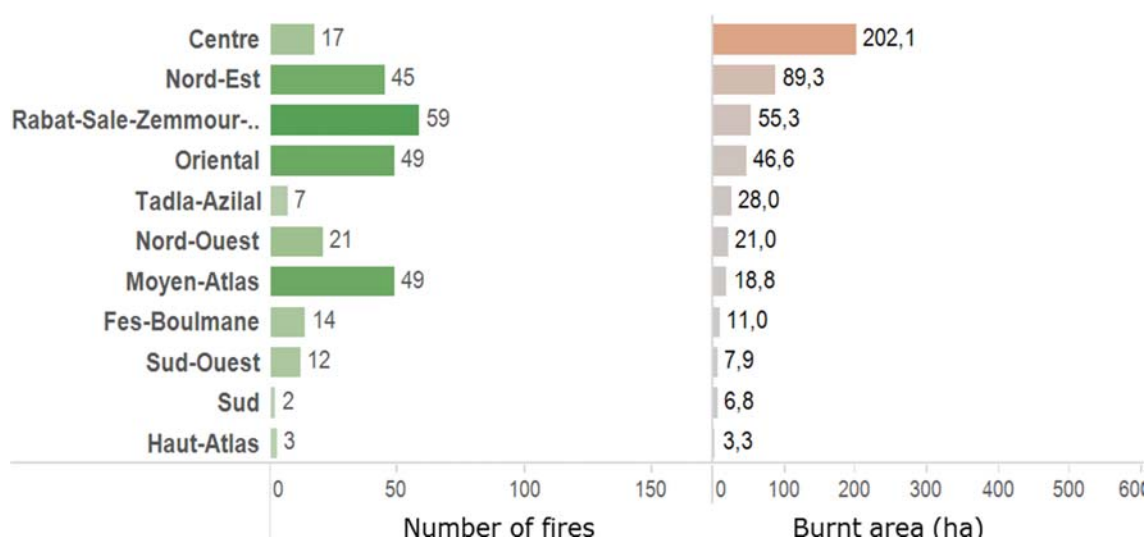


Figure 104. Number of fires and area affected (ha) by forest region.

The data showing the distribution of fires by forest region are reported, below, in Table 37.

Table 37. Fire numbers and area affected by forest region

Region	Number		Area (Ha)	
	Count	%	Area	%
RIF	147	34.6	501.5	50.6
Oriental	49	11.5	46.6	4.7
Fes-Boulmane	14	3.3	11	1.1
Nord-Est	45	10.6	89.3	9.0
Haut-Atlas	3	0.7	3.3	0.3
Centre	17	4.0	202.1	20.4
Moyen-Atlas	49	11.5	18.8	1.9
Rabat-Sale-Zemmour-Zaer	59	13.9	55.3	5.6
Sud-Ouest	12	2.8	7.9	0.8
Tadla-Azilal	7	1.6	28	2.8
Nord-Ouest	21	4.9	21	2.1
Sud	2	0.5	6.8	0.7
Total	425	100	991.64	100

The Rif region (Tanger, Tetouan...) ranks first in terms of area affected with 501 ha (45% of the total area recorded nationally) (Figure 104 and Table 37). Therefore, despite the large number of fires (147 fires), the average area affected by each fire was only 3.4 ha.

The occurrence of fires is concentrated in the provinces of Rif and Pre-Rif (including Tangier and Tetouan); this situation is favored 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.

### Fire Causes

Forest fires of unknown origin represent a dominant share (91%). Almost all forest fires result from human action, either intentionally or by negligence (Table 38).

Table 38. Causes of fires

Origin	Cause	Number		Area	
		Count	%	Area	%
Accidental	Landfill, Honey extraction, High tension line	11	2.59	22.74	2.29
unknown	Unknown	391	92	900.78	90.84
Intentional	Land clearing, Vandalism	9	2.12	66.75	6.73
<b>Total</b>		425	100	991.64	100

### Forest fire risk mapping in Morocco

In 2015, the mapping of static and dynamic risk of ignition and fire spread was completed for the whole of the kingdom. This mapping is a Decision Support System to help managers in all operations related to anticipation, prevention and intervention effectiveness.

- The static risk maps (see Figure 105 and Figure 106) are used to guide and optimize investment means, in the short and medium terms (10 years), especially as regards infrastructure, equipment and fire management in forest areas.
- Dynamic risk maps (see Figure 107), is an interactive map published on the web ([www.sysfeu.com](http://www.sysfeu.com)); these maps, updated twice a day, offer trigger process alerts and pre-positioning of the intervention means of the departments involved (HCEFLCD, PC, GR and FRA) depending on the scale of the danger of forest fires.

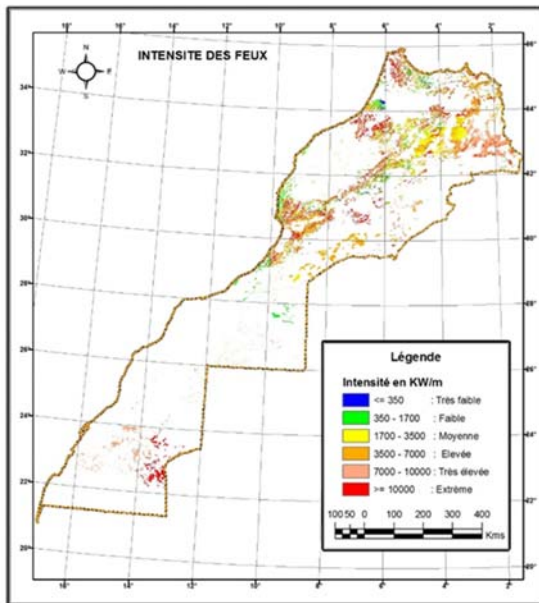


Figure 105. Risk of fire spread (fire intensity) in Morocco

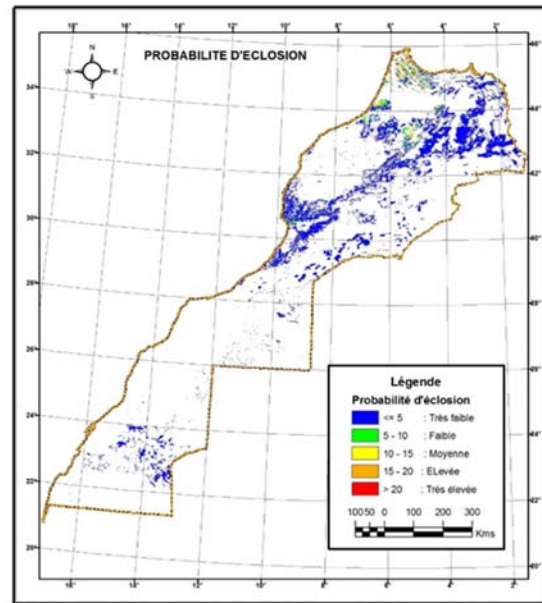


Figure 106. Ignition risk in Morocco

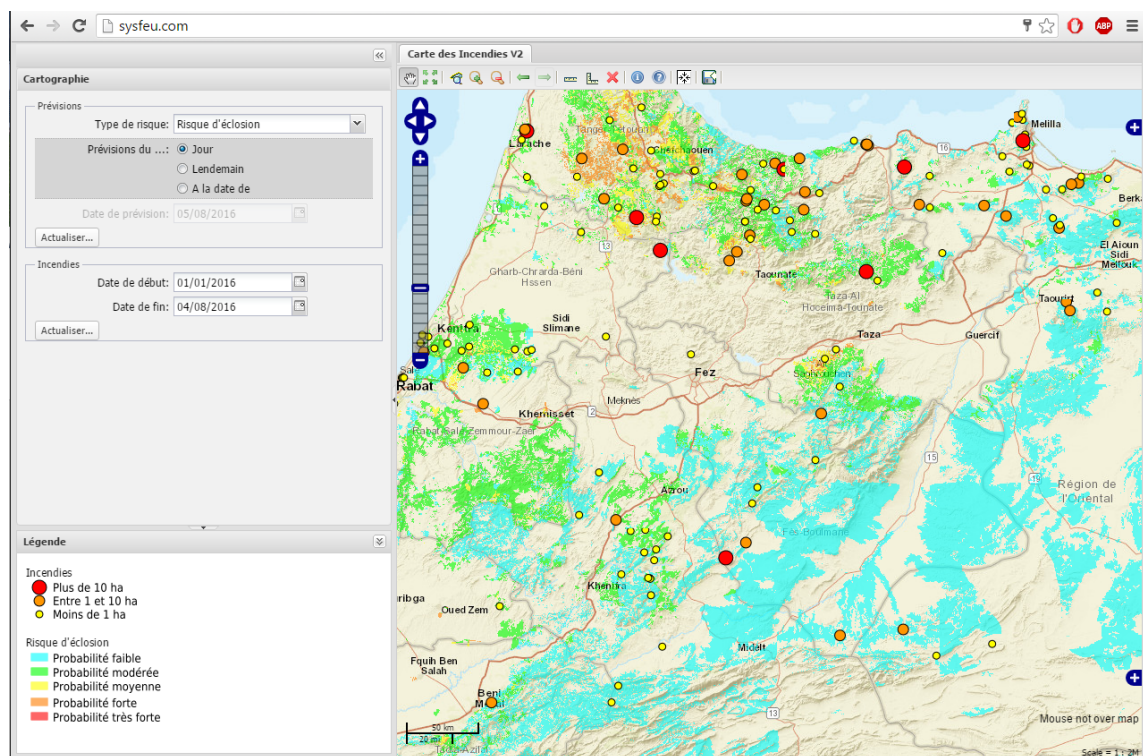


Figure 107. User interface for the dynamic maps

Table 39. Fire fighting means in 2015.

<i>Activities</i>	<i>Department</i>	<i>Quantity</i>
<b>Monitoring and alerts</b>	High Commission of Forests, Water and combating Desertification	<b>1200</b> watchers
	Ministry of the Interior	<b>NC</b> [Estimated at <b>1000</b> watchers]
<b>Ground intervention</b>	High Commission of Forests, Water and combating Desertification	<b>332</b> forest fighters with 65 vehicles for the first intervention
	Civil Protection	<b>NC</b>
	Auxiliary Forces	<b>NC</b> [Estimated at 300 persons]
	Royal Armed Forces	<b>NC</b> [Estimated at 300 persons]
<b>Aerial control</b>	Royal Gendarmerie	Twelve <b>(12)</b> Turbo Trush aircraft
	Royal Air Forces	Two <b>(2)</b> C130 aircraft and five <b>(5)</b> Canadairs

**NC** : Not Communicated

### *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 the 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.

### *Fire fighting means*

The means mobilized by the different departments in 2015 in Morocco for the operations against forest fires, are shown in Table 39 above.

### *Loss of human lives*

No lives were lost in the 2015 season.

### *Establishment of a New National Centre of Climatic and Forest Risk Management*

To crown the effort made by Morocco in terms of integrated forest fire management, solidifying progress and also the good position in terms of area burned compared to forest areas in the country, with the lowest rate of area burned (0.04%) across the Mediterranean region, the HCEFLCD, with technical support from the US Forest Service, has established a new National Centre of Climatic and Forest Risk Management (CRCF).



Figure 108. The National Centre of Climatic and Forest Risks Management.



The mission of this centre is to ensure:

In terms of proactive forest fire risk management :

- The establishment, supervision and monitoring at the national level, prevention programs, forecasting and mitigation against forest fires ;
- Improving the effectiveness and efficiency of the inter-partner coordination process in order to provide in real time all information related to fires and resources mobilized to fight against fire.
- Coordination with the departments and institutions involved, prioritization of incidents in forests to facilitate decision-making by consensus for the mobilization of adequate intervention and mitigation means;
- Coordination with the decentralised High Commission units, standardization processes and implementation of anti-fire facilities (DFCI).



Figure 109. The Coordination Centre.

In the area of intervention:

- The dissemination and sharing of information in accordance with the operational orders and procedures established for this purpose;
- Post Commandments of feeding sites information required for a coordinated fight.



Figure 110. Meeting room.

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



### 3 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).

EFFIS is the EC focal point of information on forest fires aiming to support the national services in charge of the protection of forests against fires in the EU and neighbouring countries, and also to provide the EC services such as the Emergency Response Centre (ERC), formerly Monitoring and Information Centre (MIC), of Civil Protection and the European Parliament with up to date and harmonized information on forest fires in Europe.

Research activities for the development of the system initiated in 1998 and the first EFFIS operations were in the year 2000. In 2003, EFFIS was officially established in the context of Regulation (EC) No 2152/2003 (Forest Focus) of the European Council and Parliament on monitoring of forests and environmental interactions.

The purpose of EFFIS is to provide information for the protection of forests against fire in Europe addressing both pre-fire and post-fire conditions. It also centralises the national fire data that the Member States collect through their national forest fire programmes. A web mapping interface has been set up on the EFFIS website<sup>1</sup> which allows users to access EU wide information about forest fires and other related environmental data.

EFFIS monitors 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 daily updated on the EFFIS web site, which can be interactively queried<sup>2</sup>. EFFIS provides daily meteorological fire danger maps and forecasts of fire danger up to 6 days in advance, updated maps of the latest hotspots (active fires) and fire perimeters. The damage caused by forest fires in the European and Mediterranean region is also estimated from the burned area maps of EFFIS.

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) System, allowing a harmonized evaluation 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. Since 2007 the RDA is updated up to two times every 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.

Other EFFIS modules have been developed and are currently in a final validation stage. Such modules are aimed to provide an assessment of atmospheric emissions from forest fires and of the socio-economic impact of forest fires in Europe.

<sup>1</sup> <http://effis.jrc.ec.europa.eu>

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

### 3.1 EFFIS Danger Forecast: 2015 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.

In this chapter the fire danger trends assessed by EFFIS in the different countries during the 2015 fire season are presented, comparing them with previous years.

In 2015 the fire danger was broadly in line with average values through most of the year. There was a spike in fire danger in most countries in the week 6-12 August, where greater than average values were observed, particularly in eastern parts of Europe.

In northern and central parts of Europe, higher than normal values were also seen in spring (April-May).

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

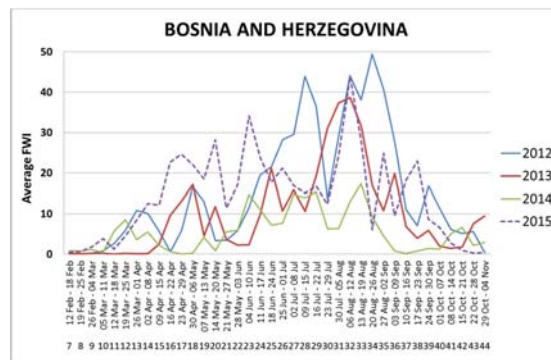
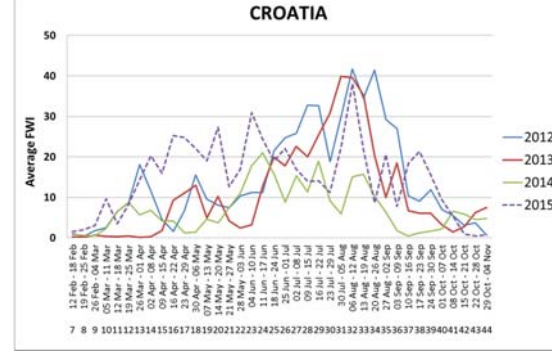
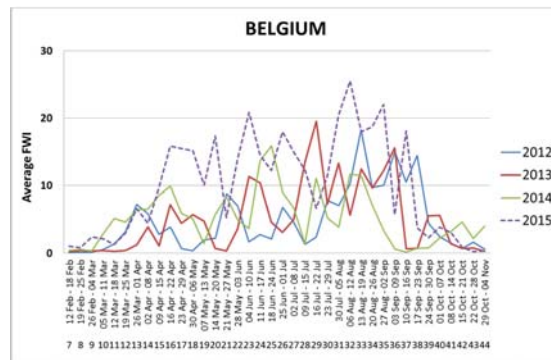
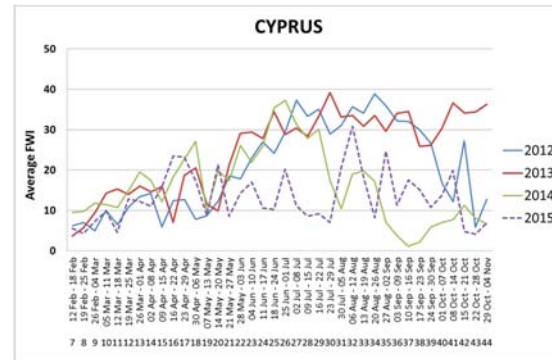
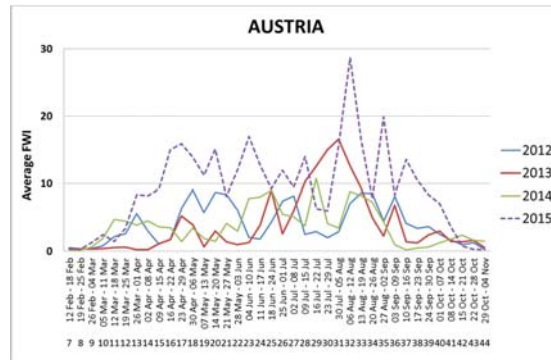
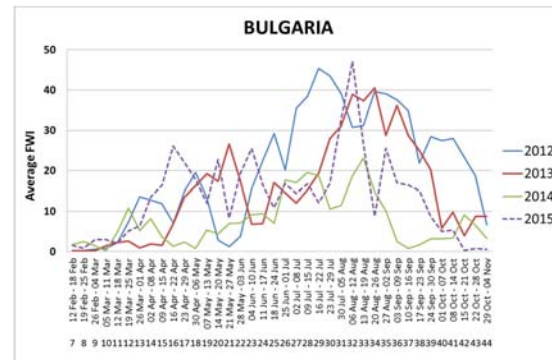
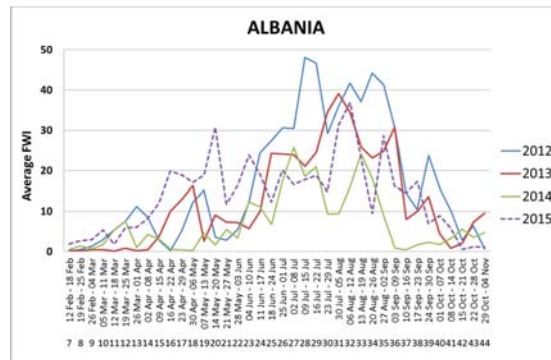
The following figures show fire danger through 2015 as determined by the average FWI values assessed during the fire season in the individual countries.

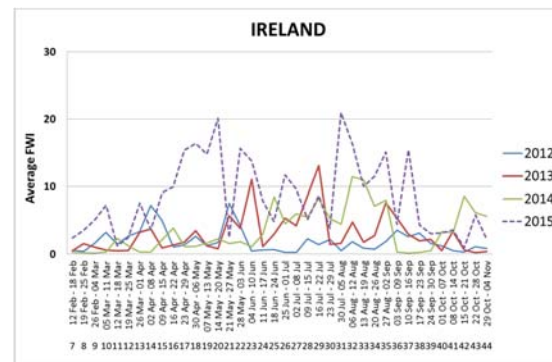
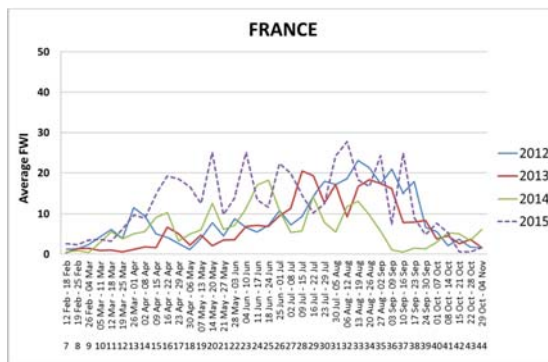
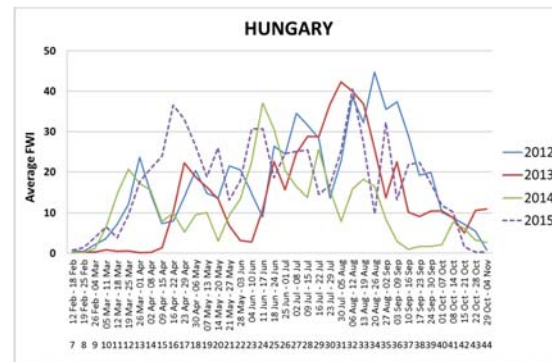
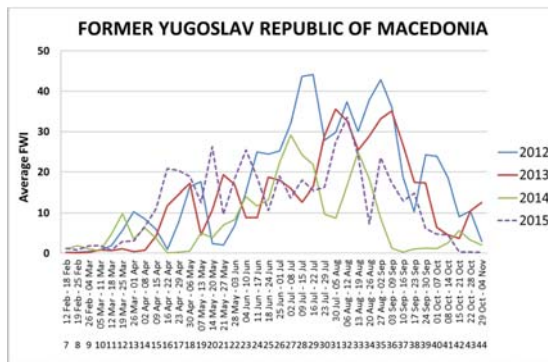
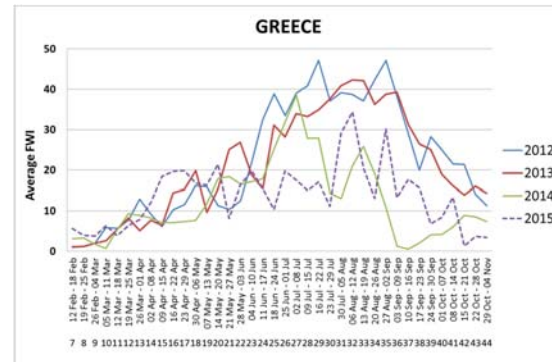
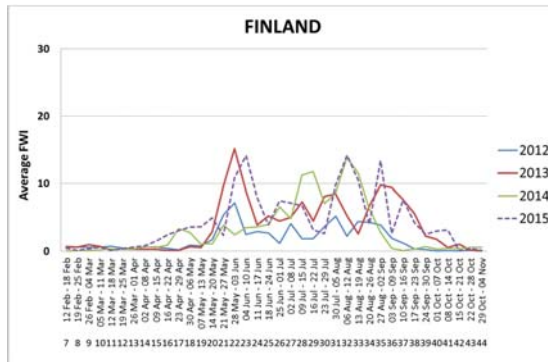
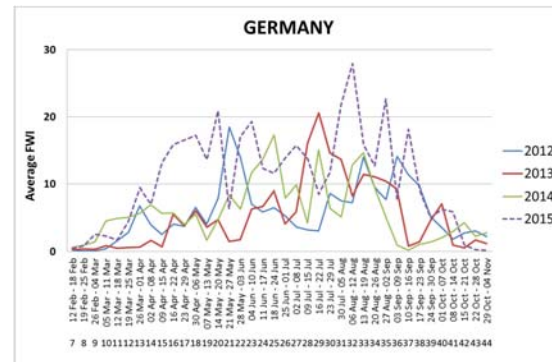
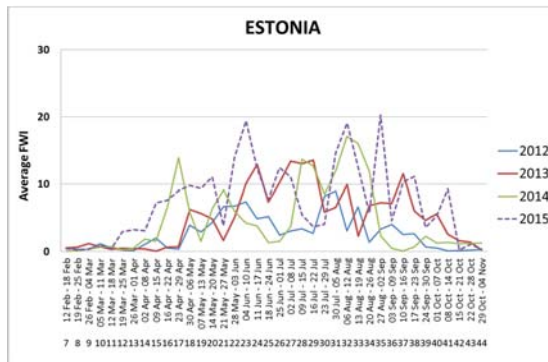
The graphs show the weekly averages of FWI over entire countries; therefore local peaks might have been flattened, especially in those countries such as France or Italy, where there are strong differences in fire danger level with changing latitudes; nevertheless the general trend is depicted providing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

To allow a better comparison with past seasons, the curves of 2013 and 2014 are presented in conjunction with 2015 for all countries.

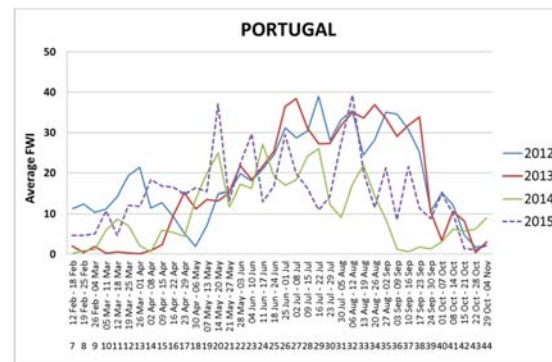
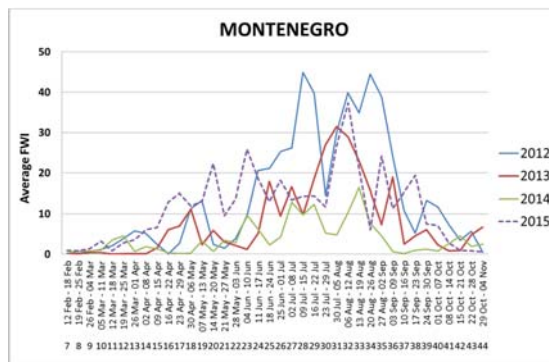
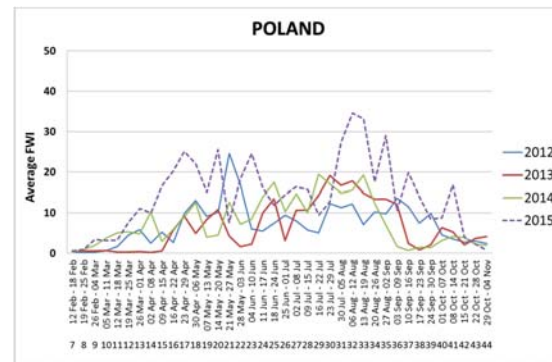
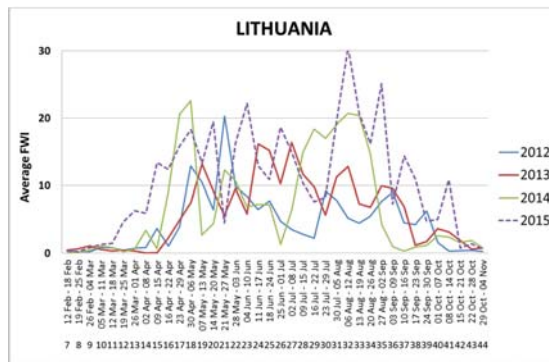
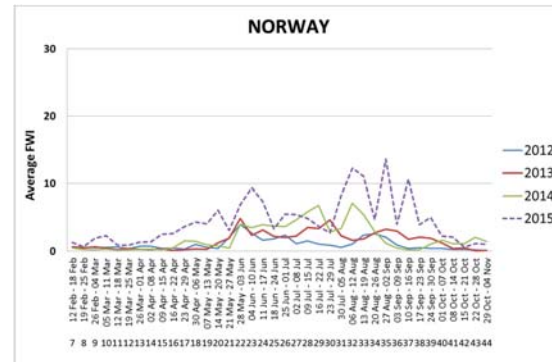
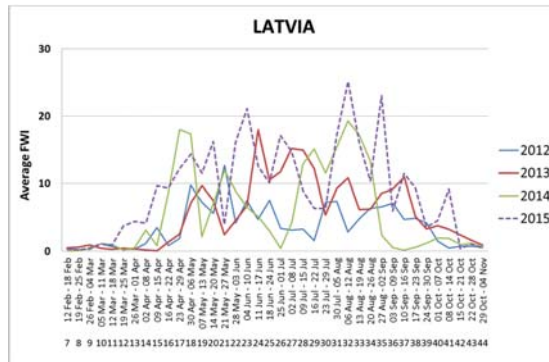
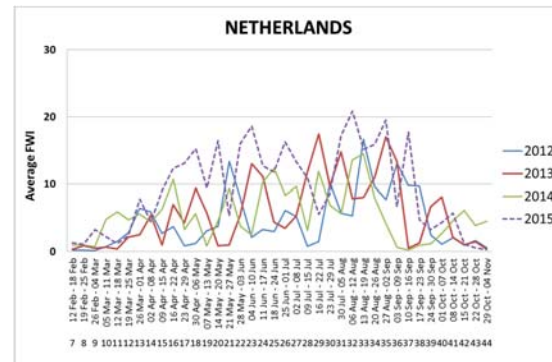
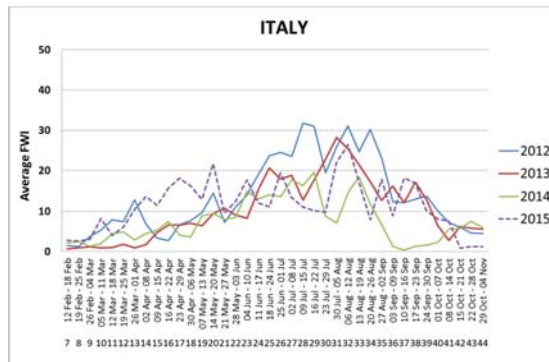
The countries analysed are those participating in the EFFIS network for which data are available, and are presented in alphabetic order within the two groups (European countries and MENA countries) in the graphs that follow.

**NOTE:** In order to make the graphs more readable, 3 scales have been used to present the FWI: 0-30 for the most northern countries where fire danger rarely reaches high levels; 0-50 for most other countries including those in the Mediterranean; and 0-70 for the MENA countries and Turkey.

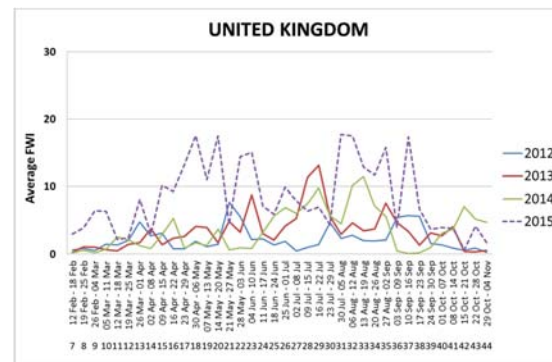
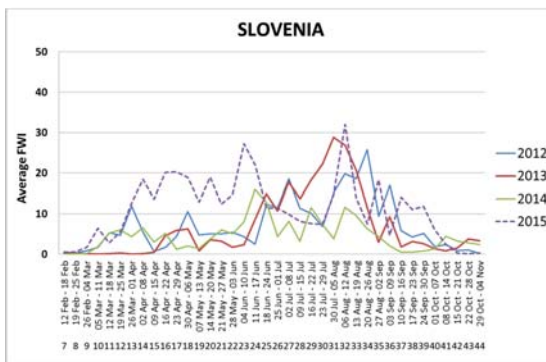
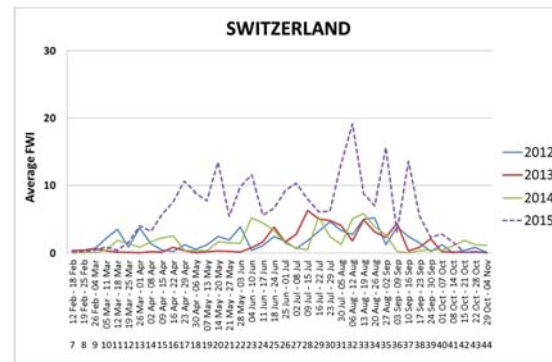
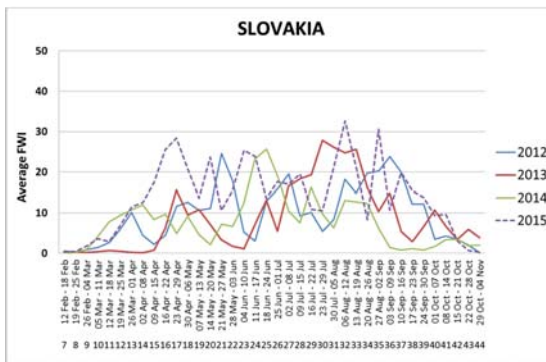
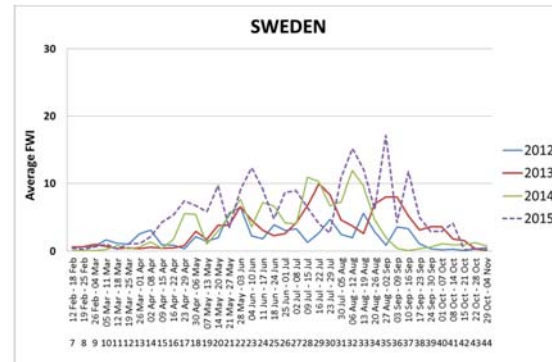
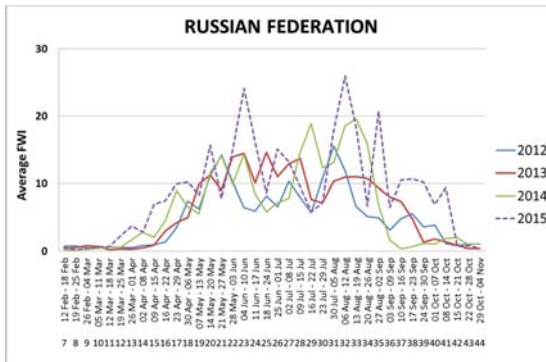
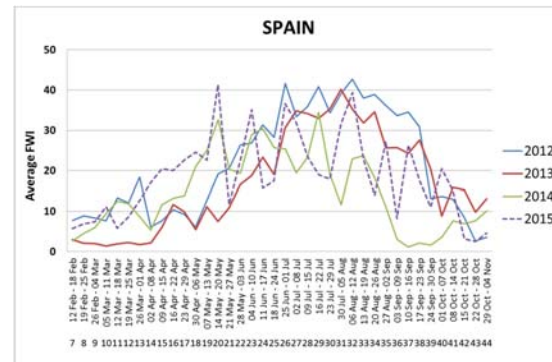
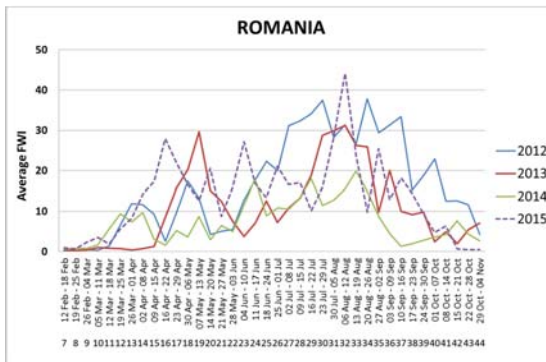


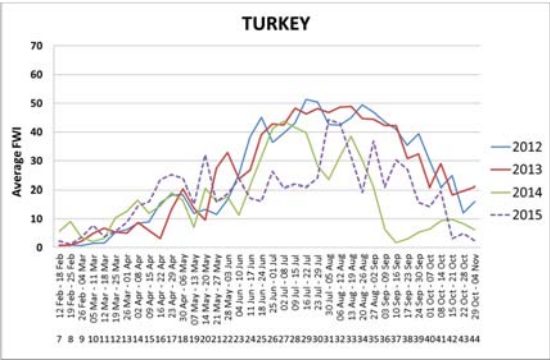




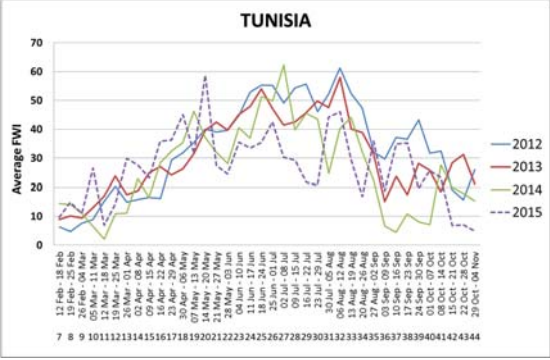
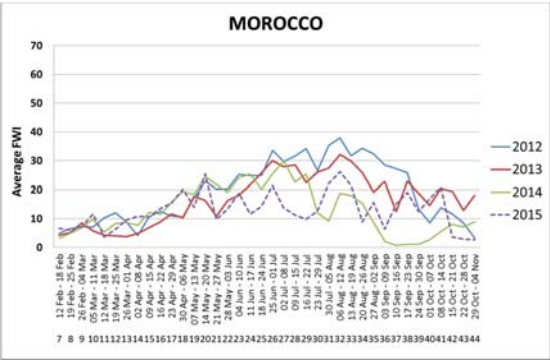
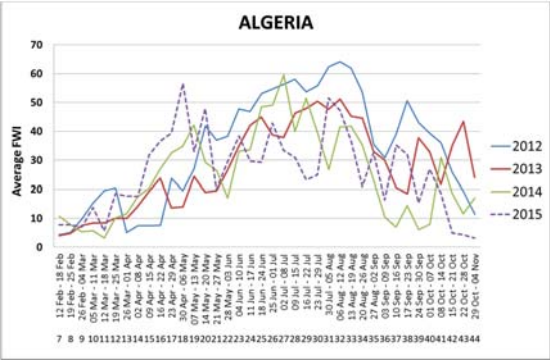








**MENA Countries**



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 111. 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.

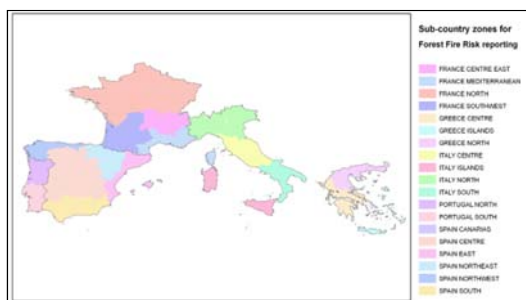


Figure 111. Sub-country regions identified for fire danger trend reporting in the five largest Mediterranean Member States.

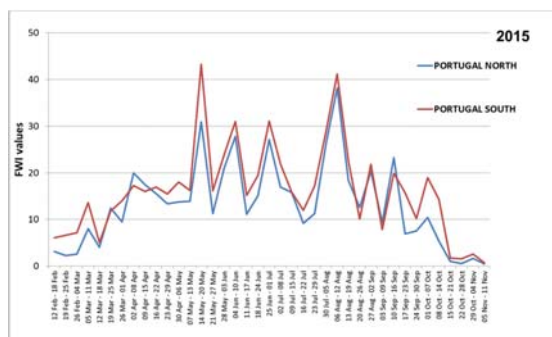


Figure 112. Fire danger trends in 2015 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal.

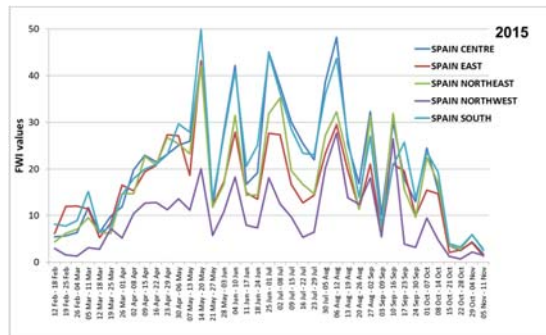


Figure 113. Fire danger trends in 2015 as determined by the Fire Weather Index (FWI) in the regions identified for Spain.

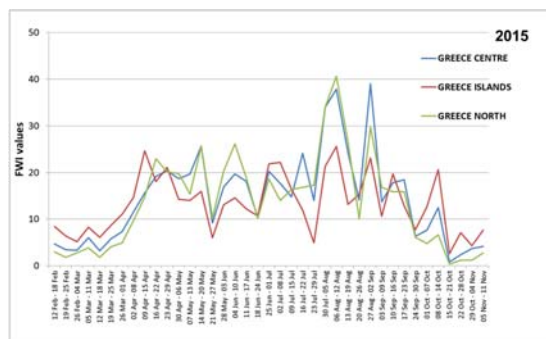


Figure 114. Fire danger trends in 2015 as determined by the Fire Weather Index (FWI) in the regions identified for Greece.

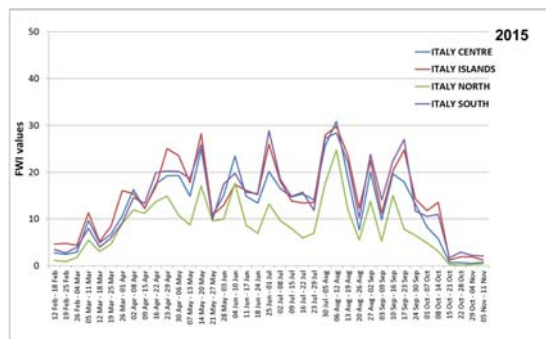


Figure 115. Fire danger trends in 2015 as determined by the Fire Weather Index (FWI) in the regions identified for Italy.

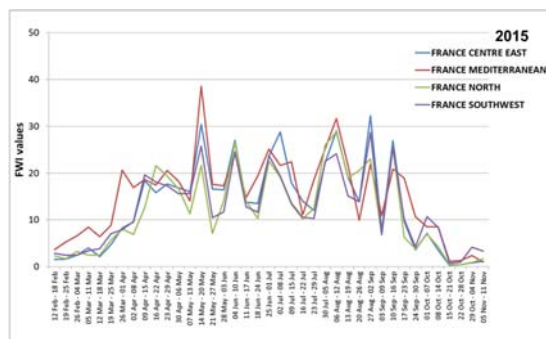


Figure 116. Fire danger trends in 2015 as determined by the Fire Weather Index (FWI) in the regions identified for France.

To facilitate the comparison among the different countries in EU, in the next graphs (Figure 117 to Figure 123), 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 2013 to 2015.

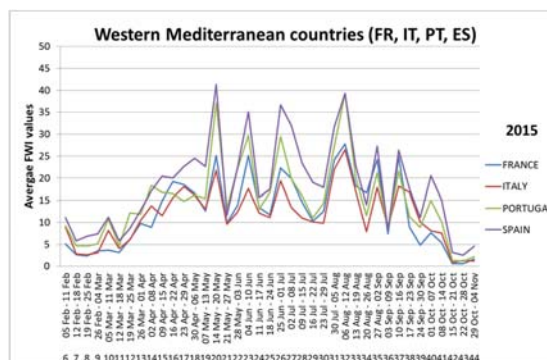
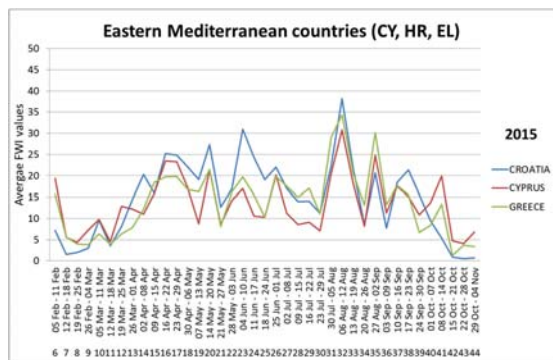
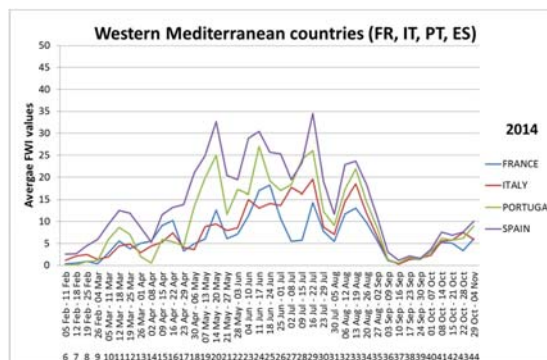
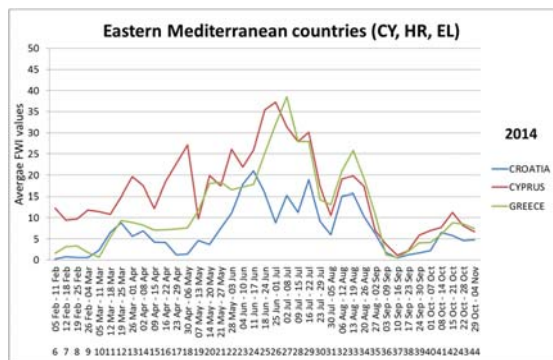
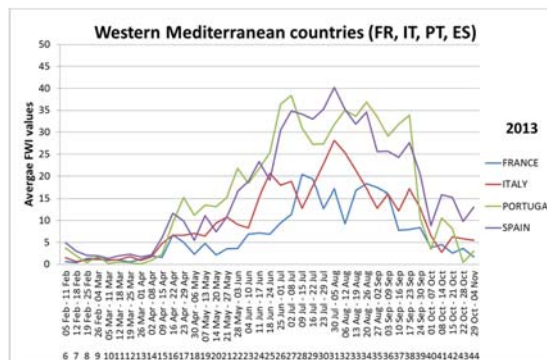
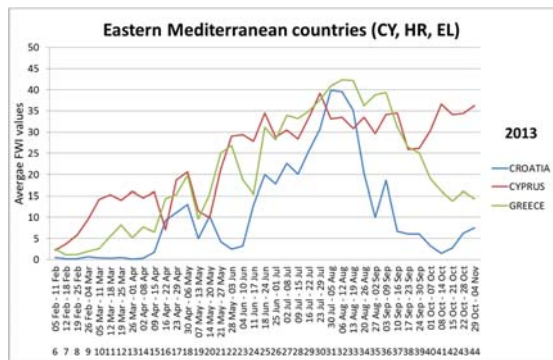


Figure 117. Fire danger trends 2013-2015 in eastern EU Mediterranean countries (CY, HR, GR).

Figure 118. Fire danger trends 2013-2015 in western EU Mediterranean countries (FR, IT, PT, ES).



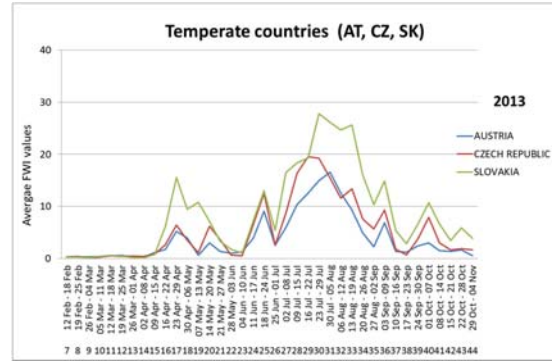
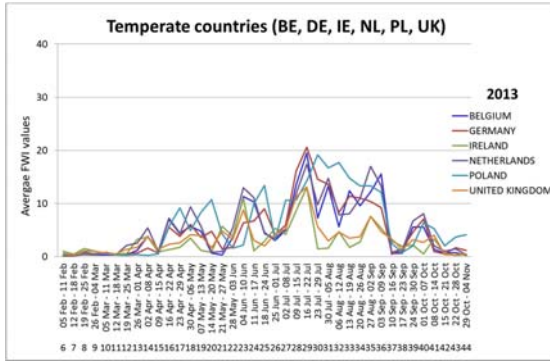


Figure 119. Fire danger trends 2013-2015 in some northern EU temperate countries (BE, DE, IE, NL, PL, UK).

Figure 120. Fire danger trends 2013-2015 in some central EU temperate countries (AT, CZ, SK).



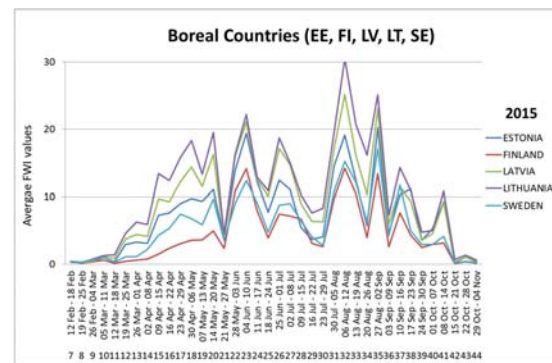
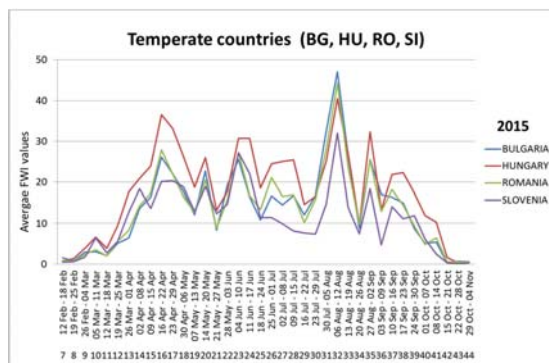
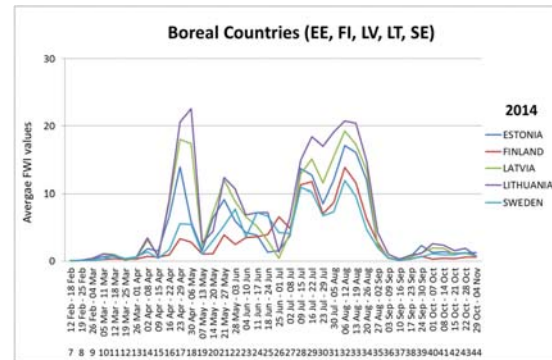
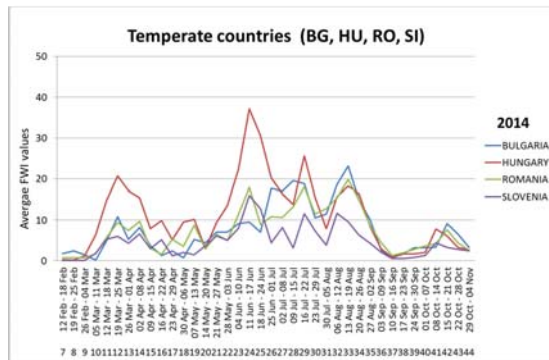
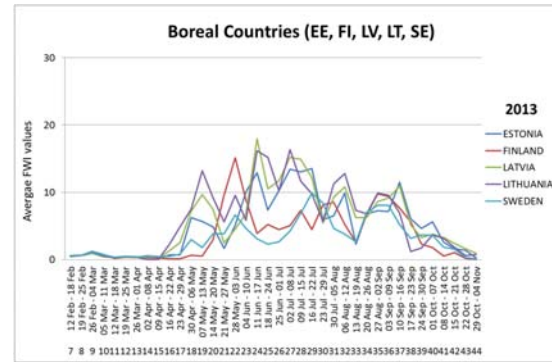
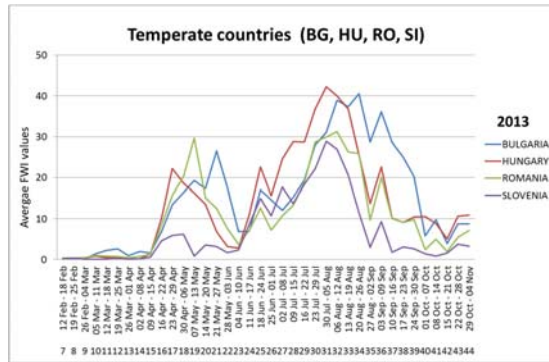


Figure 121. Fire danger trends 2013-2015 in some eastern EU temperate countries (BG, HU, RO, SI).

Figure 122. Fire danger trends 2013-2015 in some EU boreal countries (EE, FI, LV, LT, SE).

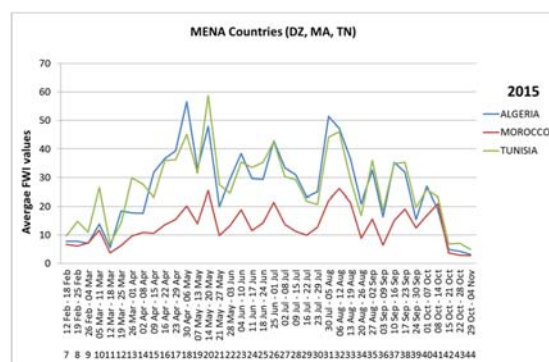
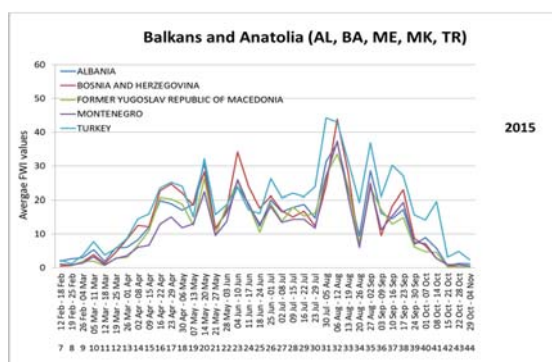
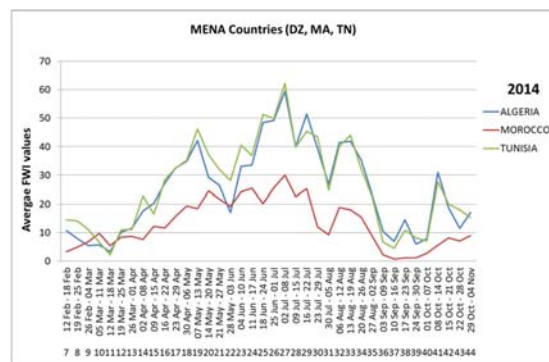
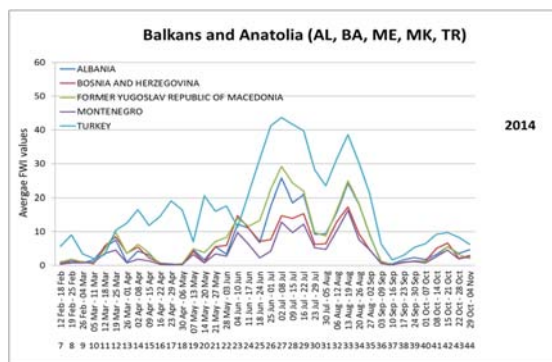
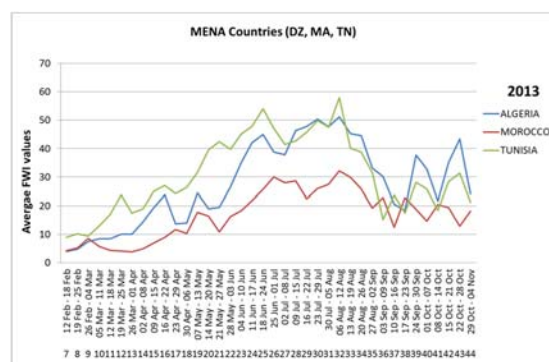
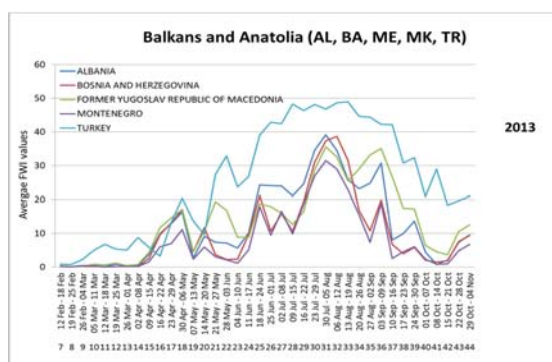


Figure 123. Fire danger trends 2013-2015 in the Balkans and Anatolia (AL, BA, ME, MK, TR).

Figure 124. Fire danger trends 2013-2015 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.

### 3.2 EFFIS Rapid Damage Assessment: 2015 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 2015 fires of greater than 30 ha were observed in 32 countries. The area affected was over twice that burnt in 2014, and similar to the amounts recorded in 2013. The country most affected was Syria, accounting for around one quarter of the total burnt area, while Spain was the most affected European country with 16% of the total. The greatest number of fires (177) were recorded in Portugal (nearly one fifth of the total).

The total area burned in 2015 by fires larger than 30 ha, as shown by the analysis of satellite imagery, was 398 325 ha (Table 40). These figures may also include agricultural and urban areas that were burned during the forest fires.

Table 40. Areas burned by fires of at least 30 ha in 2015 estimated from satellite imagery.

<i>Country</i>	<i>Area (Ha)</i>	<i>Number of Fires</i>
Albania	3777.61	19
Algeria	37086.65	105
Belgium	108.74	2
Bosnia & Herzegovina	15031.12	27
Bulgaria	3284.98	8
Croatia	7867.72	17
Cyprus	196.98	2
France	2097.53	17
Germany	104.38	2
Greece	10826.4	26
Hungary	1609.88	2
Ireland	6803.5	27
Israel	3838.09	6
Italy	7824.34	65
Kosovo under UNSCR 1244	386.05	4
Lebanon	140.16	2
Montenegro	13532.52	44
Morocco	566.06	6
Norway	142.27	1
Palestinian Territory	1532.73	2
Poland	560.03	2
Portugal	47472.45	177
Romania	7319.49	15
Serbia	1011.18	5
Spain	63638.89	113
Sweden	146.72	3
Syria	93288.84	94
The former Yugoslav Republic of Macedonia	4722.98	15
The Netherlands	21.92	1
Tunisia	6187.18	21
Turkey	55070.35	88
United Kingdom	2127.6	4
<b>TOTAL</b>	<b>398325</b>	<b>922</b>

Figure 126 below shows the scars caused by forest fires during the 2015 season.

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 125.

The total burnt in protected areas in 2015 was 43 743 ha, an increase of around 50% over

2014. The country most affected was Spain, accounting for a quarter of the total.

Summary	Total Area (Ha)
<b>EU28</b>	<b>162011.6</b>
<b>Other European countries</b>	<b>93674.1</b>
<b>Middle East and North Africa</b>	<b>142639.7</b>
<b>Natura2000 and protected sites</b>	<b>44408.75</b>

Country	Area (Ha)	% of Natura2000 Area	Number of Fires
Belgium	100.73	0.026	2
Bulgaria	3037.04	0.081	7
Cyprus	38.37	0.024	1
France	437.29	0.006	6
Germany	104.38	0.002	2
Greece	2050.66	0.057	6
Hungary	1609.88	0.081	2
Ireland	4598.28	0.505	20
Italy	2990.24	0.052	29
Poland	560.03	0.009	2
Portugal	9483.74	0.496	57
Romania	7078.4	0.166	14
Spain	10940.51	0.08	47
Sweden	2.98	0	1
The Netherlands	21.92	0.004	1
United Kingdom	688.58	0.039	1
<b>EU28 total</b>	<b>43743.03</b>		<b>198</b>
Algeria	556.23	0.334	5
Morocco	109.49	0.014	1
<b>Other total</b>	<b>665.72</b>		<b>6</b>
<b>TOTAL</b>	<b>44408.75</b>		<b>204</b>

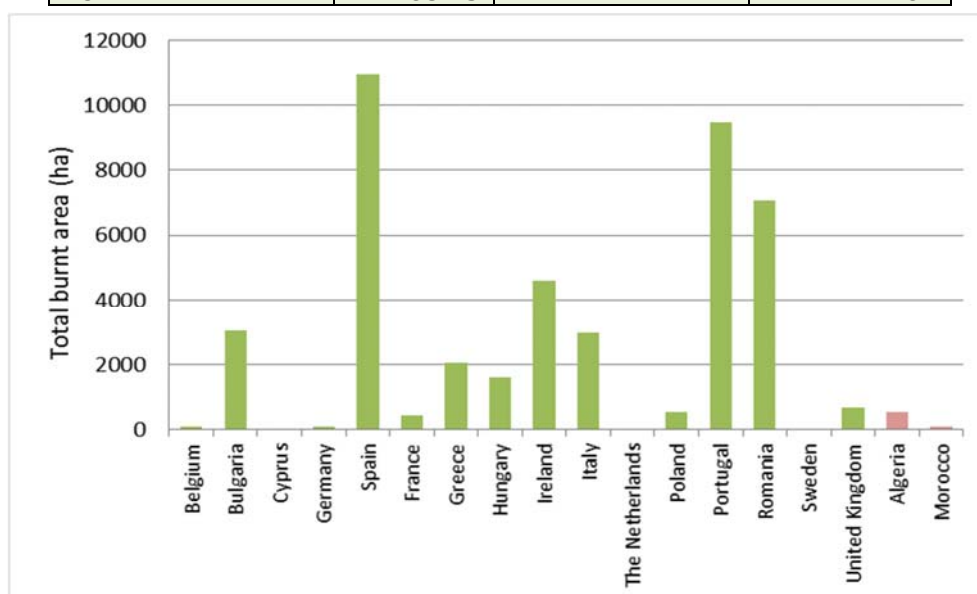


Figure 125. Burnt area in Natura2000 sites and other protected areas in 2015.



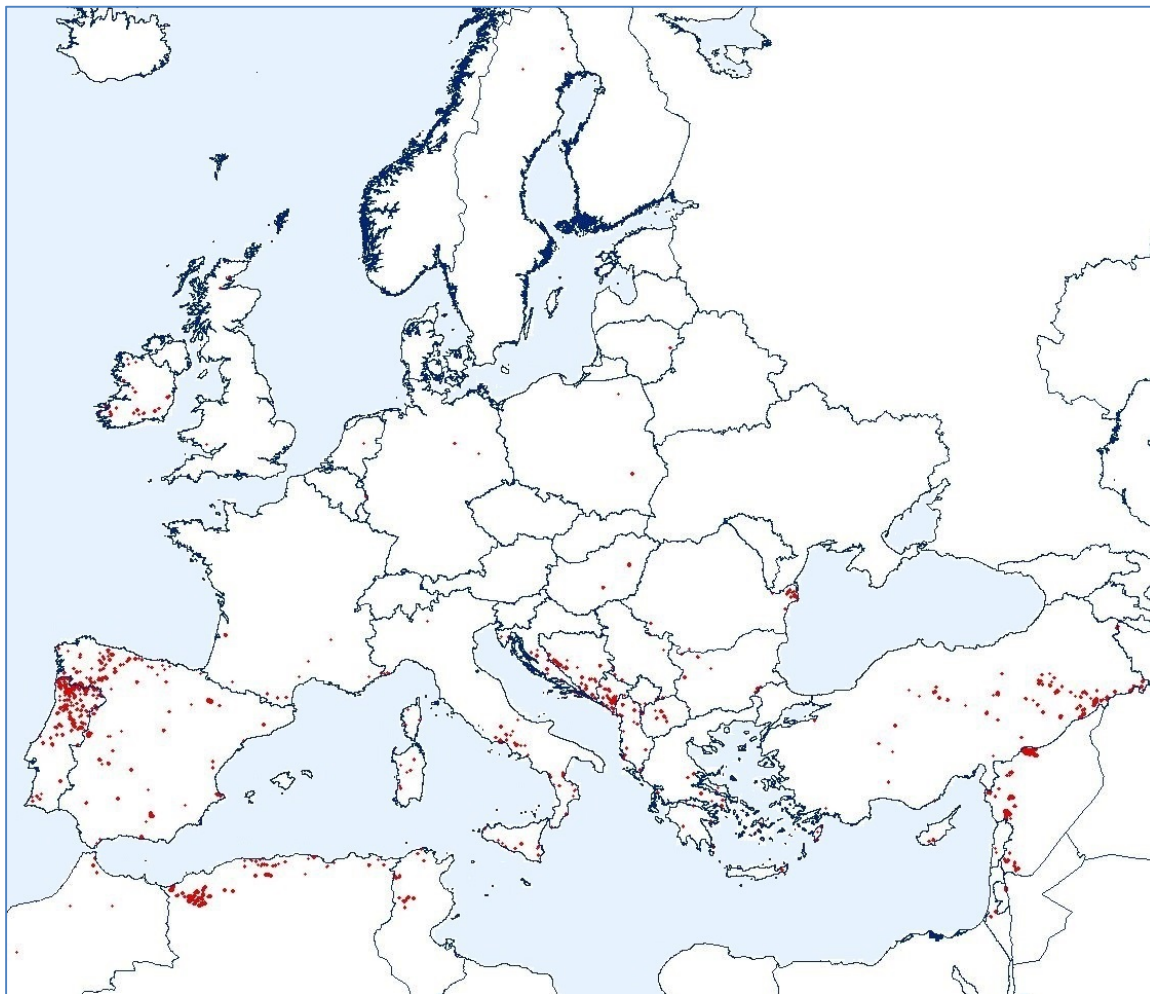


Figure 126. Burnt scars produced by forest fires during the 2015 fire season.

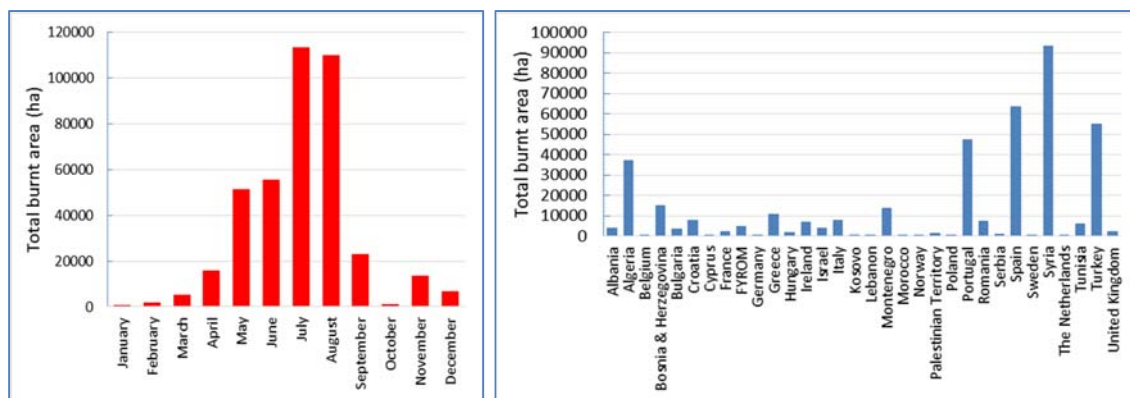


Figure 127. Total burnt area of fires >30 ha by month and by country in 2015

In 2015, 16 of the EU28 countries were affected by fires of over 30 ha: (Belgium, Bulgaria, Cyprus, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Spain, Sweden, United Kingdom), burning a total of 162 011 ha (around twice the amount that was recorded in 2014, but below the long-term average). Of this total, 44 409 ha (27%) were on Natura2000 sites.



### 3.3 European countries

After an unusually light year in 2014, the total burnt area recorded in 2015 was very close to the long term average. However, the year was notable for the unusually large burnt area recorded outside the traditional peak months of July and August: one quarter of the annual total was recorded during May-June (average is around 7.5%) and over 5% was recorded in November and December (average is less than 0.5%). Over 80% of the early season burnt area occurred outside Europe (in Syria), while the bulk of the late-season fires were recorded in the Balkan states. Spain also experienced a number of December fires.

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

#### 3.3.1 Albania

Albania had a light year for fires: the total was well below the long-term average, although more burnt area was recorded than in the past 2 years. Between July and November 19 fires of over 30 ha burnt a total of 3 778 ha, including one fire in Surroj that covered 754 ha. The burnt area scars left by the 2015 fires in Albania can be seen in Figure 128 below.

Table 41. Distribution of burnt area (ha) in Albania by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	2638.79	69.85
Other Natural Land	1075.46	28.47
Agriculture	63.37	1.68
<b>Total:</b>	<b>3777.61</b>	<b>100</b>

#### 3.3.2 Belgium

In Belgium, 2 fires covering 109 ha were recorded in April. 101 ha of this was in Natura2000 areas, corresponding to 93% of the total area burned, and 0.03% of the total Natura2000 areas in the country.

Table 42. Distribution of burnt area (ha) in Belgium by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Other Natural Land	107.87	99.19
Agriculture	0.88	0.81
<b>Total:</b>	<b>108.74</b>	<b>100</b>

#### 3.3.3 Bosnia-Herzegovina

In Bosnia-Herzegovina over three times as much land was burnt as was recorded in 2013 or 2014, although the total was still significantly below the long-term average. The season was long, and 27 fires of over

30 ha were recorded throughout the season from March to December, with one third of the total annual damage actually occurring in December. There were 5 fires over 500 ha, including one of 4408 ha in Livno. Table 43 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 43. Distribution of burnt area (ha) in Bosnia-Herzegovina by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	4700.13	31.27
Other Natural Land	8331.89	55.43
Agriculture	1999.1	13.3
<b>Total:</b>	<b>15031.12</b>	<b>100</b>

#### 3.3.4 Bulgaria

There were 8 fires of over 30 ha in Bulgaria during July and August, resulting in a total burnt area of 3285 ha. Much of this damage resulted from 2 very large fires, including one of 1 715 ha in Rayanovtsi, Sofia which is clearly visible in Figure 128 below. Of the annual total, 3 037 ha occurred on Natura2000 sites, amounting to 92% of the total and 0.081% of Natura2000 land.

Table 44. Distribution of burnt area (ha) in Bulgaria by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	698.51	21.26
Other Natural Land	1732.42	52.74
Agriculture	842.25	25.64
Artificial Surfaces	0.12	0
Other Land Cover	11.69	0.36
<b>Total:</b>	<b>3284.98</b>	<b>100</b>

#### 3.3.5 Croatia

17 fires of over 30 ha were recorded in Croatia burning a total of 7868 ha over the period February to December, although two-thirds of the damage occurred in July. The annual recorded burnt area was significantly higher than the previous two years, but still well below the peaks of 2011 and 2012. Three of the fires were over 1 000 ha and can be seen in Figure 128 below. Table 45 presents the distribution of the mapped burnt area by land cover type.

Table 45. Distribution of burnt area (ha) in Croatia by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	3479.36	44.22
Other Natural Land	2294.49	29.16
Agriculture	2049.29	26.05
Artificial Surfaces	44.57	0.57
Other Land Cover	0	0
<b>Total:</b>	<b>7867.72</b>	<b>100</b>



Figure 128. Satellite image showing impact of forest fires across the Balkans in 2015.

### 3.3.6 Cyprus

Cyprus had a very light year in 2015: the lowest for several years. Only two fires of over 30 ha were recorded: one in June and the other in July, which burnt a total of 197 ha. 38 ha of Natura2000 sites were burnt, corresponding to 19% of the total area burned, and 0.02% of the total Natura2000 area in the country. Table 46 presents the distribution of the mapped burned area by land cover type.

Table 46. Distribution of burnt area (ha) in Cyprus by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	108.87	55.27
Agricultural Areas	88.12	44.73
<b>Total:</b>	<b>196.98</b>	<b>100</b>

### 3.3.7 The former Yugoslav Republic of Macedonia

The 2015 fire season was a relatively quiet one. The season started in July, and 15 fires burnt a total of 4 723 ha. Half of the burnt area occurred in September, but there was also significant activity in November. Much of the annual damage came from four fires of over 500 ha in size (largest one was 1 384 ha). Visible Table 47 presents the distribution of the mapped burned area by land cover type.

Table 47. Distribution of burnt area (ha) in FYROM by land cover types in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	1692.42	35.83
Other Natural Land	2061.86	43.66
Agricultural Areas	968.7	20.51
<b>Total:</b>	<b>4722.98</b>	<b>100</b>



### 3.3.8 France

In France, 17 fires of more than 30 ha were recorded throughout the year, resulting in a total burnt area of 2 098 ha, less than half that recorded in 2014. Of this total, 437 ha were on Natura2000 sites, corresponding to 20.8% of the total area burned, and 0.006% of the total Natura2000 areas in the country. Table 48 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 Corsica are shown in Figure 129.

Table 48. Distribution of burnt area (ha) in France by land cover types in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	1185.36	56.51
Other Natural Land	509.14	24.27
Agriculture	375.57	17.91
Artificial Surfaces	27.46	1.31
<b>Total:</b>	<b>2097.53</b>	<b>100</b>



Figure 129. Impact of forest fires in southern France and Corsica in 2015.

### 3.3.9 Germany

There were two fires of over 30 ha in Germany in 2015; one in June and the other in July. The area covered was 100% in Natura2000 sites, and affected solely Forest and Other Wooded Land. The area burnt amounts to 0.002% of the Natura2000 area in the country.

#### 3.3.10 Greece

Greece had a very light season for fires: the lowest since 2010. There were only 26 fires of over 30 ha, burning a total of 10 826 ha between June and September. More than half of the damage occurred in July, including one very large fire that burnt 4 093 ha in Lakonia. Of the total burnt area in 2015, 2 051 ha were on Natura2000 sites, corresponding to 18.9%

of the total area burned and to 0.057% of the Natura2000 areas in the country. Table 49 presents the distribution of the mapped burnt area by land cover type. Figure 130 shows the damage caused by forest fires in Greece.

Table 49. Distribution of burnt area (ha) in Greece by land cover types in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	6097.57	56.32
Other Natural Land	1094.07	10.11
Agriculture	3557.59	32.86
Artificial Surfaces	77.17	0.71
<b>Total:</b>	<b>10826.4</b>	<b>100</b>



Figure 130. Burnt area scars in Greece in 2015.

### 3.3.11 Hungary

There were two large fires in Hungary in July and August 2015, burning a total of 1 610 ha, all in Natura2000 sites, corresponding to 0.081% of the Natura2000 land in the country. The largest one (August) burnt 1 398 ha in Hajdu-Bihar. The distribution of burnt area according to the different land cover types is shown in Table 50.

Table 50. Distribution of burnt area (ha) in Hungary by land cover types in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	184.32	11.45
Other Natural Land	1329.88	82.61
Agriculture	95.61	5.94
Other Land Cover	0.07	0
<b>Total:</b>	<b>1609.88</b>	<b>100</b>

### 3.3.12 Ireland

The fire season was early in Ireland, and all but one of the 27 large fires of the year were recorded in April. The south-west of the country was particularly affected, and one fire of 1 342 ha and two others over 600 ha were recorded in this region (Figure 131). 4 598 ha of the total occurred in Natura2000 sites, corresponding to 67.6% of the total and 0.5% of the total Natura2000 land in the country. The most affected land type was Other Natural Land, as shown in Table 64.

Table 51. Distribution of burnt area (ha) in Ireland by land cover types in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	367.71	5.4
Other Natural Land	6297.93	92.57
Agriculture	132.49	1.95
Other Land Cover	5.37	0.08
<b>Total:</b>	<b>6803.5</b>	<b>100</b>



Figure 131. Burnt area scars in Ireland in 2015.

### 3.3.13 Italy

For Italy the 2015 fire season resulted in the lowest total recorded burnt area for over a decade. 65 fires of over 30 ha burnt a total of 7 824 ha. Fires were recorded from March to September, although the majority of the damage occurred in July-August. There was only one fire over 500 ha during the year: in Olbia-Tempio region in Sardinia. Of the year's total, 2 990 ha of damage occurred on Natura2000 sites, corresponding to 38% of the total area burned, and 0.052% of the total Natura2000 area in the country. Table 64 presents the distribution of the mapped burnt area by land cover type. Figure 132 shows the distribution of the major forest fires occurring in 2015.

Table 52. Distribution of burnt area (ha) in Italy by land cover types in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	3593.89	45.93
Other Natural Land	2584.09	33.03
Agriculture	1635.86	20.91
Artificial Surfaces	10.22	0.13
<b>Total:</b>	<b>7824.07</b>	<b>100</b>

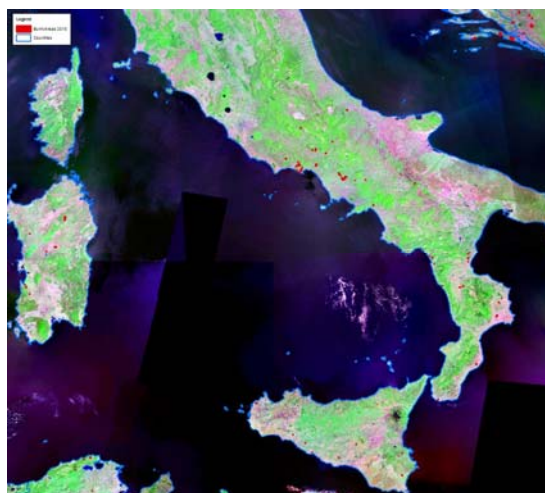


Figure 132. Impact of forest fires in southern Italy, Sicily and Sardinia in 2015.

### 3.3.14 Kosovo under UNSCR 1244

The fire season was late in Kosovo. In 2015 4 fires of over 30 ha occurred between August and November, burning a total of 386 ha. Table 56 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 53. Distribution of burnt area (ha) in Kosovo by land cover types in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	258.1	66.86
Other Natural Land	127.94	33.14
<b>Total:</b>	<b>386.05</b>	<b>100</b>

### 3.3.15 Montenegro

The 2015 fire season was long In Montenegro, and 44 fires of over 30 ha were recorded between February and December. Most of the damage was in July and August, but significant fires also occurred in November. A number of the fires of 2015 were very large: 7 were over 500 ha, and the largest was just over 2000 ha. The scars from these fires can be seen in Figure 128 above and Table 54 shows the classification of the burnt area by land type.

Table 54. Distribution of burnt area (ha) in Montenegro by land cover types in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	7388.16	54.6
Other Natural Land	5386.16	39.8
Agriculture	754.95	5.58
Artificial Surfaces	3.23	0.02
<b>Total:</b>	<b>13532.5</b>	<b>100</b>

### 3.3.16 The Netherlands

In 2015 one fire was recorded that burnt 21.92 ha of Natura2000 land in April. The land type burnt was Other Natural Land.

### 3.3.17 Norway

In Norway a single fire of 142 ha was recorded in May. The fire occurred on Other Natural Land, but no Natura2000 sites were affected.

### 3.3.18 Poland

There were 2 fires of over 30 ha in Poland in 2015; one in March and a second, larger one in April. Both of these fires occurred entirely on Natura2000 sites, amounting to 0.009% of the Natura2000 land in the country. Table 55 shows the classification of the burnt area by land type.

Table 55. Distribution of burnt area (ha) in Poland by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	432.09	77.15
Other Natural Land	127.95	22.85
<b>Total:</b>	<b>560.03</b>	<b>100</b>

### 3.3.19 Portugal

Although Portugal was the country with by far the greatest number of large fires recorded in 2015, this did not translate into a correspondingly large burnt area. 177 fires resulted in a total burnt area of 47 472 ha, less than the amount recorded in Spain, Turkey or Syria, and less than Portugal's long term average. Fires were recorded in every month from January to October, but more than half of the total burnt area occurred in August. 21 fires were over 500 ha in size, the largest of which was in Aguas Belas (Beira Interior Norte region) and which covered 5 539 ha. Of the total burnt area mapped in 2015, 9 484 ha occurred on Natura2000 sites, corresponding to 20 % of the total area burnt, and 0.496 % of the total Natura2000 areas in Portugal. The distribution of the mapped burnt area by land cover type is shown in Table 56. The mapped burnt areas can be seen in Figure 133.

Table 56. Distribution of burnt area (ha) in Portugal by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	24900.52	52.45
Other Natural Land	16775.48	35.34
Agriculture	5637.58	11.88
Artificial Surfaces	158.71	0.33
<b>Total:</b>	<b>47472.29</b>	<b>100</b>



Figure 133. Burnt areas scars in Portugal in 2015.



### 3.3.20 Romania

The amount of damage recorded in Romania in 2015 was significantly higher than in the last few years. 15 fires burnt a total of 7 319 ha, the bulk of which was the result of a single fire in the Danube delta in Tulcea province in November, when over 5 000 ha burned (Figure 134). Almost all (97%) of the mapped burnt area was on Natura2000 sites, representing 0.166% of the total Natura2000 area of Romania. Table 56 presents the distribution of the mapped burnt area by land cover type.

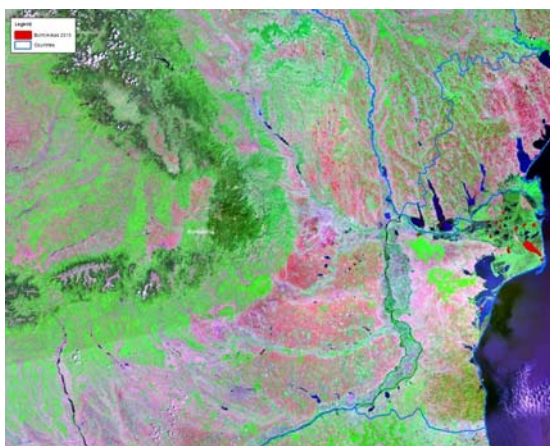


Figure 134. Fire scars in Romania in 2015.

Table 57. Distribution of burnt area (ha) in Romania by land cover types in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Other Natural Land	164.31	2.24
Other land cover	6968.58	95.21
Agriculture	183.34	2.5
Other Land Cover	3.26	0.04
<b>Total:</b>	<b>7319.49</b>	<b>100</b>

### 3.3.21 Serbia

In Serbia, 5 fires resulted in 1 011 ha of damage. Most of the burnt area was recorded in August, although there were also large fires in April and September. Table 58 shows the breakdown of burnt area by land cover type. Figure 128 above show the location of these fires.

Table 58. Distribution of burnt area (ha) in Serbia by land cover type in 2015.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest/Other Wooded Land	596.02	58.94
Other Natural Land	329.62	32.6
Agriculture	85.55	8.46
<b>Total:</b>	<b>1011.18</b>	<b>100</b>

### 3.3.22 Spain

Spain was the European country most affected by fire in 2015 in terms of burnt area although the total mapped burnt area was lower than the long term average. In total, 113 fires of over 30 ha were recorded throughout the year from January to December, nearly two-thirds of the damage occurring in July. The largest fire of the year was recorded in Spain, when a fire of 14 615 ha occurred in Biota (Zaragoza region) in July. Eight other fires of more than 1 000 ha were also mapped during the season. Of the 63 639 ha burnt in 2015, 10 940 ha were on Natura2000 sites, corresponding to 17% of the total area burned, and 0.08% of the Natura2000 areas in Spain. Table 59 presents the distribution of the mapped burnt area by land cover type. The most noticeable fires in Spain during 2015 are shown in Figure 135.



Figure 135. Impact of forest fires in Spain and Portugal in 2015

Table 59. Distribution of burnt area (ha) in Spain by land cover type in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	34242.45	53.81
Other Natural Land	9787.25	15.38
Agriculture	19495.19	30.63
Artificial Surfaces	99.48	0.16
Other Land Cover	14.51	0.02
<b>Total:</b>	<b>63638.89</b>	<b>100</b>

### 3.3.23 Sweden

The fire season in Sweden reverted to a more typical level after the exceptionally bad year in 2014. Three fires were mapped, all in August, burning a total of 147 ha. Only 3 ha of this occurred on Natura2000 land. Table 60 shows the breakdown of the burnt area with respect to different land cover types.

Table 60. Distribution of burnt area (ha) in Sweden by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	141.97	96.76
Other Natural Land	2.37	1.61
Other Land Cover	2.38	1.62
<b>Total:</b>	<b>146.72</b>	<b>100</b>

### 3.3.24 Turkey

The fire season in Turkey was by some margin the worst one in a decade. A greater burnt area was mapped than had been recorded over the previous 6 years combined. Most of the damage occurred between July and September (half of it in August alone). 88 large fires caused a total of 55 070 ha of damage. 17 of these fires were over 1000 ha and a further 16 were larger than 500 ha. Table 61 presents the distribution of the mapped burned area by land cover type. The visible scars from forest fires in the country are shown in Figure 136.

Table 61. Distribution of burnt area (ha) in Turkey by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	16107.23	29.25
Other Natural Land	26147.14	47.48
Agriculture	12762.58	23.18
Artificial Surfaces	53.4	0.1
<b>Total:</b>	<b>55070.35</b>	<b>100</b>



Figure 136. Impact of forest fires in Turkey in 2015.

### 3.3.25 United Kingdom

In the UK 4 fires burnt a total of 2 127 ha, all in April. Two fires in northern Scotland between them account for most of this total (shown in Figure 137). Of the total, 689 ha occurred on Natura2000 land, amounting to 32% of the total and 0.04% of the Natura2000 land in the UK. Table 62 presents the distribution of the mapped burnt area by land cover type.

Table 62. Distribution of burnt area (ha) in the UK by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	68.03	3.2
Other Natural Land	2024.08	95.13
Agriculture	30.07	1.41
Artificial Surfaces	4.85	0.23
Other Land Cover	0.57	0.03
<b>Total:</b>	<b>2127.6</b>	<b>100</b>

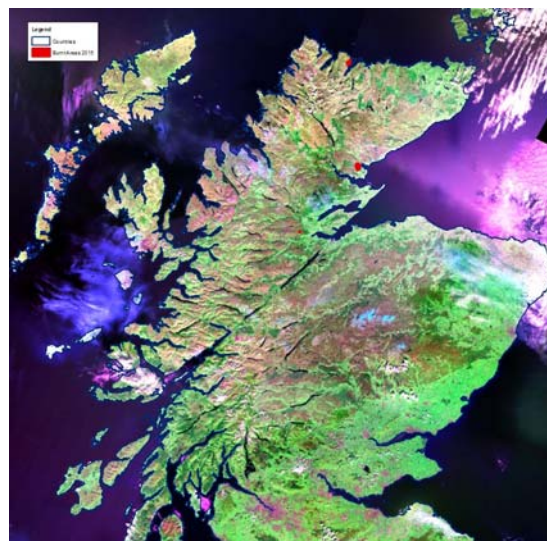


Figure 137. Fire scars in Scotland in 2015.

### 3.4 Middle East and North Africa

The 2015 fire season in North Africa and the Middle East was slightly worse than the 5-year average. Over the region, two countries account for over 90% of the total burnt area. Two-thirds of the total damage recorded was sustained by Syria, and a quarter by Algeria.

#### 3.4.1 Algeria

The 2015 fire season was a relatively quiet one for Algeria, and resulted in a total burnt area only 60% of that recorded in 2014 and well below the 5-year average (81 000 ha; see Figure 141). In 2015, 105 fires of over 30 ha burnt a total of 37 087 ha. Practically all of the damage occurred in July and August.

There were 21 fires of over 500 ha in size, the largest of which occurred in Sidi-Bel-Abbes region and covered 3265 ha. Five fires occurred in Protected Areas, totalling 556 ha and representing around 1.5% of the total burnt area. The burnt scars left by these fires can be seen in Figure 138. 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 63.

Table 63. Distribution of burnt area (ha) in Algeria by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	9125.29	24.61
Other Natural Land	7358.97	19.84
Agriculture	20602.39	55.55
<b>Total:</b>	<b>37086.65</b>	<b>100</b>

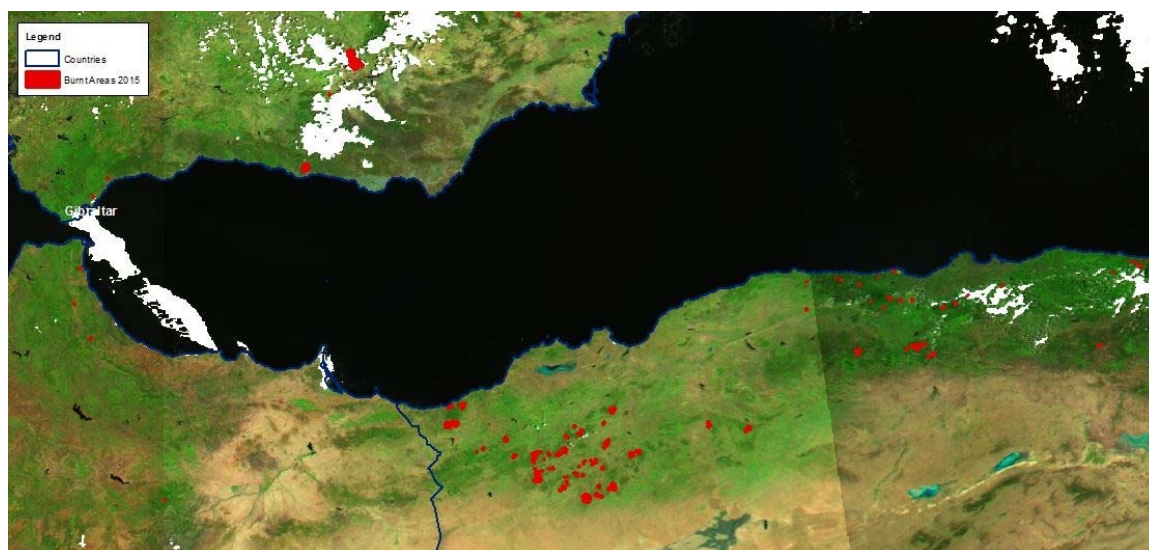


Figure 138: Impact of forest fires in Algeria in 2015

#### 3.4.2 Israel

Six fires in Israel during May and June resulted in a burnt area of 3 838 ha, the highest total for a number of years. The province of HaDarom was particularly affected: two fires covering 1733 and 685 ha were recorded in this region. Table 64 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 64. Distribution of burnt area (ha) in Israel by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	192.84	5.02
Other Natural Land	1073.09	27.96
Agriculture	2572.17	67.02
<b>Total:</b>	<b>3838.09</b>	<b>100</b>

#### 3.4.3 Lebanon

In Lebanon, 2 fires in August burnt 140 ha. The distribution of burnt area by land cover types, using the Globcover land cover map harmonised with CLC, is given in Table 65.

Table 65. Distribution of burnt area (ha) in Lebanon by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	89.43	63.8
Agriculture	50.73	36.2
<b>Total:</b>	<b>140.16</b>	<b>100</b>



### 3.4.4 Morocco

Morocco had the lightest year for forest fires for at least 6 years. Only 6 fires of over 30 ha were recorded, burning a total of 566 ha, occurring between May and September with half of the damage being recorded in July. Of this total, 109 ha occurred in Protected Areas, representing 20% of the total and 0.014% of the total protected area of the country. The distribution of burnt area by land cover types, using Morocco's own land cover map but with terminology harmonised with CLC, is given in Table 66.

Table 66. Distribution of burnt area (ha) in Morocco by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	385.37	68.08
Other Natural Land	4.06	0.72
Agriculture	176.62	31.2
<b>Total:</b>	<b>566.06</b>	<b>100</b>

### 3.4.5 Palestinian Territory

In June there were two fires recorded that burnt a total of 1 533 ha. Most of the damage resulted from one fire in the West Bank region that covered 1 331 ha. Table 64 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 67. Distribution of burnt area (ha) in Palestinian Territory by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	7.83	0.51
Other Natural Land	368.15	24.02
Agriculture	1156.74	75.47
<b>Total:</b>	<b>1532.73</b>	<b>100</b>

### 3.4.6 Syria

Syria was by a significant margin the country most affected by large fires in 2015. Between May and September 93 289 ha was recorded from 94 fires: almost 50% more than the second most affected country (Spain) and nearly one quarter of the entire burnt area recorded in 2015. This is three times the combined total recorded in Syria from the last 6 years. Almost all of the damage occurred early in the season in May and June. 46 fires of over 500 ha were recorded, 26 of them over 1 000 ha. The second largest fire of 2015 occurred in Aleppo district, and covered 13 930 ha. The impact of these fires can be seen in Figure 139. The Globcover land cover map, harmonised with CLC, was used to split the burnt area into different land type categories.

Table 68 shows the distribution of burnt area by land type.

Table 68. Distribution of burnt area (ha) in Syria by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	7158.04	7.67
Other Natural Land	25420.18	27.25
Agriculture	60692.86	65.06
Other Land Cover	17.77	0.02
<b>Total:</b>	<b>93288.84</b>	<b>100</b>

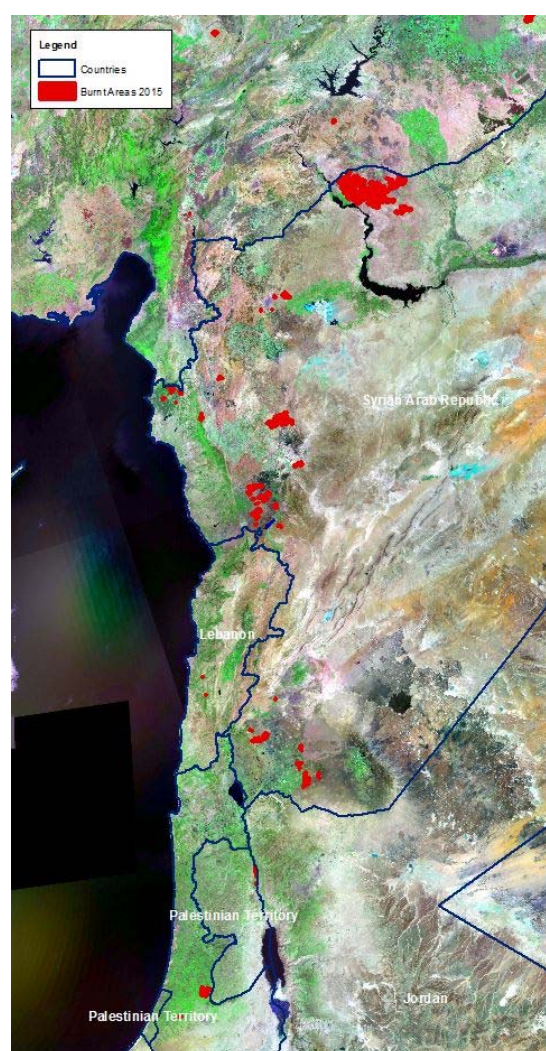


Figure 139. Burnt areas recorded in the Middle East region in 2015.

### 3.4.7 Tunisia

The 2015 fire season in Tunisia was lighter than the previous two years. Between May and September 21 fires burned 6 187 ha; around half the amounts recorded in 2013 and 2014. Around two-thirds of this damage occurred in July. Four major fires (over 600 ha) were recorded in Kassérine and Le Kef provinces. 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 69.



Figure 140. Burnt area scars in Tunisia in 2015.

Table 69. Distribution of burnt area (ha) in Tunisia by land cover types in 2015.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	6154.7	99.48
Other Natural Land	2.82	0.05
Agriculture	18.95	0.31
Other Land Cover	10.72	0.17
<b>Total:</b>	<b>6187.18</b>	<b>100.01</b>

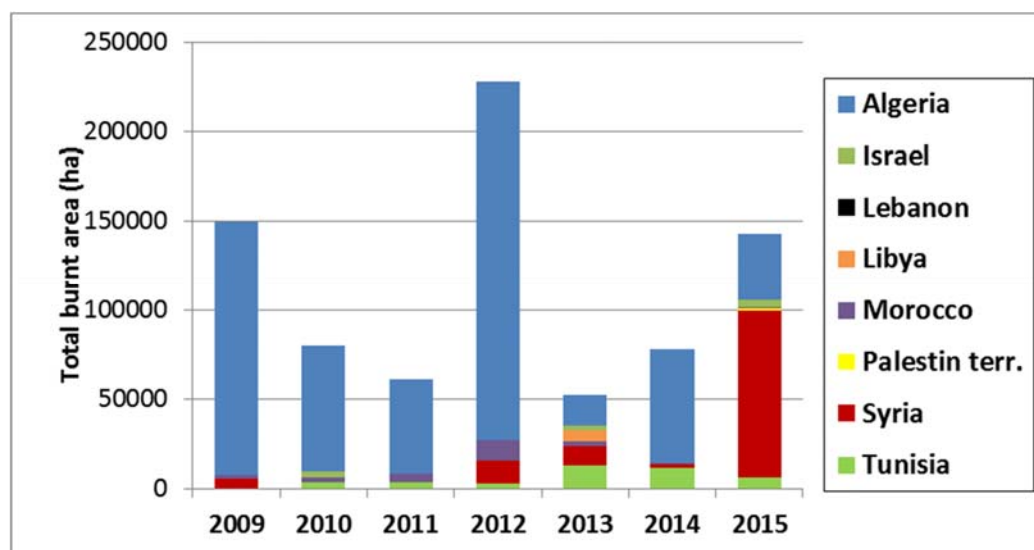


Figure 141. Comparison of burnt area recorded in the MENA countries from 2009-2015



## 3.5 European Fire Database

### *Background information*

The European 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. The database is now known as the **European Fire Database**.

### *Structure and collected information*

The database contains four types of information: about the time, location, size and cause of the fire (Table 70).

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 70 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://forest.jrc.ec.europa.eu/effis/reports/effis-related-publications/>

### Access to the information

Access to summarised information from the database is provided through the EFFIS web interface

<http://effis.jrc.ec.europa.eu/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 142). 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. Further analysis possibilities are planned for the future.

Table 70. 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

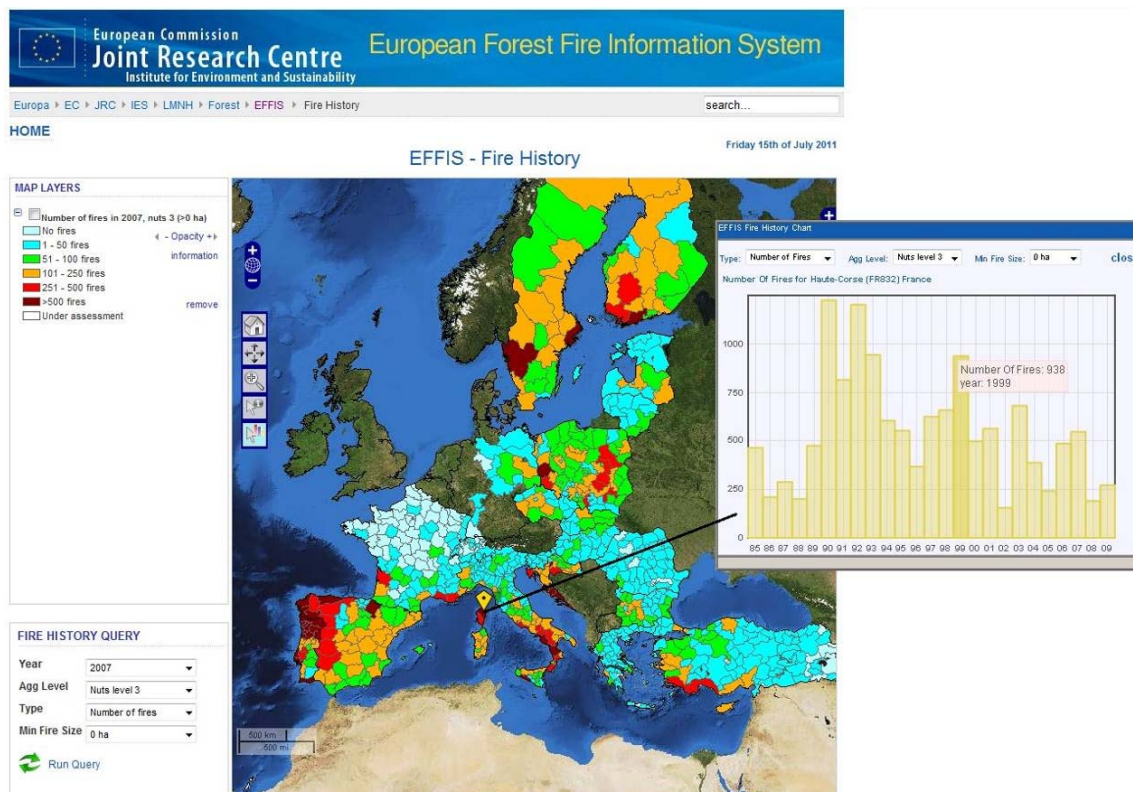


Figure 142. Access to the information stored in the European Fire Database from EFFIS web interface

Table 71. Summary of data records stored in the European 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	4045		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	2285	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	-	119	420	25652	27372	118	4907	75	-	3755	-	-	411	-
2014	151	57	68	-	251	-	-	3637	1729	-	43	1042	-	155	695	38115	11387	83	4374	35	-	-	-	-	460	-

**General notes on Table 71:**

- 2015 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 this information is only available in summary form

## 4 Background documentation

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## 5 ANNEX – Summary Tables of Fire Statistics

**Table 72. Number of forest fires in five Southern Member States (1980-2015)**

**Table 73. Burnt area (hectares) in five Southern Member States (1980 – 2015)**

**Table 74. Number of forest fires in other countries (1990-2015)**

**Table 75. Burnt area (hectares) in other countries (1990 – 2015)**

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 72. Number of forest fires in five Southern Member States (1980-2015)**

<i>Year</i>	<i>PORTUGAL</i>	<i>SPAIN</i>	<i>FRANCE</i>	<i>ITALY</i>	<i>GREECE</i>	<i>TOTAL</i>
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
<b>2015</b>	<b>15 851</b>	<b>11 928</b>	<b>4 440</b>	<b>5 442</b>	<b>510*</b>	<b>38 171</b>
<b>% of total in 2015</b>	<b>42%</b>	<b>31%</b>	<b>12%</b>	<b>14%</b>	<b>1%</b>	<b>100%</b>
<i>Average 1980-1989</i>	7 381	9 515	4 910	11 575	1 264	34 645
<i>Average 1990-1999</i>	22 250	18 152	5 538	11 164	1 748	58 851
<i>Average 2000-2009</i>	24 949	18 369	4 418	7 259	1 695	56 690
<i>Average 2010-2015</i>	18 439	12 994	3 587	5 492	1 025	41 536
<i>Average 1980-2015</i>	18 234	15 953	4 727	9 248	1 478	48 641
<b>TOTAL (1980-2015)</b>	<b>656 437</b>	<b>538 318</b>	<b>170 177</b>	<b>332 929</b>	<b>53 206</b>	<b>1 751 067</b>

\* Incomplete data

**Table 73. Burnt area (hectares) in five Southern Member States (1980 – 2015)**

<i>Year</i>	<i>PORTUGAL</i>	<i>SPAIN</i>	<i>FRANCE</i>	<i>ITALY</i>	<i>GREECE</i>	<i>TOTAL</i>
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
<b>2015</b>	<b>64 443</b>	<b>103 200</b>	<b>11 160</b>	<b>41 511</b>	<b>7 096</b>	<b>227 410</b>
<b>% of total in 2015</b>	<b>28%</b>	<b>45%</b>	<b>5%</b>	<b>18%</b>	<b>3%</b>	<b>100%</b>
<i>Average 1980-1989</i>	73 484	244 788	39 157	147 150	52 417	556 995
<i>Average 1990-1999</i>	102 203	161 319	22 735	118 573	44 108	448 938
<i>Average 2000-2009</i>	150 101	127 229	22 362	83 878	49 238	432 809
<i>Average 2010-2015</i>	92 377	98 660	8 947	59 345	29 609	288 937
<i>Average 1980-2015</i>	105 893	164 592	24 895	107 002	45 424	447 807
<b>TOTAL (1980-2015)</b>	<b>3 812 148</b>	<b>5 925 323</b>	<b>896 216</b>	<b>3 852 072</b>	<b>1 635 277</b>	<b>16 121 036</b>

**Table 74. Number of forest fires in other countries (1990-2015)**

Country	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	-
2015	2383	345	429	177	87	-	67	745	106	1071	1069	704	107	247	425	12257	29	250	12238	242	93	2700	162	-



Table 75. Burnt area (hectares) in other countries (1990 – 2015)

Country	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	-
2015	13010	268	4313	9416	652	-	83	143	1798	526	4730	615	753	71	992	5510	143	1671	2875350	353	65	594	45	-



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