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# Forest Fires in Europe, Middle East and North Africa 2013

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# Forest Fires in Europe, Middle East and North Africa 2013

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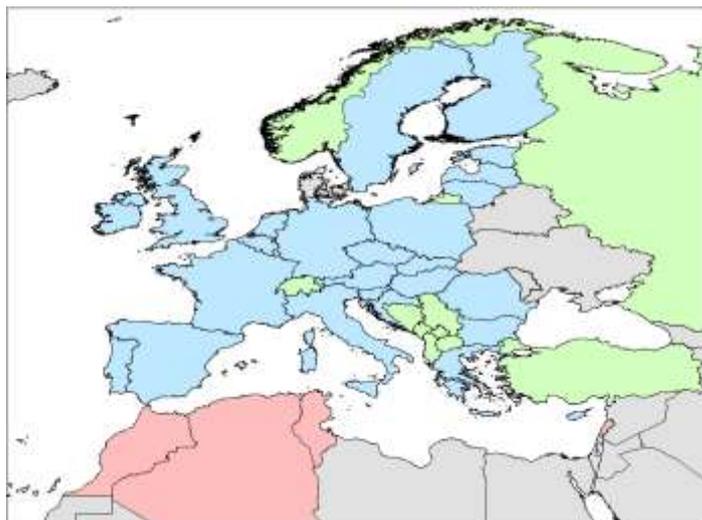
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## 1 PREFACE

The aim of the European Forest Fire Information System (EFFIS) is to provide harmonised information on forest fires in the pan-European region. For this purpose collaboration with EU Member States and neighbouring countries has been on-going since 1998. EFFIS provides an ideal platform for countries to exchange good practices on fire prevention, firefighting, restoration practices and other activities related to fire management.

In the last years the system has been extended to include countries in the Middle East and North Africa (MENA). Since 2011, in collaboration with the FAO Silva Mediterranea (FAO) and GIZ, Middle East and North African (MENA) countries have been participating in the EFFIS activities and have been included as members of its Expert Group on Forest Fires (EGFF).



Currently, the EFFIS network is constituted by 39 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, FYROM, Kosovo, Montenegro, Norway, Russia, Serbia, Switzerland and Turkey), and 4 MENA countries (Algeria, Lebanon, Morocco and Tunisia).

This is the 14th issue of the EFFIS annual report on forest fires, which is now consolidated as highly appreciated documentation of the previous year's forest fires. 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 2013 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.

Also this year we are confident that we will further improve 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.

## 2 FOREST FIRES 2013

### 2.1 Introduction to the 2013 fire season in Europe, Middle East and North Africa.

Although variability exists on the length and intensity of the fire season in the countries of the EFFIS network, this is normally considered as the period between March and October. Overall, 2013 was a mild year in terms of fire danger conditions and total burnt area in the European Union countries. However, as described in the next paragraph, episodes of intense fire danger and large fires occurred in August, especially in Portugal and Spain.

The first part of the 2013 fire season was fairly mild, due to relatively cool and wet weather in southern Europe during spring and early summer. Nevertheless, unusually periods of high temperatures in the UK and Ireland resulted in significant fire episodes in these countries. These conditions persisted in April due to a continuous drought period in the UK that dangerously lowered the moisture content of the vegetation at the end of April.

Fire weather conditions in the Mediterranean region were driven by warm and dry anomalies in the region, resulting in a series of large fires in Greece. However, during this period (spring and early summer) a considerable number of wet periods took place, lowering fire danger conditions over most of the European territory.

Significant fire activity in the Mediterranean countries started only in July. A clear signal of the beginning of 2013 fire season in July was the series of large fires in Portugal (15 015 ha burnt in Douro), Spain (2 090 ha burned in Mallorca), Greece (4 227 ha in Rhodes) and in Italy, where Sicily was hit by a number of large fires.

However, during August moderately mild conditions continued in most of Europe, with the exception of Portugal (which was severely affected by several fires larger than 1 000 ha, especially during the second half of the month) and Spain (see Figure 1 and Figure 2).

It is worth mentioning that during the 2013 fire campaign, a new set of EFFIS products that relate to the long-range weather forecast were introduced in the system. These comprise (a) seasonal and (b) monthly forecasts.

Seasonal forecast maps show temperature and rainfall anomalies that are expected to prevail over European and Mediterranean areas during the next 2 months based on the Seasonal Forecast System (S4) of ECMWF (European Centre for Medium-Range Weather Forecasts), while monthly forecast maps show temperature and rainfall anomalies during the next 2 weeks based on the Monthly Forecast System (MFS) of ECMWF.

MFS is based on an ensemble comprising 50 plus one (control) members with a forecast horizon of 32 days.

As an example of these products, Figure 1 and Figure 2 show the prevailing fire weather conditions over Portugal during the intense fire episode of the second part of August.

Figure 1 shows the forecast temperature anomalies for the week starting from 12 and ending on 18 August. The main characteristic of this weekly forecast is the precision in pointing out the area of north Portugal and its capability to forecast this distinct maximum of warm anomalies.

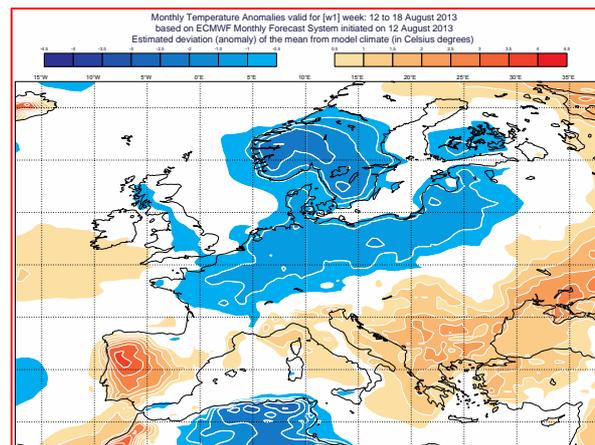


Figure 1. EFFIS (MFS) week 1 temperature anomaly forecast initiated on 12 August and valid for the time interval between 12 to 18 August 2013.

Similarly, Figure 2 shows the forecast temperature anomalies for the week starting from 19 and ending on 25 August. This also highlights the intense maximum anomaly centred over Portugal.

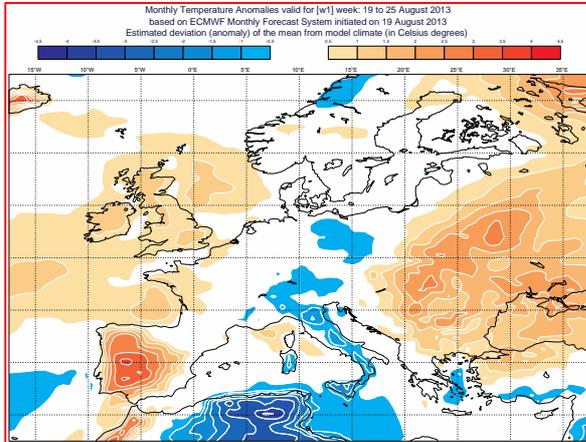


Figure 2. EFFIS (MFS) week 1 temperature anomaly forecast initiated on 19 August and valid for the time interval from 19 to 25 August 2013.

In addition to the conditions shown in Figure 1 and Figure 2, fire danger conditions in Portugal were aggravated by an additional significant element: the easterly flow over the Portuguese mainland providing hot (land air) over the hot spot areas due to the high-pressure system centred to the north.

The total burned area mapped by the European Forest Fire Information System (EFFIS) in 2013 was 252 047 ha in the EU28 countries, 36 122 ha in the other European countries, and 52 390 ha in North Africa and the Middle East.

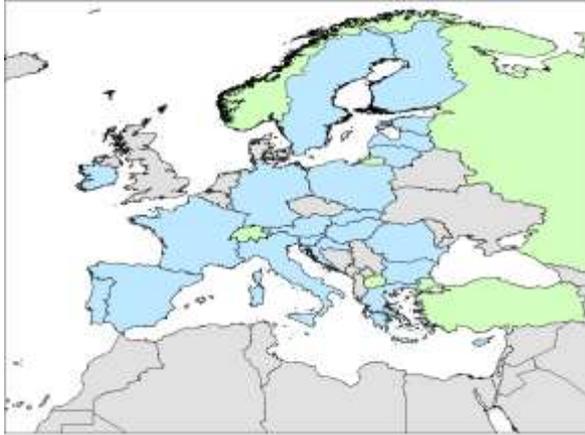
Overall, the fire season was well below the historical average, despite the very high-to-extreme fire danger level reported by EFFIS in early August in large portions of the south-eastern EU, the Balkan region and North Africa and the remarkable fire activity observed in Portugal in the second half of August.

During August, in addition to Portugal, EFFIS mapped significant fire events in Turkey, Italy, Corsica, Bulgaria, Algeria, Cyprus, Bosnia and Herzegovina, Greece and Spain.

The EU's Emergency Response Coordination Centre (ERCC) was called upon by Bosnia and Herzegovina for assistance in fighting forest fires, and Canadair planes were deployed by EU Member States to help battle the fires in several countries.

## 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 EU Member States and 5 other non-EU members of the EFFIS network.



### 2.2.1 Austria

#### *Fire danger in the 2013 fire season*

In 2013 Austria had a long season with a high level of forest fire danger for the first time. In particular, in the eastern part of Austria (Lower Austria, flatland) there were some big fires that burnt more than 100 ha. There were also large fires in the mountains of Upper Austria, Carinthia and Tyrol.

#### *Fire occurrence and affected surfaces*

The area of Austria is 83 858 km<sup>2</sup> 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 7 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.

Table 1 shows the number of fires and burnt area in Austria in 2013, calculated by the Austrian federal fire brigade association based on the reports of the different fire brigades. 12 of the fires burned more than 5 ha.

Table 1. Number of fires and burned area in Austria in 2013

<i>Fire type</i>	<i>No. of Fires</i>	<i>Burned area (ha)</i>
<i>Wildland fires</i>	852	42
<i>Forest fires</i>	357	165
<b>Total</b>	1209	207

#### *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 2013 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. Unfortunately, over the last few years in all forest areas there has been an unfavourable trend of a decreasing rate of fulfilment of forest fire prevention events and planned financial resources for their implementation.

In 2013 the number of fires and affected forest areas were significantly less compared to 2012. The EFA statistics for forest fires occurring in the country during the year recorded 408 fires with 3 313.9 ha affected. The biggest fire affected 394 ha. The average size of forest fires in 2013 was 8.4 ha. For comparison, in 2012, burned areas were 12 730 ha and the number of fires was 876, which represents a halving in the number of fires in 2013 and an almost fourfold decrease in the burned areas. Compared to the average for the period 2001-2012 (9 541 ha burnt and the average number of fires 560), 2013 was a year with good results for forests in the country. According to the statistics reported in the Regional Forest Directorate RFD, the regions most affected by forest fires were RFD Kardzhali with 58 fires and 796.3 ha burnt, RFD Stara Zagora (18 and 513.8 ha), RFD Sliven (14 and 417.5 ha) and RFD Sofia (57 and 307.5 ha). The trends regarding the number of fires and burnt area are presented in Table 2 and Figure 3.

Most of the burned areas are state owned - 68%; 22% are municipal property, 9% are privately owned and less than 1% belongs to the church and to other legal entities.

The main causes for the forest fires during 2013 are as follows:

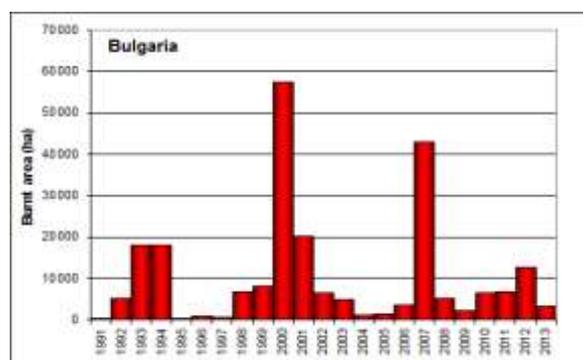
- Carelessness - 287 in number (70%)
- Arson - 47 in number (12%)
- Natural - 12 in number (3%)
- Unknown - 62 in number (15%)

Analyzing these basic causes, we note that in 2013 human negligence is the reason for over than 70% of them, and proven arson is 11%. Only 3% of the fires are caused by lightning, while the remaining 16% are unknown.

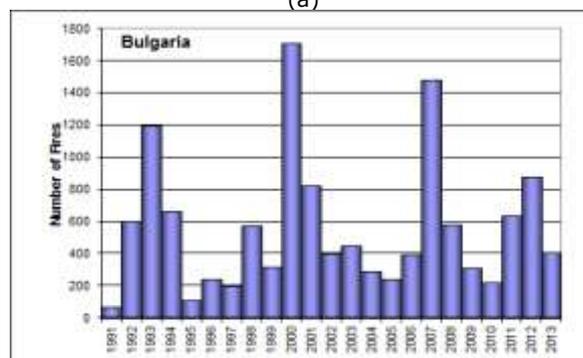
The direct losses by forest fires in 2013 are estimated to be less than 370 000 Euro, although the average damage for the last 12 years is 3 000 000 Euro. During 2013 there were no reported losses of human lives by forest fires.

Table 2. Forest fire statistics for Bulgaria 2003-2013

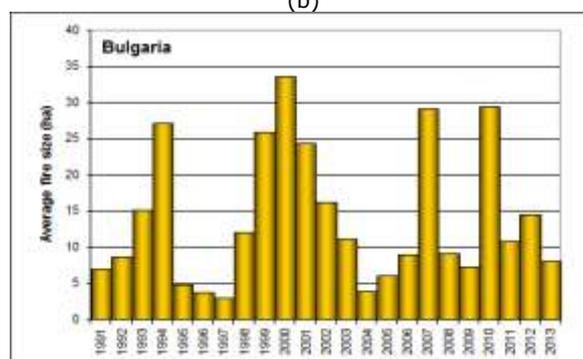
Year	Burnt area (ha)		Fire causes (number)			Total number of fires
	Total	Forest lands	Human activities	Natural	Unknown	
2003	5000	4284	281	9	162	452
2004	1139	1139	116	2	173	291
2005	1446	1446	114	7	130	251
2006	3537	3537	191	9	192	392
2007	42999	42999	1163	18	298	1479
2008	5289	5289	484	8	90	582
2009	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
<b>Mean</b>	<b>8285</b>	<b>8222</b>	<b>381</b>	<b>11</b>	<b>144</b>	<b>536</b>



(a)



(b)



(c)

Figure 3. Burnt areas (a), number of fires (b) and average fire size (c) in Bulgaria from 1991 to 2012

(Source: Executive Forest Agency, Bulgaria)

### 2.2.3 Croatia

#### *Fire danger in the 2013 fire season*

Climatological analysis of the Meteorological and Hydrological Service indicates an extremely rainy spring, in early June. Fire Danger Rating was Very Low or rarely Low. Between 15th and 22nd of June our country was hit by a heat wave with maximum air temperatures higher than 35°C. During this period, Fire Danger Rating rose everywhere, but due to a resurgence of moist and cooler air it then decreased again. On the Adriatic coast and in areas along the Adriatic, July brought mostly dry and sunny weather. Precipitation was rare and mostly weak and due to such weather conditions, the Fire Danger Rating was rising and by the end of the month it was mostly in the category of very high risk. Occasionally there were penetrations of moist and unstable air, and localized rainfall.

The mean monthly Fire Danger Rating for August 2013 was moderate only in the north-western part of Istria, and for most of the coastal area (the entire Primorje-Gorski Kotar County, Zadar, part of Šibenik-Knin County, a smaller part of the interior of the Split-Dalmatia County and a greater part of Dubrovnik -Neretva County) it was high. The mean monthly Fire Danger Rating was very high for the southeastern part of Šibenik-Knin County, for most of Split-Dalmatia County and for smaller part of Dubrovnik County (islands of Korčula, Lastovo and Sušac). These values are slightly above average compared to the ten-year average (2003-2012), but significantly lower in comparison with August 2012, when almost the entire coastline had a mean monthly Fire Danger Rating of very high (Figure 4).

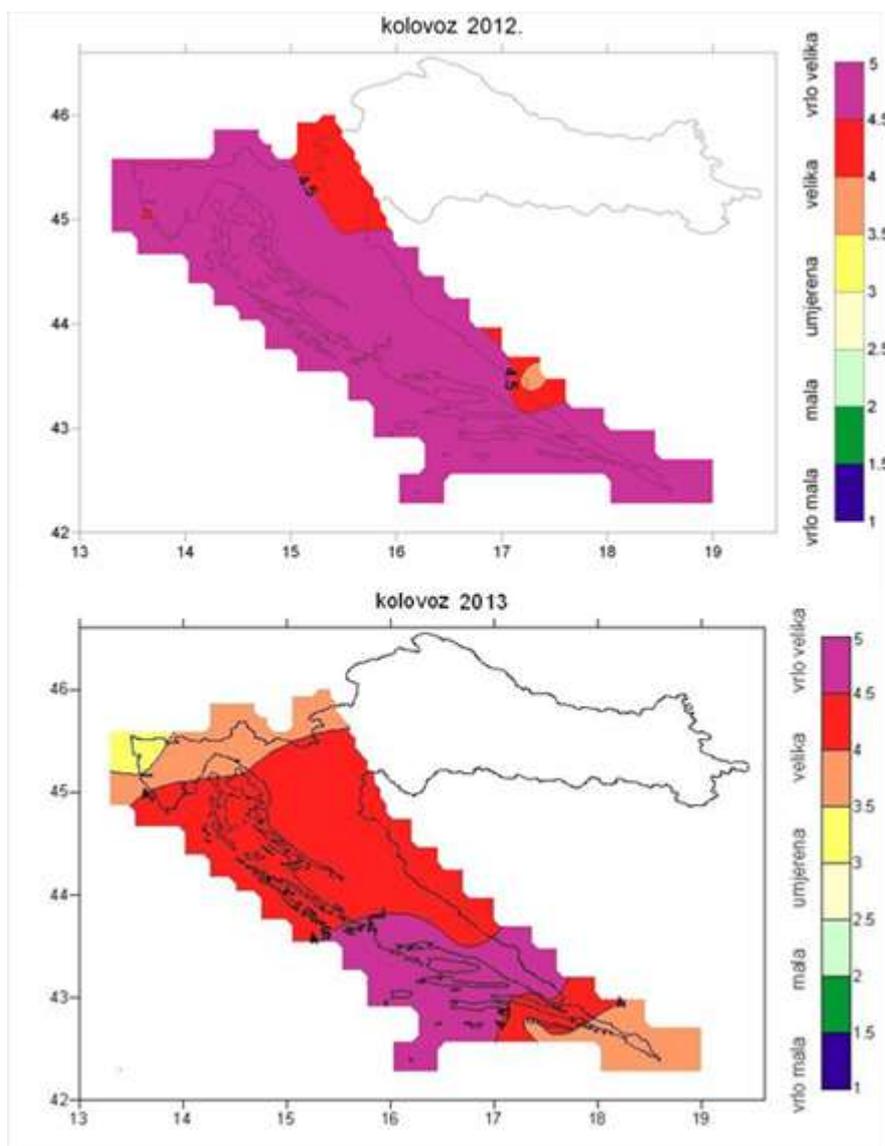


Figure 4. Average monthly Fire Danger rating for forest fires for August 2012 and 2013.

### Fire occurrence and affected surfaces

During 2013, 137 wildfires affected 1 999 hectares of land. Most of the fires (104) occurred in the Split area (76% of the number of fires and 88% of the affected surfaces). The trend of number of fires, burnt area and average fire size can be seen in Figure 7<sup>1</sup>.

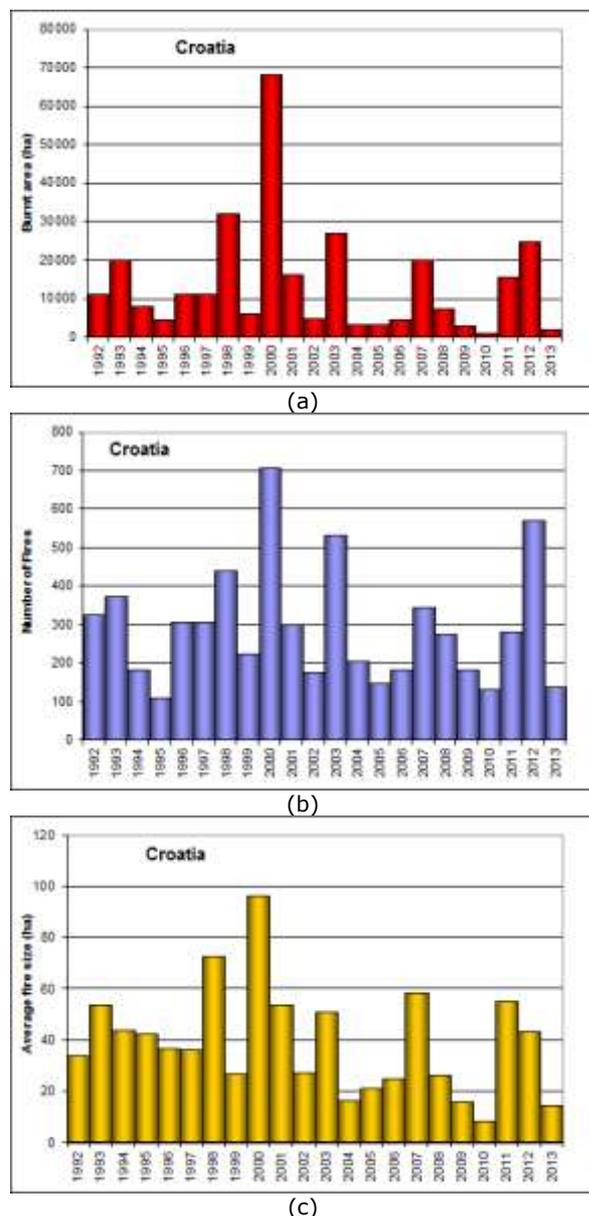


Figure 5. Burnt areas (a), number of fires (b) and average fire size (c) in Croatia from 1992 to 2013.

Of the total affected area, 203 hectares or 10.15% of tall forests were affected, 733 ha or 37% of other forests (medium forest, coppice, bushes and shrubs, macquis, garigue) and 1 063 ha or 53% of unwooded forest and agricultural land.

Table 3. 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
<b>2013</b>	<b>942</b>	<b>628</b>	<b>429</b>	<b>1999</b>

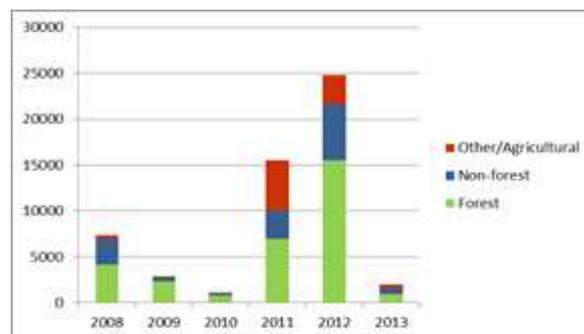


Figure 6. Burnt area in Croatia by land type

As far as the ownership structure of the affected surfaces is concerned, it can be noted that 1 335 ha or 67% of the affected surfaces were state owned and 664 ha or 33% occurred on private (forest and agricultural) land.

### 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, the National Protection and Rescue Directorate has prepared a National Engagement Plan for the 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 forest fires.

<sup>1</sup> Data changed from last year: different sources and methodology used to measure totals

Before the start of the fire season, assessments are made and Fire Protection Plans are drafted for particularly vulnerable areas. Firefighters and fire-fighting equipment from the continental part of the country were deployed during the summer months to 15 vulnerable coastal locations in total. A total of 28 firefighting vehicles with 510 firefighters were preventively deployed to the coastal part of the Republic of Croatia. During the summer, in addition to local firefighting forces, an additional 1075 seasonally employed firefighters were engaged in the coastal area and were allocated to professional and voluntary fire brigades.

#### *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 have realised 476 hours of flight time during forest fire 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 with regard to unhindered crossing of state borders by ground and air forces in a case of a major fire in the border area. A Standard Operating Procedure with regard to unhindered crossing of state borders by ground and air forces in case of a major fire in the border area was signed in July with Montenegro.

The Republic of Croatia has also assisted other countries with fire. During 2013, aircrafts took action beyond the borders of our country on four occasions: three times in Bosnia and Herzegovina and once in Portugal. During those activities, 102 hours of flight time were realised.

#### *Loss of human lives*

According to the data from the Ministry of the Interior, during 2013, 22 people were killed and 81 people sustained bodily injuries in all wildfires throughout the Republic of Croatia (vegetation fires, fires in buildings and fires on the means of transport). During extinguishing vegetation fires in coastal and karst areas, two fire fighters sustained minor injuries, while there were no fatalities among fire fighters.

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

## 2.2.4 Cyprus

### *Fire danger in the 2013 fire season*

In May the weather was warm and relatively wet with certain periods giving local rain and isolated thundery showers. The mean air temperature was 2.5 °C above normal and the average precipitation was 24.7mm (126% of normal). In many occasions maximum temperatures exceeded 28 °C inland and 20 °C in the mountains, and the highest temperatures recorded were 36.2 °C and 28.4 °C respectively.

In June, the mean temperature was approximately 1.0 °C above normal and the average precipitation was zero. Extremely high temperatures were recorded during the period 18-25 of the month, when maximum temperatures were about 2 to 9 °C above normal. The highest temperature recorded was 37.7 °C inland and 30.4 °C in the mountains.

In July, the mean temperature was about 0.5 °C above normal and the average precipitation was well below normal (15% of normal). Unstable weather conditions prevailed during mid-July giving local rain and isolated thunderstorms in some areas. Maximum temperatures exceeded 37 °C inland and 28 °C in mountainous areas. Regarding extremes, the highest maximum temperature was 38.4 °C inland and 30.2 °C in the mountains.

In August the weather was dry, with zero precipitation. The mean air temperature was 0.9 °C above normal and the mean daily temperatures were around normal during most of the month. The mean daily maximum temperature was 38 °C inland and 28 °C in the mountains.

During September the weather was relatively wet and the average precipitation was 7.0mm (156% of normal). Extremely high temperatures were recorded during mid-September when maximum and minimum temperatures were 2 to 8 °C above normal, exceeding 34 °C inland and 24 °C in the mountains. The highest maximum temperature recorded was 39.2 °C inland and 32.6 °C in mountainous areas.

In October the weather was dry. Unstable weather conditions prevailed during certain periods of the month, giving local showers and isolated thunderstorms. The mean air temperature was 1.0 °C below normal and the average precipitation was 14.4mm (44% of normal). Maximum temperatures

exceeded 28 °C inland and 19 °C in the mountains, during most days of the month.

### *Fire occurrence and affected surfaces*

During 2013, both the number of forest fires as well as the total burnt area showed a significant increase compared to the respective figures of the previous years. In 2013, 135 fires occurred, burning a total area of 2 835 hectares, of which 1 681 ha was forest and other wooded land. The total burnt area of almost half of these fires was smaller than 1 ha. Also, 6 fires with burnt area greater than 50 ha were recorded.

### Major fires in 2013

- **Choirokitia, Larnaca District.** On the 19th of June 2013, a fire was set probably by arsonists near Choirokitia village. Due to the strong winds and the rugged terrain the fire spread rapidly, burning 1 000 hectares of wild vegetation and agricultural crops. As a result of this fire, the nearby highway was closed for hours due to the thick smoke in the area, and the residents of the surrounding villages were moved to safe locations.
- **Trachypedoula, Paphos District.** On the morning of 21 August 2013 at 02:00 hours, a fire was set probably by arsonists near Trachypedoula community. The constant changing of the direction of the strong winds pushed the fire into areas difficult to reach. The fire destroyed 812 hectares of other wooded land and agricultural properties and threatened homes and farms in the nearby villages.

### *Fire causes*

Most of the forest fires of the year 2013 were caused accidentally or by negligence, at a percentage of 67%. Deliberate fires corresponded to 19% and fires caused by lightning (natural), corresponded to 4%.

Table 4. Number of forest fires and burnt areas in Cyprus from 2009 to 2013

Year	Number of fires	Burned area (ha)		
		Total	Forest and other wooded land	Agriculture and other artificial land
2009	91	885	460	425
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

The trends regarding both the number of fires and burnt areas over the last 14 years (2000-2013) are shown in Figure 7.

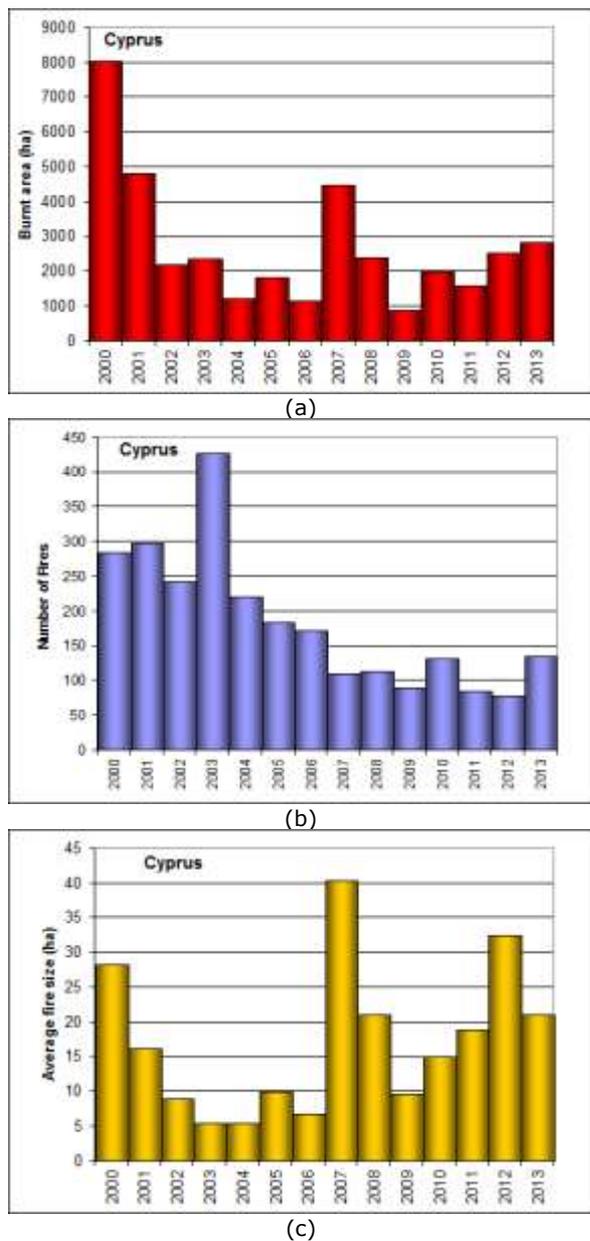


Figure 7. Burnt areas (a), number of fires (b) and average fire size (c) in Cyprus from 2000 to 2013.

*Injuries and loss of human lives*

In 2013, no deaths or injuries during the suppression of forest fires were reported.

*Fire prevention activities and fighting means*

During the year 2013, an intensive fire awareness raising campaign was undertaken, with numerous presentations at schools and message announcements through the media. For fire detection purposes, 27 lookout stations and an automatic detection system were operated. A number of 420 forest fire fighters were recruited and deployed during 2013 to form the Forest Fire Fighting Task Force. The aerial means that were used in firefighting operations during the year 2013 included the two firefighting aircrafts of the Department of Forests and a number of firefighting helicopters.

*Operations of mutual assistance*

In response to request for assistance, one firefighting helicopter was sent from Cyprus to Lebanon, to assist in putting out a huge fire that broke out on July 30, 2013.

*(Source: Ministry of Agriculture, Natural Resources and Environment, Department of Forests, Cyprus).*

## 2.2.5 Estonia

### *Fire occurrence and affected surfaces*

In 2013 a total number of 1264 forest fires and wildfires were recorded; 15 of these were classified as forest fires. Forest fires and wildfires destroyed 3 buildings.

Table 5. Forest fires in Estonia 2000-2013

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

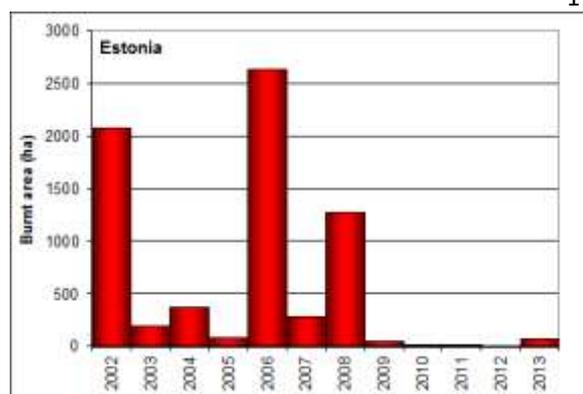
Forest fires in 2013 were recorded in 10 counties. The first fire in 2013 was recorded in May, the last one in August. The largest fire of 2013 occurred in August in Harju county Keila, burning an area of 66.1 ha.

In 2013, 87% of forest fires were of direct or indirect human origin. 68% of the fires were caused by accident/negligence.

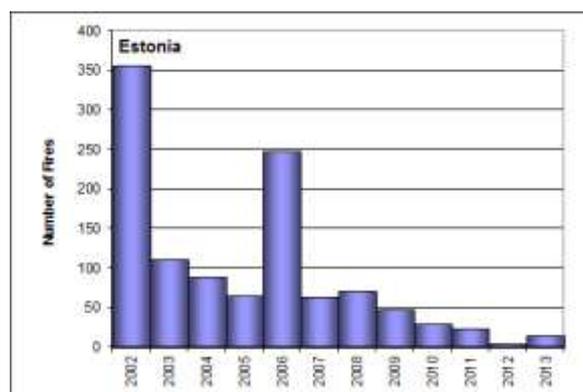
The burnt area, number of fires and average fire size for the years 2002-2013 are shown in Figure 8.

### *Fire fighting means and intervention campaigns*

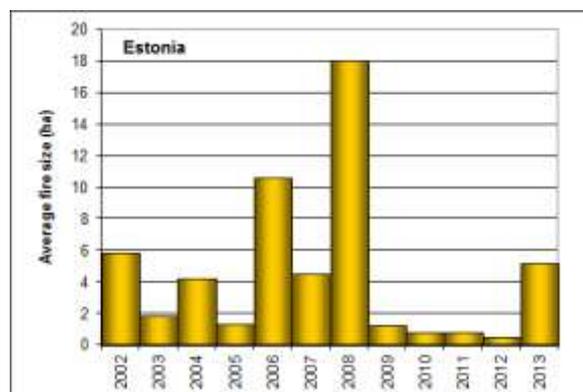
The Estonian Rescue Board is responsible for fighting forest and wildfires. The Estonian Rescue Board cooperates in its operations with the Police and Border Guard Board, Estonian Defence Forces, Environmental Board, State Forest Management Board, Private Forest Centre, Environmental Inspectorate and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



(a)



(b)



(c)

Figure 8. Burnt areas (a), number of fires (b) and average fire size (c) in Estonia from 2002 to 2013

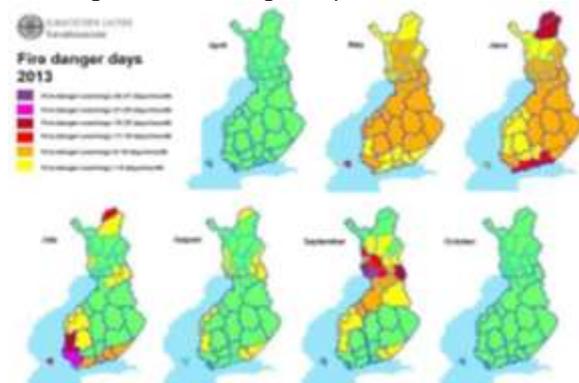
(Source: The Estonian Environment Agency, Estonia)

## 2.2.6 Finland

### Fire danger in the 2013 fire season

Based on information from the Finnish meteorological institute, summer 2013 was typical in Finland. Fire danger days for 2013 are presented below.

Figure 9. Fire danger days in Finland 2013



### Fire occurrence and affected surfaces

The number of forest fires in 2013 in Finland was slightly higher than the normal average level. There were 2 764 wildfires in Finland last year and 1 452 of them were reported as forest fires. The total burned area was around 692 ha, of which 461 ha was forest land. The average burned forest area per fire was 0.32 ha. The yearly trends in terms of number of fires and burnt area from 1996-2013 in Finland are shown in Figure 7.

### Fire causes

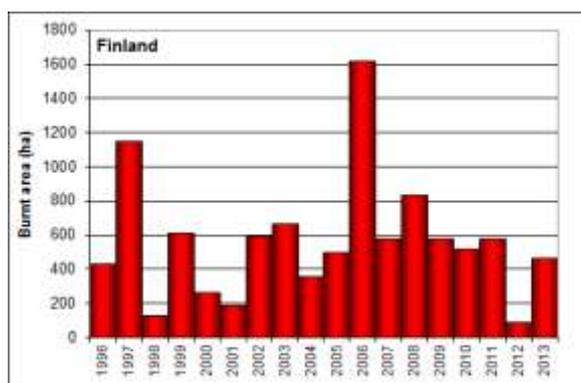
The most common cause of wildfires in Finland was human actions. These caused about 2 fires of 3, mainly accidents. The second biggest reason was natural: 10% of fires. The reason for the fire could not be found in over 15 % of the cases (average from 2007 to 2011).

### Fire prevention activities

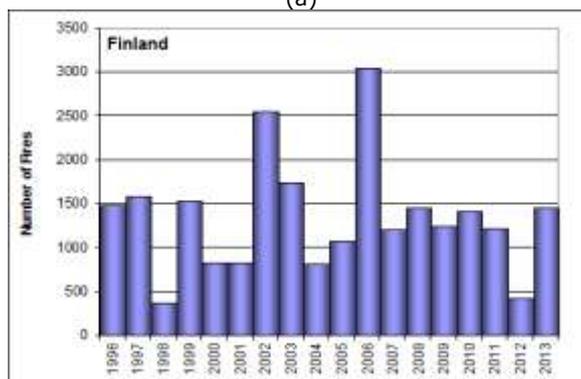
There was more cooperation with institutes such as the Finnish meteorological institute, for example projects for improving situation awareness.

### Loss of human lives

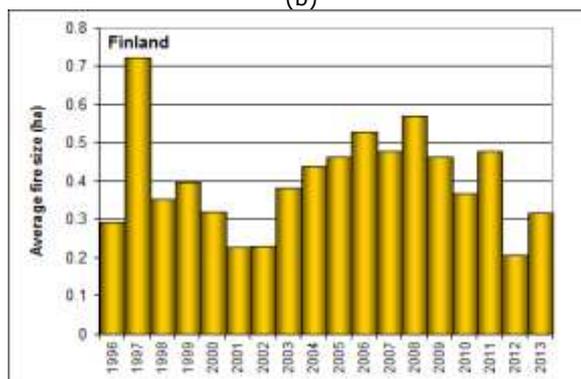
One person died in Finland forest fires in 2013. Twelve persons were injured in different wildfires, with minimal burns. Some of the wildfires caused damage to buildings, and also a few wildfires were caused by fires in buildings or vehicles.



(a)



(b)



(c)

Figure 10. Burnt areas (a), number of fires (b) and average fire size (c) in Finland from 1996 to 2013.

### 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.

### Operations of mutual assistance

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

(Source: Ministry of the Interior).

## 2.2.7 France

### Fire danger in the 2013 fire season

The exceptional figures this year can be explained in part by favourable meteorological conditions.

The first half of the year in France was cool and rainy. This situation, which limited the development of fires during late winter and early spring (which may be critical in the departments of the Mediterranean hinterland, the Pyrenees and the Massif Landes) lasted until June. Also, despite the often high temperatures and rainfall deficit recorded in July and August in the Mediterranean region and in the Southwest, vegetation remained relatively less susceptible to fire and the number of outbreaks of fire was reduced.

Another positive element was that the summer was generally not very windy in the South. In total therefore, the overall level of risk was very limited.

Thus, in the Mediterranean region, the number of areas classified as "severe weather hazard" totalled 56 last summer, although on average it is 600. It has never

been so low in the last 10 summers. The measurements made by the National Forestry Office (ONF) to measure the water content of plants show a lower amount of dehydration than in previous summers.

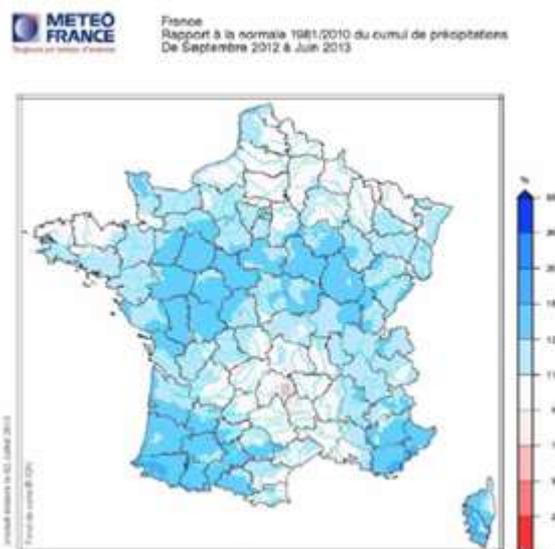


Figure 11. Cumulative precipitation in France from September 2012-June 2013 compared with average 1981-2010

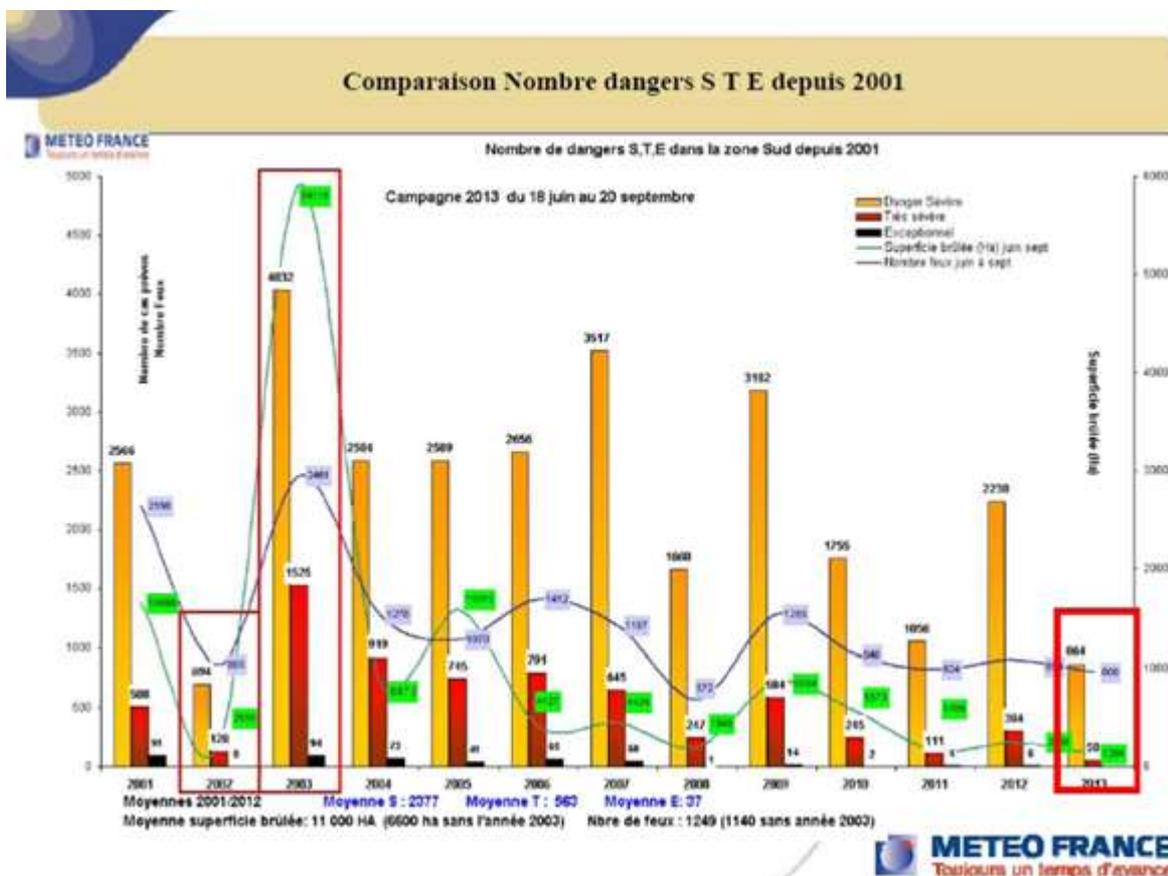


Figure 12. Incidence of Severe (S), Very severe (T) and Extreme (E) fire danger from 2001-2013.

### Fire occurrence and affected surfaces

Due to favourable meteorological conditions, the results obtained in 2013 in France for the fight against forest fires are exceptional. 3 232 ha were affected by 2061 fires in 2013, while the ten-year average is 19 900 ha. The burnt area has never been this low since the establishment of national statistical monitoring in 1976. This positive assessment is part of a positive trend over several years.

The Mediterranean region was the most affected by fires, but its proportion of the total (which was 59% in 2013) continues its tendency to decrease (it previously stood at over 70%).

#### Mediterranean departments

1 920 ha were affected by fire in the Mediterranean regions (average is 13 300 ha), of which 990 ha occurred during the summer period (from 694 fires). This value represents only 10% the average over the last 10 summers.

The largest fire of the year (250 ha) developed in Aude at Fleury on June 25, before the summer reinforcement resources were deployed. Another significant fire, in terms of area, developed in Ghisonaccia in Corsica on September 18. This burnt 180 ha (mainly agricultural areas). In total, 2 fires burnt more than 100 ha, compared with a dozen on average each summer, while 85% of fire outbreaks were contained before they burnt 1 ha.

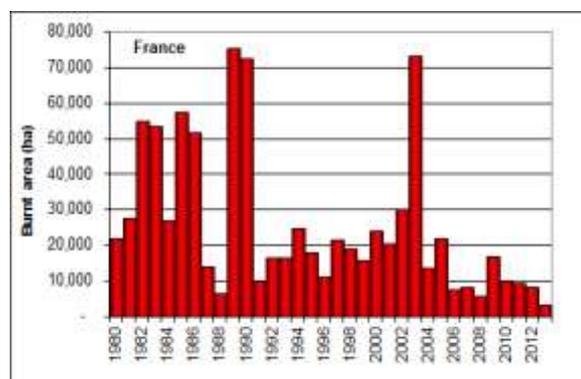
#### Southwest regions

1 130 ha were burnt by fire in the Southwest (average 3 850 ha), of which 360 ha were in the Landes forest (which is the most economically important region) against 1 060 ha on average.

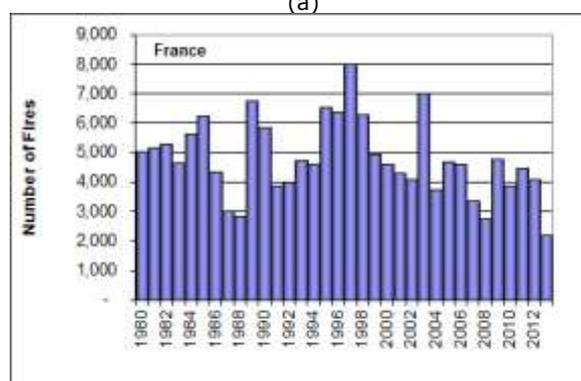
The only notable fire that developed in the Landes region in 2013 took place in Labrit on February 28 and affected 250 ha in a sector heavily impacted by the 2009 storm KLAUS. During the summer the operational activity there was particularly limited (only 60 ha affected during the summer period).

Although 570 ha were burnt in the Pyrenees, mainly during the winter (which is usually the highest risk period because of the frequent use of slash and burn practice), this figure is significantly lower than the average, since on average over 1 500 ha are affected by fire. Only one fire was of notable size, which developed in Azeirex in the Hautes-Pyrénées (144 ha on 10 March).

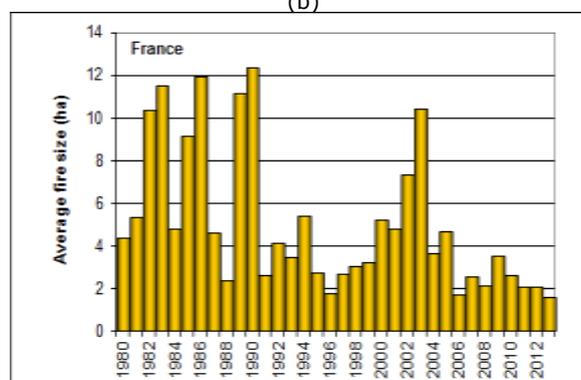
The yearly trends in terms of numbers of fires and burnt areas in France since 1980 are shown in Figure 7.



(a)



(b)



(c)

Figure 13. Burnt areas (a), number of fires (b) and average fire size (c) in France from 1980 to 2013.

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

The *Direction Générale de la Sécurité Civile et de la Gestion des Crises* (DGSCGC) also mobilized reinforcements in the overseas region of La Réunion, in the Indian Ocean. After having sent air and ground reinforcements to this area during major fires in 2010 and 2011, it prepositioned a Dash water bomber during the sensitive period 2013 (October to December) as it did in 2012.

Damage during the sensitive period in Réunion was limited, and a total of 324 ha of various vegetation was burned, including 63 ha of forests, although this year there was an exceptional drought, prompting the authorities to bring forward the positioning of the Dash by a fortnight.

Once in place, the Dash was engaged in reinforcing the local fire brigade in about twenty fires.

#### *Fire prevention activities*

In addition to the continuation of activities in 2012, in 2013 there was a period of reflection on the development of the state strategy and policy for the prevention of forest fires in the southern zone. This should lead to a review of governance and a new definition of priorities for fire prevention by the end of 2014.

The first generation of plans for protection of forests against fire (PPFCI) is reaching expiry and these plans should be renewed.

The overall budget for prevention is around 150 million euros in subsidies from local authorities and state together.

In the southern area, the state contributes about 20M€ of which 10.8M€ is for the general interest role assigned to the ONF. Of this, € 1.9 million was spent on patrols.

Maintenance operations involved:

- 597 water points
- 15 lookout posts
- 424 km of track maintenance DFCI
- 1092 ha maintenance of firebreaks
- 441 prescribed burns.

Out of the 6193 days of armed patrols, there were 129 interventions on incipient fires.

In the order of a thousand forest and related agent communities and the state are deployed in preventive monitoring.

In terms of communication, the *Délégation à la Protection de la Forêt Méditerranéenne* (DPFM) has published a bimonthly newsletter since April 2013.

#### Fire fighting means

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

- 650 military personnel of instruction and intervention of the civil protection units (UIISC);
- 23 water bombers;
- 3 reconnaissance and coordination aircraft, including one placed in operational reserve, and 35 rescue and command helicopters.

Finally, reserve firefighters from departmental fire and rescue services outside the Mediterranean area, strictly respecting the qualifications and authority of those personnel running these detachments, were positioned in different areas of defence. They could thus supplement the Centre Opérationnel de Gestion Interministérielle des Crises (COGIC) of the Directorate General of Civil Security and crisis management, providing local resources in areas especially threatened by the risk of fire. A dozen columns were available to be deployed, although they were not required, given the conditions.

The effectiveness of the intervention 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 event of a fire.

Thus, in times of high risk, both national and local resources are mobilized proactively according to the hazard 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 armed reconnaissance missions, the military resources made available under a protocol funded by the Ministry of the Interior provide patrols alongside local actors (foresters,

firefighters, members of community committees for forest fires).

The activity of the national means, compared to previous years, was not limited either for operational prevention (since the measures within this framework are enabled, especially with regard to air assets, when the risk is high) or for supporting local resources committed to reported fires.

Thus, in the Mediterranean region the national means were only requested 140 times during the summer (all requests for assistance having been met), or 20% of fire starts, whereas they usually intervene in one third of fires.

- The water bombers BASC spent 1 367 hours of flight operations forest fires (977 hours in control, 390 hours GAAR) whereas the year average is 3 970 hours (2 570 hours fight, 1 400 hours GAAR);
- Military sections of the civil defence force conducted 390 field monitoring operations and intervened in 90 fires, mostly in Corsica;
- It was not necessary to mobilize the reserve firefighters from other areas of defence; only some very limited scale operations were implemented at local level.

The resources set up to strengthen the protection of Landes region during periods of severe risks, by prepositioning civil security air assets in Bordeaux in order to reduce response time, was only occasionally activated (9 days of implementation, 1 fire dealt with by air assets).

#### *Loss of human lives*

The measures taken to prevent and fight against forest fires were effective in protecting the population, since there were no casualties among its members, and damage to infrastructure (residential buildings...) was limited.

#### *Operations of mutual assistance*

The favourable conditions made it possible to respond positively to the request for assistance made by the Portuguese authorities during the period of intense activity that they faced at the end of August and early September.

1 reconnaissance aircraft and 2 Canadair (complemented by a third) were made available from August 22 to September 4. The water bombers conducted 259 hours of flight during forty interventions, providing more than 1100 drops, and the reconnaissance aircraft allowed the local national authorities to set priorities and prepare missions with 34 hours of flight.

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

### 2.2.8 FYROM

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 2013 fire season

The fire danger in the 2013 season in Macedonia was at a minimum level. The majority of fires occurred in the late spring and during the summer months.

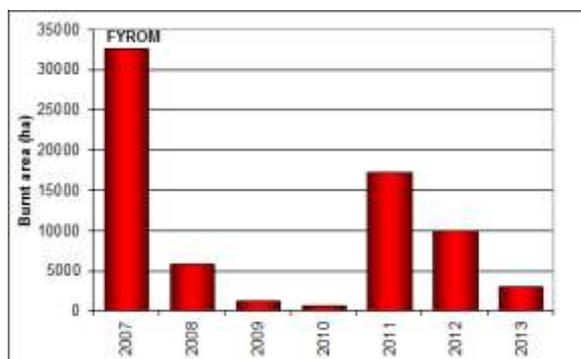
#### Fire occurrence and affected surfaces

During the year 2013 there were 947 fires, of which 186 were forest fires, affecting a total area of 3 027.5 ha. The forest land affected was 1 260.7 ha and 19 % 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 2007-2013 are shown in Figure 14. The number of fires and burnt area according to types of fires are shown in Figure 15.

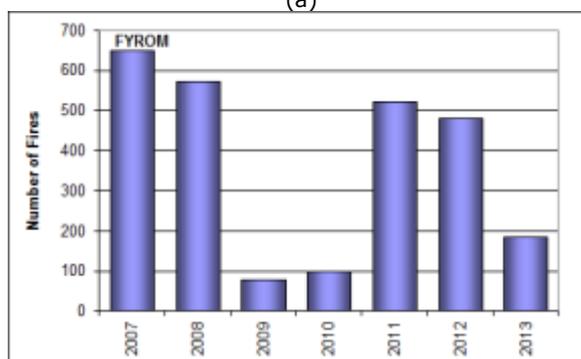
#### Fire fighting means and information campaigns

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.

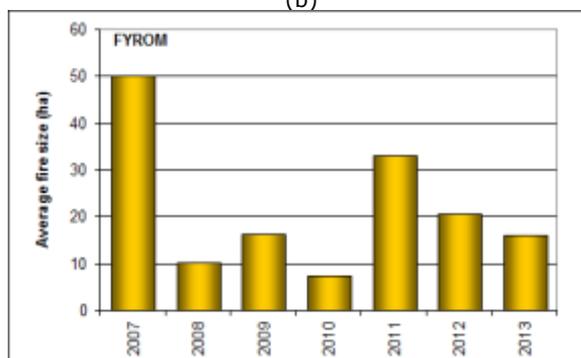
Three planes of the Protection and rescue directorate were also engaged for fire extinguishing during the 2013 forest fires. 309 flights were made, lasting 94 hours during the period of time from July until September 2013.



(a)

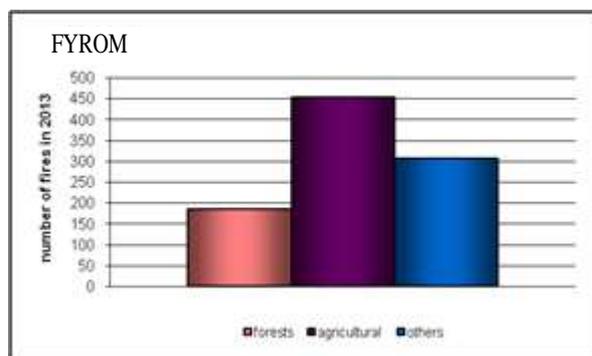


(b)

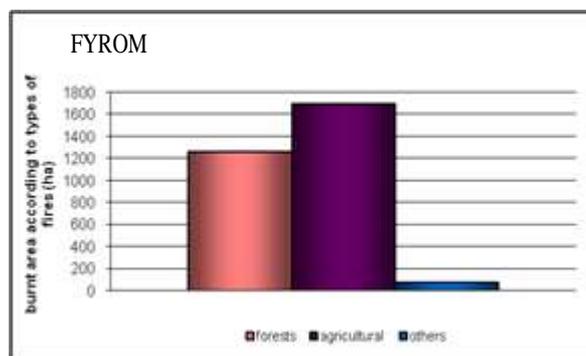


(c)

Figure 14. Burnt areas (a), number of fires (b) and average fire size (c) in FYROM from 2007 to 2013



(a)



(b)

Figure 15. Number of fires (a) and burnt area (b) according to the type of fires in FYROM in 2013

(Source: Protection and rescue Directorate, Sector for analysis and research, FYROM)

## 2.2.9 Germany

### Fire occurrence and affected surfaces

A total of 515 forest fires were reported in Germany in 2013, corresponding to a burnt area of 198.7 ha (37.1 ha in deciduous forests and 161.6 ha in coniferous forests).

This represents a fall in both the number of fires and the burnt area as compared with recent years.

In 2013, the most affected province (Land) in terms of burnt area was Niedersachsen, although Brandenburg recorded more fires. (Table 6). In 2013, 4 Länder (Bremen, Hamburg, Saarland and Schleswig-Holstein) did not record any fires.

Table 6. Burnt area in total and by forest type, and total number of fires, Federal Republic of Germany, 2013

	Burnt area (ha)			Number of fires
	Coniferous forest	Broadleaves forest	Total	
<i>Baden-Württemberg</i>	2.0	2.2	4.1	27
<i>Bayern</i>	26.8	4.1	30.9	45
<i>Berlin</i>	1.0	0.0	1.0	1
<i>Brandenburg</i>	48.4	0.6	48.9	167
<i>Bremen</i>	0.0	0.0	0.0	0
<i>Hamburg</i>	0.0	0.0	0.0	0
<i>Hessen</i>	6.7	2.7	9.5	36
<i>Mecklenburg-Vorpommern</i>	1.4	0.8	2.1	19
<i>Niedersachsen</i>	55.2	11.2	66.4	91
<i>Nordrhein-Westfalen</i>	2.7	0.6	3.2	36
<i>Rheinland-Pfalz</i>	1.0	0.3	1.3	9
<i>Saarland</i>	0.0	0.0	0.0	0
<i>Sachsen</i>	4.4	0.2	4.6	38
<i>Sachsen-Anhalt</i>	11.6	14.2	25.8	37
<i>Schleswig-Holstein</i>	0.0	0.0	0.0	0
<i>Thüringen</i>	0.5	0.3	0.8	9
<b>Germany</b>	161.6	37.1	198.7	515

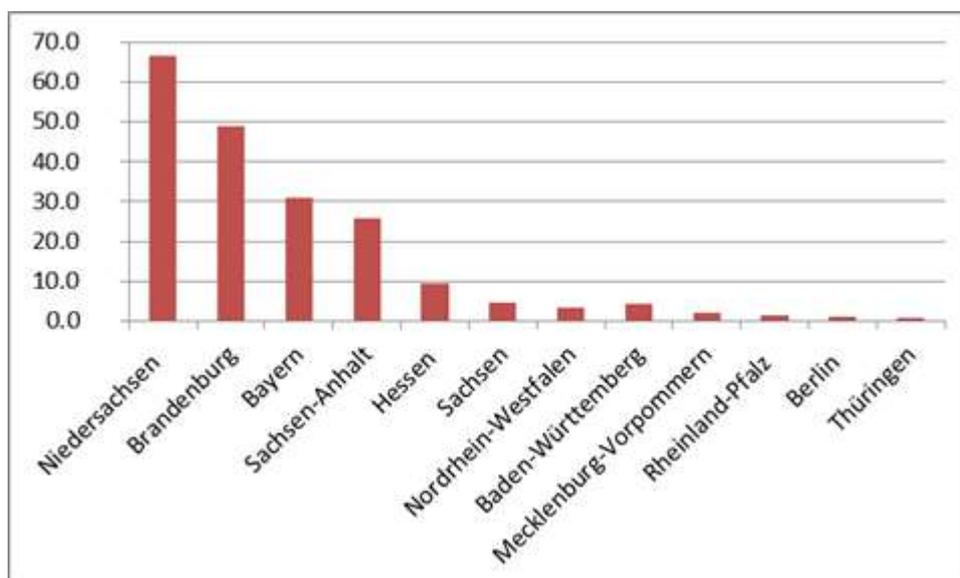


Figure 16. Burnt area in Germany in 2013 by Land

In 2013 the majority of fires occurred in May (229 ignitions, 99.4 ha burnt; Figure 17).

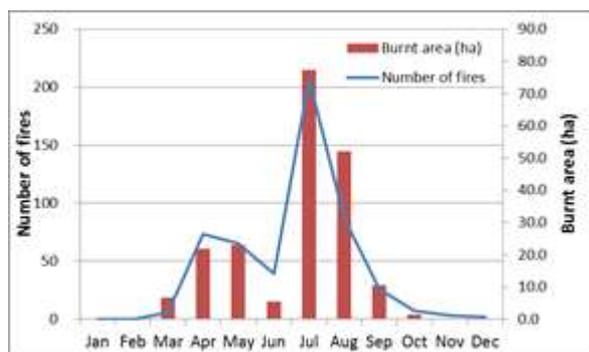


Figure 17. Number of fires and burnt area by month in Germany in 2013

The trend of the burnt areas, number of fires and average fire size in Germany for the years 1991-2013 are shown in Figure 19.

*Fire causes and impacts*

The main causes of forest fires during 2013 are shown in Figure 18. Within the category of negligence fires, the majority (88) were caused by the general public (campers, visitors, children etc.). This is similar to the proportions recorded in 2012, although the numbers are lower.

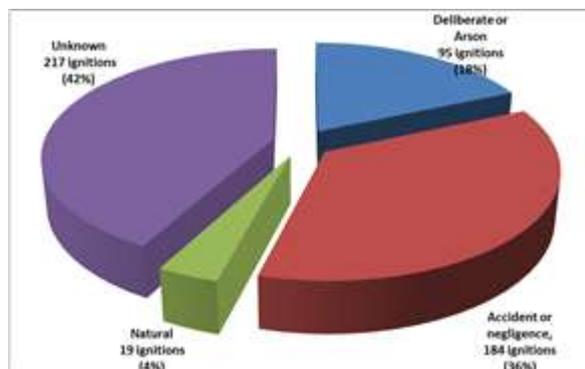
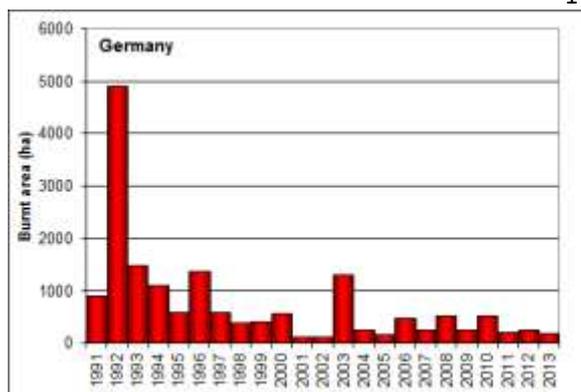
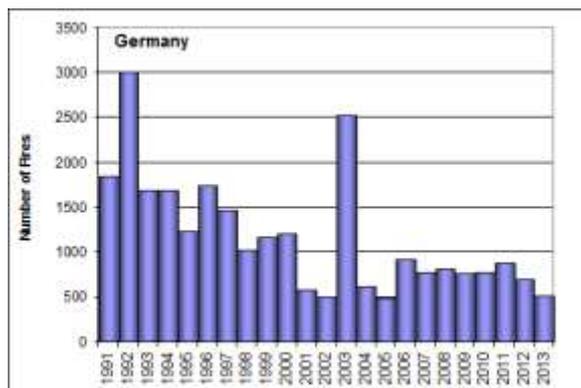


Figure 18. Causes of forest fires in 2013

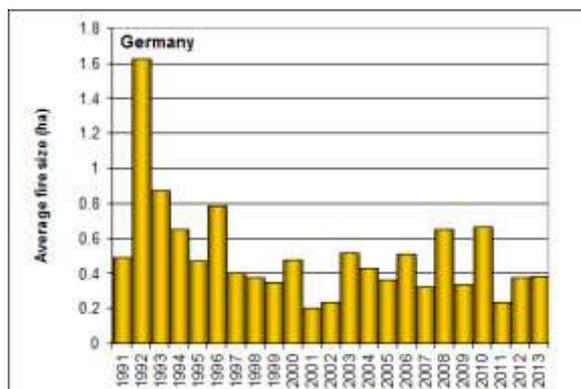
The economic damage caused by forest fires in 2013 is estimated to be 0.5 million Euro, similar to the amount recorded in 2012. The yearly average from 1991 to 2012 is 2.0 million Euro. In 2013, approximately 2.3 million Euro were spent on prevention measures and surveillance activities.



(a)



(b)



(c)

Figure 19. Burnt areas (a), number of fires (b) and average fire size (c) in Germany from 1991 to 2013.

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

### 2.2.10 Greece

#### *Fire danger in the 2013 fire season*

Fire danger through the 2013 fire season remained low throughout the year and it seems that the burned area level remained low as well, in comparison to results from previous years. During the 2013 spring months there was a prolonged period of temperatures above average values, and especially the first 10 days of May was extremely hot. Although one 4-day period of daily maximum temperatures set some records above average values for June over West Greece, the rest of summer was mild without extreme weather conditions all over the country.

#### *Fire occurrence and affected surfaces*

The number of forest fires and burnt area in Greece during 2013 are indicated in Table 7. The results of the fire campaign of 2013 in Greece, constitute combined information according to data available by local Forest Service units and the availability of a mapping of burnt areas for 2013 based on 10 TM satellite images with spatial resolution of 30m. Although the available information concerning the number of forest fires is not complete, the respective information about areas burnt should be satisfactory.

During 2013, a number of around 862 forest fires were recorded. This number is still provisional and it is likely to rise when the compilation of fires is complete; however the

number of forest fires recorded refers to the majority of the 2013 fire incidents and there is no large deviation expected.

From the results up to now, insomuch the records will be probably reformed, the number of fires is relatively medium in comparison to the results of previous years although the burnt area is considerably higher. Compared to the previous year, the burned area was less: 46 676.46 ha, of which 92% occurred in wooded areas.

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

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

The personnel involved in fire suppression was 15 296 persons, of which 8 304 are permanent personnel of the Fire Brigade which deals also with the structural fires, 4 000 personnel employed with five year contracts, 1 492 personnel hired seasonally just for forest fire suppression and 1 500 are volunteer fire fighters.

The Fire Brigade of Greece owns about 1 633 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 2013 campaign are indicated in Table 8.

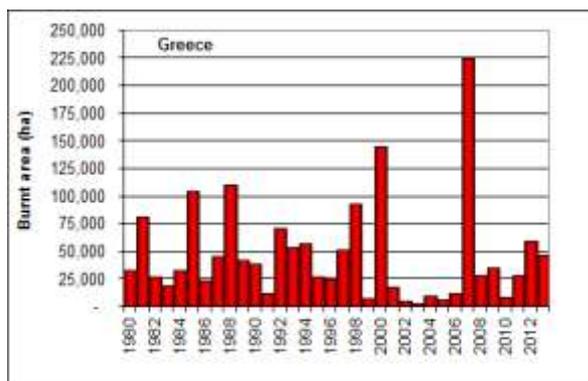
Table 7. Number of fires and burned area in 2013 by regional forest administration

FOREST ADMINISTRATION AUTHORITIES	Total number of fires*	fires <1 ha	fires 1-5 ha	Fires 5-100 ha	Fires 100-500 ha	fires >500 ha	Total Burned area (ha)	Wooded Burned area (ha)	Non wooded Burned area (ha)
Macedonia-Thrace	135	91	26	16	1	1	1 422.89	1 355.38	67.51
Epirus & Western Macedonia	164	110	41	13	0	0	279.93	254.54	25.39
Thessaly and Central Greece	228	132	44	47	4	1	6 455.33	6 112.63	342.69
Peloponnese, Western Greece & Ionian	167	116	22	22	5	2	33 185.60	33 166.20	19.39
Attica	39	22	11	5	1	0	546.06	291.76	254.30
Aegean (Northern & Southern Aegean)	27	13	10	2	0	2	4 471.69	1 786.97	2 684.72
Crete	102	62	28	12	0	0	314.97	300.97	1400
<b>TOTAL</b>	<b>862</b>	<b>546</b>	<b>182</b>	<b>117</b>	<b>11</b>	<b>6</b>	<b>46 676.46</b>	<b>43 268.45</b>	<b>3 408.00</b>

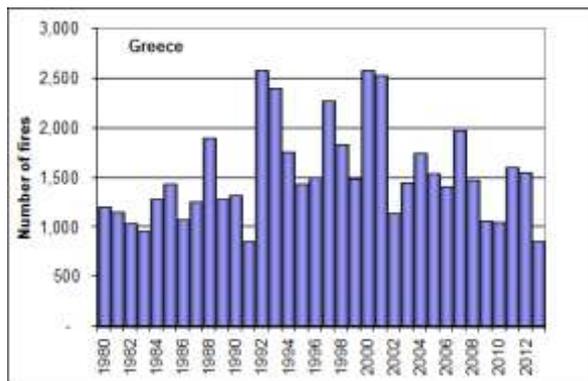
\* Counts not complete

Table 8. Aerial means participating in the 2013 campaign

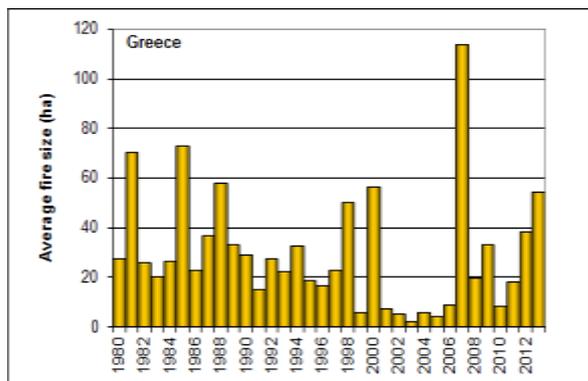
<b>STATE OWNED MEANS</b>			
AIRCRAFT	LARGE	CL-215	8
		CL-415	6
	SMALL	PEZETEL	17
HELICOPTERS		CHINOOK	2
		BK 117 C1	3
		AS 332 L1 SUPER PUMA	2
<b>TOTAL</b>			<b>38</b>
<b>HIRED MEANS</b>			
HELICOPTERS		H/P SIKORSKY 64	3
		H/P KA-32	6
		H/P Mi-8	1
<b>TOTAL</b>			<b>10</b>



(a)



(b)



(c)

Figure 20. Burnt areas (a), number of fires (b) and average fire size (c) in Greece from 1980 to 2013

*Operations of mutual assistance*

During the 2013 fire campaign, international mechanism was not activated.

*Injuries and loss of human lives*

During the fire campaign two persons died. Both of them were citizens. Seven persons suffered from burns (four citizens and three firefighters) and fourteen persons (one citizen and 13 firefighters) were injured.

*(Source: Ministry of Environment, Energy and Climatic Change; Special Secretariat of Forests; General Directorate for Development and Protection of Forests and Natural Environment, Greece)*

### 2.2.11 Hungary

#### *Fire danger in the 2013 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 were some extreme weather situations in 2013. The first five months of 2013 were characterised with lots of rain. From June a drought period started, which lasted throughout the summer until the end of August. Both extreme weather conditions influenced the whole fire season and fire situation.

Fire danger started to rise in June but did not reach the "very high" level last year. There were some short periods (days) when the FWI values reached the "extreme" level in summer, so regional fire bans were ordered nine times by the Forestry Directorates.

#### *Fire occurrence and affected surfaces*

Forest fire data are collected in 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 2007 are shown in Table 9.

Table 9. Number of fires and burnt areas

Year	Total number of wildfires	Forest fires		Other land types
		Number	Burned area (ha)	Number
<b>2007</b>	6691	603	4636	6088
<b>2008</b>	6639	502	2404	6137
<b>2009</b>	8658	608	6463	8050
<b>2010</b>	3120	109	878	3011
<b>2011*</b>	8436	2021	8.055	6415
<b>2012*</b>	21581	2657	13978	18924
<b>2013*</b>	4602	761	1955	3841

*\*From 2011 Fire Database linking between Forestry Directorate and Fire Service*

A total of 761 forest fires were reported with a total burnt area of 1 955 ha in 2013. The number of fires and the total burnt area were lower compared to the previous two years, can be seen in Table 9. 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 40% of the forest fires occurred. Figure 21 shows the locations of forest fires in Hungary in different seasons of the year.

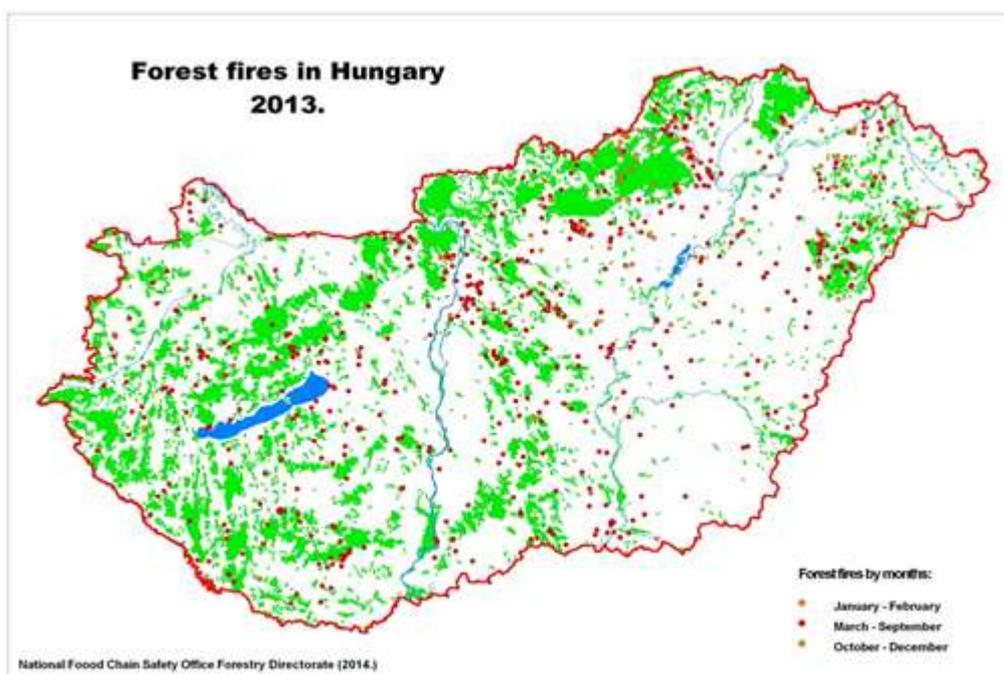


Figure 21. Locations of forest fires in Hungary in 2013

98% of forest fires are surface fires, as shown in Table 10. 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 10. Fires in Hungary 2013 by fire type

Type of forest fire	Number of fires	Total burnt area (ha)
Ground fires	10	3
Surface fires	748	1937
Crown fires	3	15
Total	761	1955

The average proportion of fires smaller than 1 hectare is almost 67%. The average total burnt area was 5.1 hectares in 2013, which is similar to previous years. In 2013 there were only seven fire events when more than 50 hectares were burnt. In most cases about 20% of the total burnt area is forest.

Small fires are usually low intensity surface fires where dry grass and small twigs are burning. In 2013 there was one fire event where more than 100 hectares were burnt. The yearly trends in terms of number of fires and burnt area during the last 14 years in Hungary are shown in Figure 7 below.

#### Fire Causes

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

There are a lot of fires with unknown causes. If the point of ignition is not detected by fire investigators, the cause of the fire is reported as unknown.

Figure 23 represents the tendencies experienced in recent years that there are two most endangered forest fire periods during the year. Due to extremely rainy weather conditions last Spring, there was only one danger period during the year. Although some wildfires were recorded in springtime, until the middle of July there were only a few small outbreaks of forest fires.

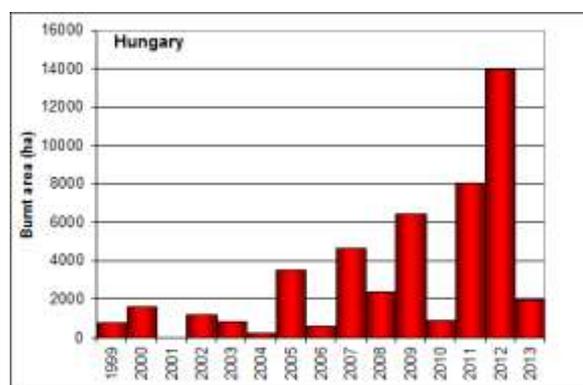
Contrary to recent trends, there were no spring fires last year. In the arid summer period (June-August), forest litter, needles,

dead twigs and branches became totally dry. Negligently lit fires could start easily burning. 85% of forest fires in the summer period were smaller than 1 hectare.

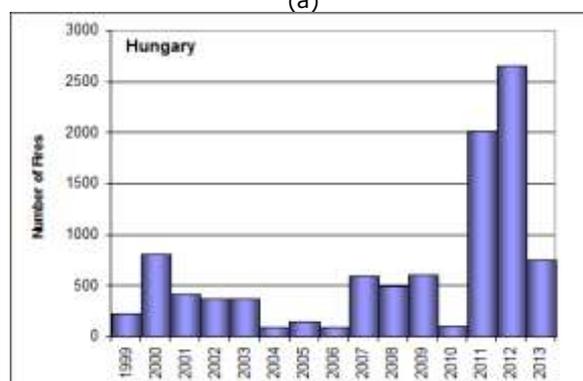
Studying the statistics we can see that a total of 407 hectares of forest were burned or affected by fire during 2013. In addition, more than 1 024 hectares of grass vegetation and 524 hectares of bush vegetation were destroyed in forest fires.

Table 11. Fires by forest type

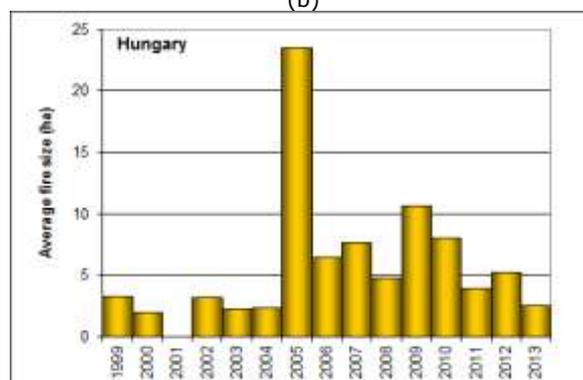
Forest type	Total burnt area (ha)
Forested land	<b>407</b>
Other wooded land	<b>524</b>
Other land	<b>1024</b>
<b>Total</b>	<b>1955</b>



(a)



(b)



(c)

Figure 22. Burnt areas (a), number of fires (b) and average fire size (c) in Hungary from 1992 to 2013.

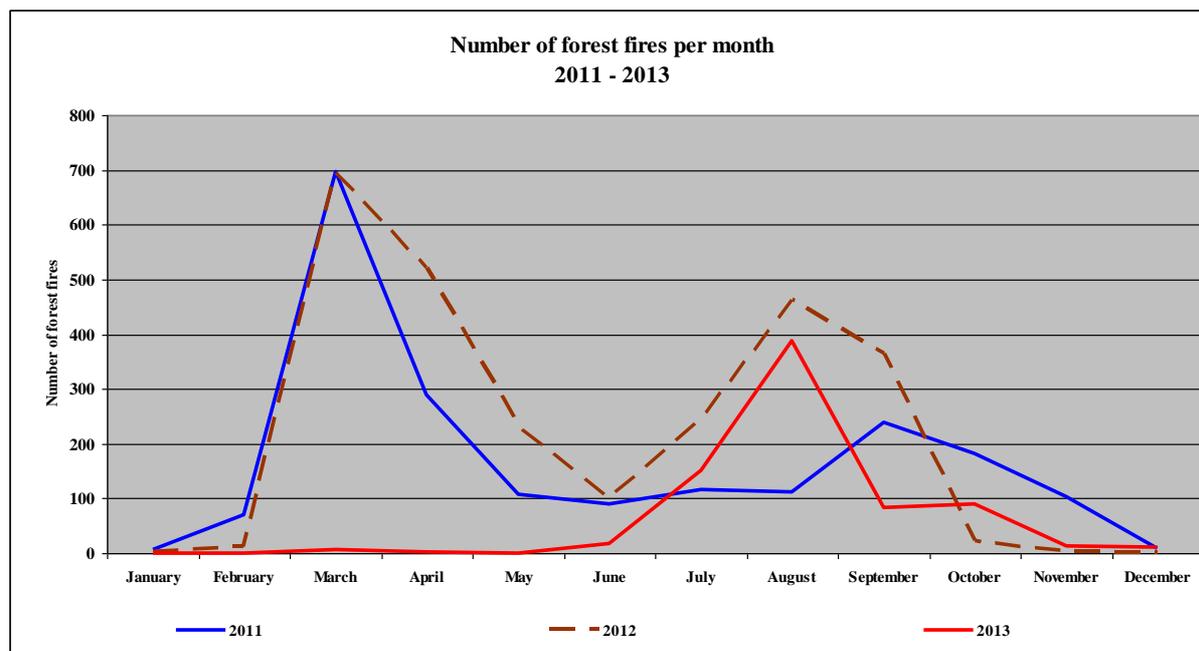


Figure 23. Number of fires per month in Hungary 2011-2013

### *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. National Fire Prevention Committee established by the government has been monitoring all fire prevention activities and the implementation of fire awareness raising campaign.

Fire prevention and firefighting activities were presented by spokesman and members of National Fire Prevention Committee in the media in the frame of awareness-raising campaigns.

Use of data derived from FWI developed by the JRC was also integrated in the fire ban system. Its values were taken into consideration and were analysed throughout the whole fire season supported by JRC.

Representatives of forest authority took an active part in fire prevention training activities organised by fire brigades twice last year. The main goal of trainings was to teach how to the use newly developed fire maps in fire fighting and prevention.

The webpage of the Forestry Directorate has been continuously updated with fire prevention and fire ban information.

The forest authority and Disaster Recovery Directorates jointly controlled the forest areas where forest managers had to make forest fire protection plans.

Two types of brochures about fire prevention developed by forest authority were handed out to visitors of forest and forest managers last year.

### *Operations of mutual assistance and loss of human lives*

There were no casualties among fire fighters or civilian people during fire fighting in 2013. Fire service equipment was not heavily damaged. No death or personal injury occurred during fire fighting in 2013. Neither Fire Service nor Forest Authority served mutual assistance last year.

*(Source: National Food Chain Safety Office; Forestry Directorate, Forest Inspection and Protection Service Unit).*

## 2.2.12 Ireland

### *Introduction*

Fire presents a significant threat to forest resources in Ireland. While the recent focus since 2010/2011 has been on destruction of forest resources, there is now also a much clearer understanding of the impact of wildfire on other critical resources and ecosystem services, most notably upland habitats, water quality and carbon management.

### *Fire incidence levels*

During 2013, over 10 000ha of open land is known to have been affected by fire. 8 900ha of burned land was detected by the European Commission, using MODIS imagery. Of this area, 75% was located within Natura 2000 designated lands, mainly in Co. Mayo, in the North-West of Ireland. The area affected is predominantly Low-level Atlantic blanket peat. Given the low level of fire detection by MODIS in Ireland, it is contended that the actual area affected by fire is significantly greater than the area detected, and may be as high as 15 000ha for 2013, predominantly open non-forest land.

Strong dry easterly conditions in early April created Ideal conditions for fire development and spread and problems with fire were experienced in all western counties, particularly Clare, Galway and Mayo. The main fire danger period occurred during the first week in April, and significant fire activity was recorded in Western counties.

Two fires in Co. Mayo, at over 2 000ha each, were among the largest fires detected in Europe during 2013.

### *Financial losses attributable to fire*

Financial costs of these fires are significant. Coillte (State Forestry Board) losses are known to be 215ha. Private Sector losses are estimated to be in the region of 300ha, with most losses reported in counties Clare and Mayo. Total reconstitution costs for 515ha would be in the region of €1.8 million. Fire Service mobilisations were in the region of 2 400 units and at this level, fire suppression costs, including Coillte/NPWS/BNM costs, could be in the region of €3 million. Coillte firefighting crews backed by aircraft generated significant costs that are borne by the company.

What cannot be measured in financial terms is the disruption to normal fire service operation, and the diversion of emergency services resources away from their main task of saving lives in the community. A number of homes were also threatened during the incidents, and the fires featured on local and national media.

### *Fire prevention activities*

In terms of wildfire management, DAFM Forest Service has been to the fore in developing appropriate prevention and mitigation responses and specialised technical capacity in Ireland. DAFM Forest Service personnel have been heavily involved in the development of Wildfire Interagency Groups and local level partnerships in fire prone counties, with pilot groups operating in Cork, Kerry, Clare and Laois. These groups permit coordination and the sharing of data and information for fire prevention and mitigation activities at local level, and to permit better targeted fire prevention and enforcement measures on the ground.

DAFM also coordinates fire prevention planning and awareness measures, and issues guidance to the relevant sectors affected. During 2013 DAFM issued five Fire warning circulars to the Forestry Sector. These specify the level of risk projected and the type of actions required by forest owners and managers to mitigate this risk. Two Ministerial press releases were also issued to the general media during periods of very high or extreme risk. Forest fire prevention promotional materials and personnel were also available at the Irish Forestry Show and National Ploughing Championships, the largest agricultural event of its type in Europe. A significant advertising and editorial campaign was also mounted within the agricultural and forestry media sector.

Irish Fire Authorities have been forging strong links with authorities in the UK where similar fire issues exist, and in the development of technology transfer between UK and Irish authorities. Officers from DAFM and Irish Fire and Rescue Services attended the UK Wildfire 2013 conference and exhibition in Wales, UK in late 2013. This event provided an ideal background for networking with organisations from the UK and further afield.

Major opportunities exist for future cooperation and inter-regional funding of fire mitigation programmes and for the adoption and adaptation of UK land management policy and practice guides relating to fire management. The recently published Scottish Government Wildfire Operational Guidance is currently being evaluated and is the de facto operational guidance for Irish Fire Services dealing with wildfire incidents.

#### *Fire fighting means*

Fire suppression efforts are usually manual and are generally carried out by county level Fire and Rescue Services. Specialised wildfire units do not exist. Some fire suppression capabilities are retained by Coillte Teoranta the Irish State Forestry Company and Bord na Mona, the State Peatland management company. Contract aviation resources and expertise were used extensively by Coillte and some larger private forestry interests during 2013, with a high degree of success. The state national Parks Service reportedly also utilised helicopter resources at one incident in Co. Mayo.

Given ongoing changes in land management practice, demographics and climate change projections, wildfire is likely to remain a significant issue into the future in Ireland. A major emphasis is therefore placed on the land management aspects of wildfire mitigation and policies and relevant new agriculture support schemes in Ireland will take account of these requirements. Significant work remains in developing a wildfire management culture in Ireland appropriate to the scale and nature of the problem.

The Department of Agriculture, Food and the Marine would like to express thanks to the EFFIS members, JRC teams, and other European partners for assistance received during 2013.

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

There were no known deaths or injuries arising from wildfire activity in Ireland during 2013.

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

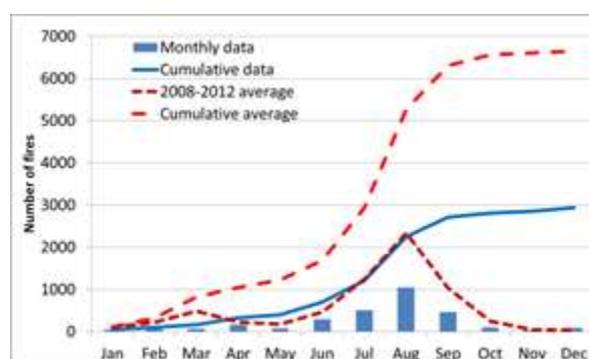
## 2.2.13 Italy

### Fire occurrence and affected surfaces

In 2013 throughout the country 2 936 forest fires burnt a total area of 29 076 hectares, of which 13 437 were wooded.

Compared to the previous year 2012, the total number of forest fires has decreased by 65%, while the total burnt area decreased by almost 80%. The figure appears to be among the lowest in the entire series, well below the long-term average.

The total number of fires is 67% lower than the forty-year long term average of 9 000 events per year. The total area affected by fire was at a historic low, less than 78% of the long-term average.



The average size for a given event was about 10 ha, 77% of the long-term average of around 12 ha. The proportion of woodland affected was 54%, similar compared to last year 2012 and in line with the long-term average.

Over 60% of events and 80% of the total burnt area was concentrated in the southern regions. Sicily and Sardinia appear to be the regions most affected by the phenomenon, together totalling about 25% of the events with more than 50% of the total area burnt by fire. Puglia, Campania and Calabria experienced an additional 30% of the fires, both in terms of number of events or burnt areas.

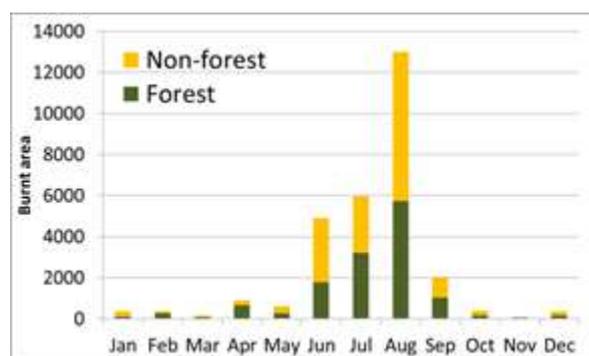


Figure 24. Number of fires and burnt area by month.

Table 12. Number of fires and burnt area in Italy by region in 2013

YEAR 2013	Num. fires	Burnt area (ha)			
		Forest	Non-forest	Total	Av. fire size
PIEMONTE	147	355	349	704	4.8
VALLE D'AOSTA	4	1	3	4	1.0
LOMBARDIA	92	100	393	493	5.4
TRENTINO ALTO ADIGE	38	11	32	43	1.1
VENETO	31	3	5	8	0.3
FRIULI VENEZIA GIULIA	51	1166	271	1437	28.2
LIGURIA	139	242	20	262	1.9
EMILIA ROMAGNA	34	10	16	26	0.8
TOSCANA	209	90	55	145	0.7
UMBRIA	21	24	20	44	2.1
MARCHE	14	17	6	23	1.6
LAZIO	198	1177	224	1401	7.1
ABRUZZO	41	84	229	313	7.6
MOLISE	63	91	277	368	5.8
CAMPANIA	319	751	313	1064	3.3
PUGLIA	357	1579	1739	3318	9.3
BASILICATA	126	391	546	937	7.4
CALABRIA	292	1714	1095	2809	9.6
SICILIA	458	2083	3006	5089	11.1
SARDEGNA	302	3548	7040	10588	35.1
<b>TOTAL</b>	<b>2936</b>	<b>13437</b>	<b>15639</b>	<b>29076</b>	<b>9.9</b>

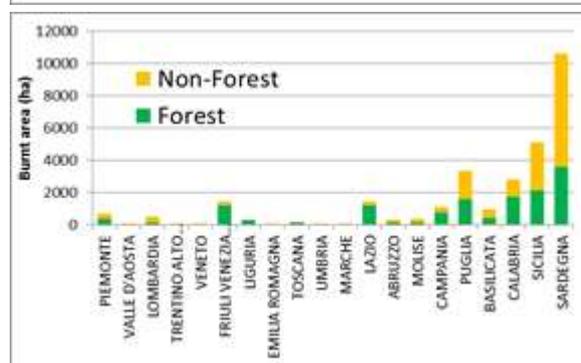
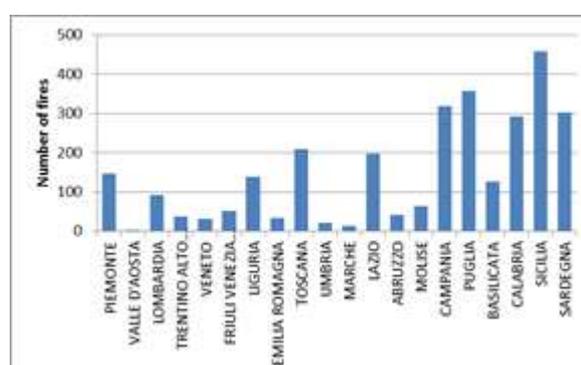


Figure 25. Number of fires and burnt area by region in 2013

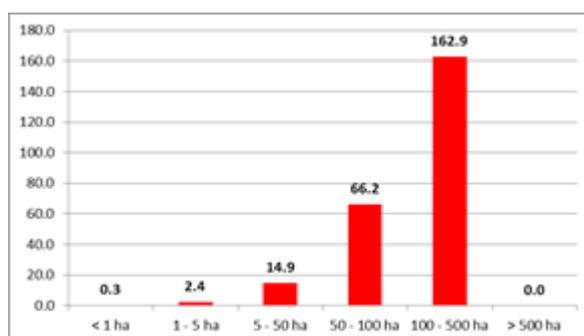
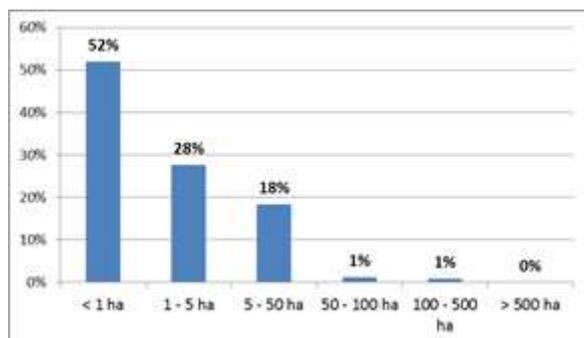
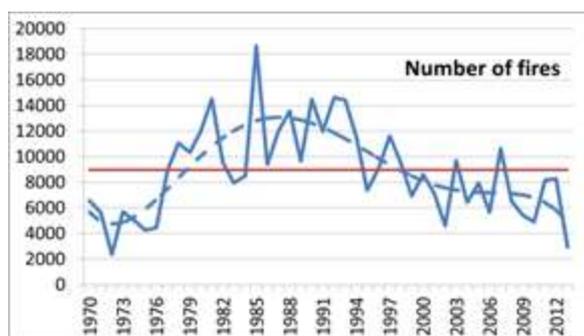
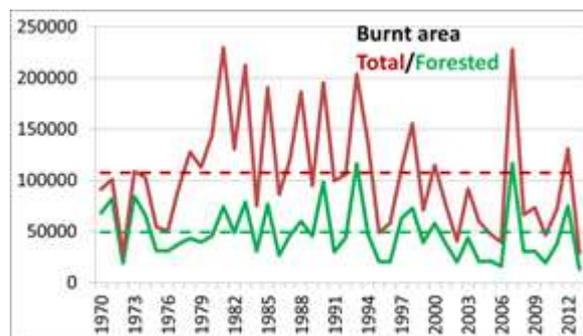


Figure 26. Number of fires and burnt area in 2013 classified by fire size class.

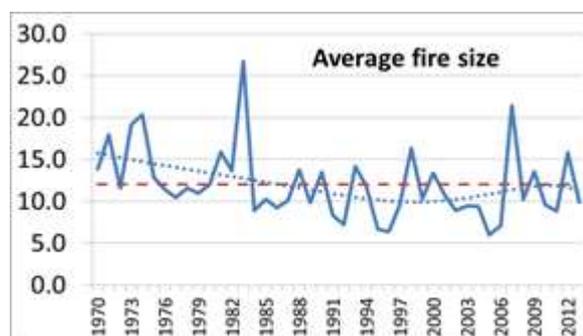
The complete archive of data on forest fires collected by the *Corpo Forestale dello Stato* (State Forestry Corps) is available from 1970 to present. The number of fires increased in the 1970s, then remained less than 10 000 per year until 1978, when there were over 11 000 fires, to remain consistently 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 to 42 000 in the last 8 years. 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 45 000 in recent years.



The average burnt area per fire has decreased progressively over the decades, from 13.5 to 12.7 hectares in the 1970-80s, to 10.6 for the period 1990-1999, with a slight rise in the years 2000-2007 to 10.8 hectares. The year 2012 saw a considerable increase due to the large areas that affected Sicily, while the average of other regions has stabilized at a value of 10.5 in line with the long-term.



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

#### Fire prevention activities

The *Corpo Forestale dello Stato*, 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 *Corpo Forestale dello Stato*, also through the research of evidence collected at the scene of fires and the analysis of residues of explosives and triggers.

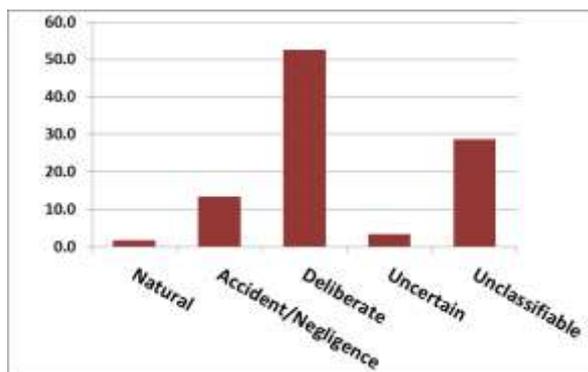


Figure 27. Fire causes in Italy in 2013

Actions against forest fire offences made by the territorial State Forestry Corps in 2013, made it possible to report 300 people to the Judicial Authority, including 238 for negligence fires and 62 for arson. Of these, 7 people were arrested, pursuant to custodial measures for arson, while 293 were released on caution.

In total, over the period 2000-2013, 5 302 people have been reported to the Judicial Authority for the forest fire offences, of which 171 were arrested in the act or were subjected to official cautions.

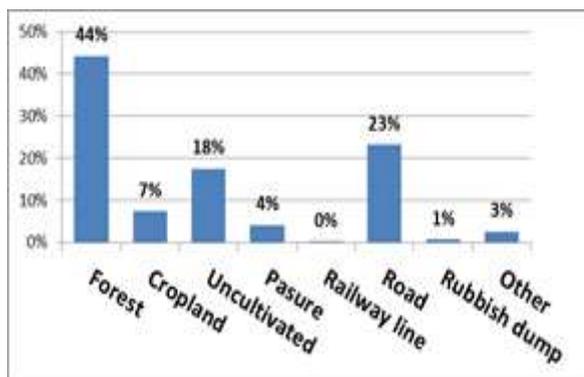
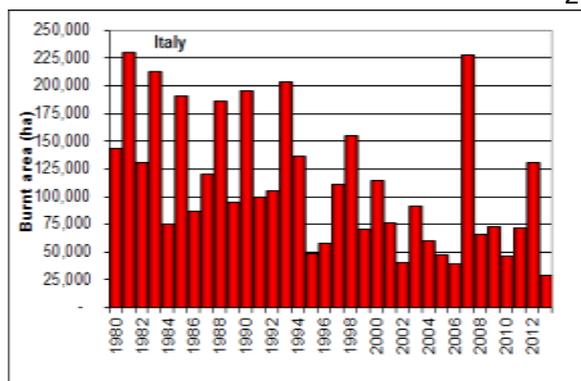
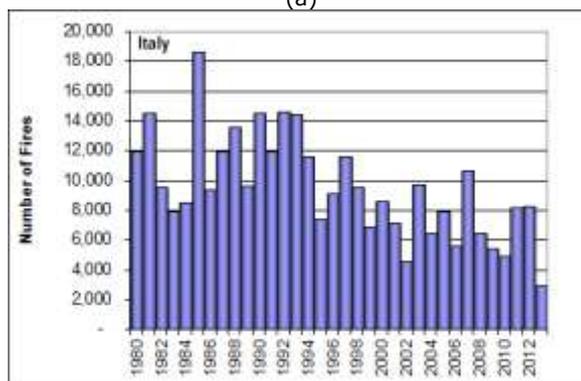


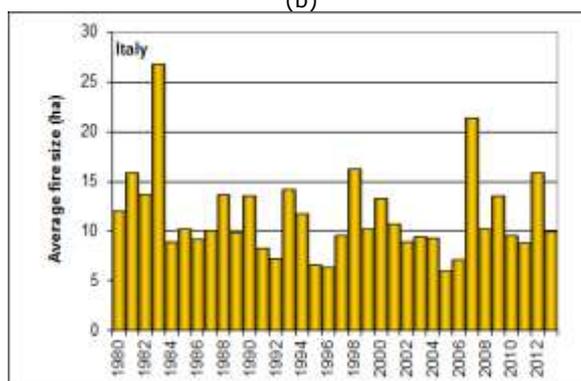
Figure 28. Initial location of fires in Italy in 2013



(a)



(b)



(c)

Figure 29. Burnt areas (a), number of fires (b) and average fire size (c) in Italy from 1980 to 2013.

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

### 2.2.14 Latvia

#### *Fire danger in the 2013 fire season*

In 2013 the forest flammable period was set from first of May and continued until September 16.

#### *Fire occurrence and affected surfaces*

In total, 422 forest fires were discovered and extinguished in 2013 during which 217 hectares were burnt. Of these, 78 hectares of forest, 92 hectares of young stands and 47 hectares of other wooded land were affected.

Table 13 shows the distribution of numbers of fires and burnt areas by month during the fire season, and Figure 31 shows the locations of the fires in 2013.

In 89 % of cases the fires were detected and put out before the burned area had reached 1 hectare.

Traditionally, the highest number of forest fires was in the vicinity of the two Latvia's biggest cities – Riga and Daugavpils (128 fires, 56.7 hectares affected area, and 85 fires, 19.5 hectares, respectively).

In 2013 the State fire and rescue service extinguished 2316 wildfires. The total burnt area is nearly 1 885 hectares.

Table 13. Number of fires and burnt areas by month

Month	Number of forest fires	Burnt area (ha)
March	7	0.8
April	42	62
May	108	69.46
June	61	8.3
July	114	50.04
August	62	24.03
September	23	2.3
October	4	0.04
November	1	0.03
<b>Total</b>	<b>422</b>	<b>217</b>

The yearly trends in terms of number of fires and burnt area during the last 21 years in Latvia are shown in Figure 30.

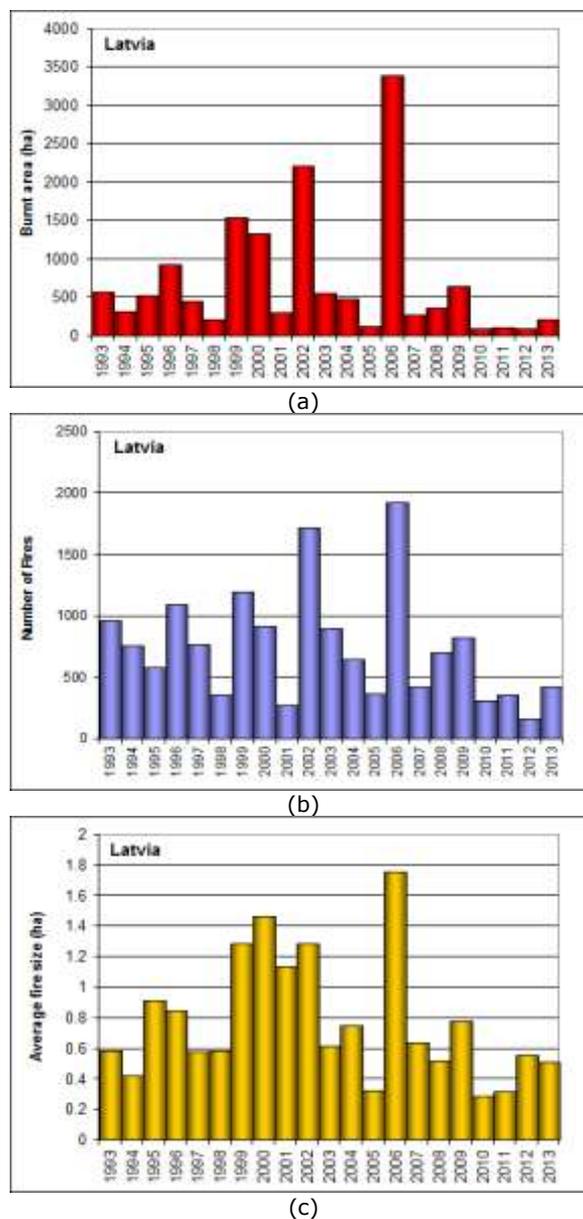


Figure 30. Burnt areas (a), number of fires (b) and average fire size (c) in Latvia from 1993 to 2013.

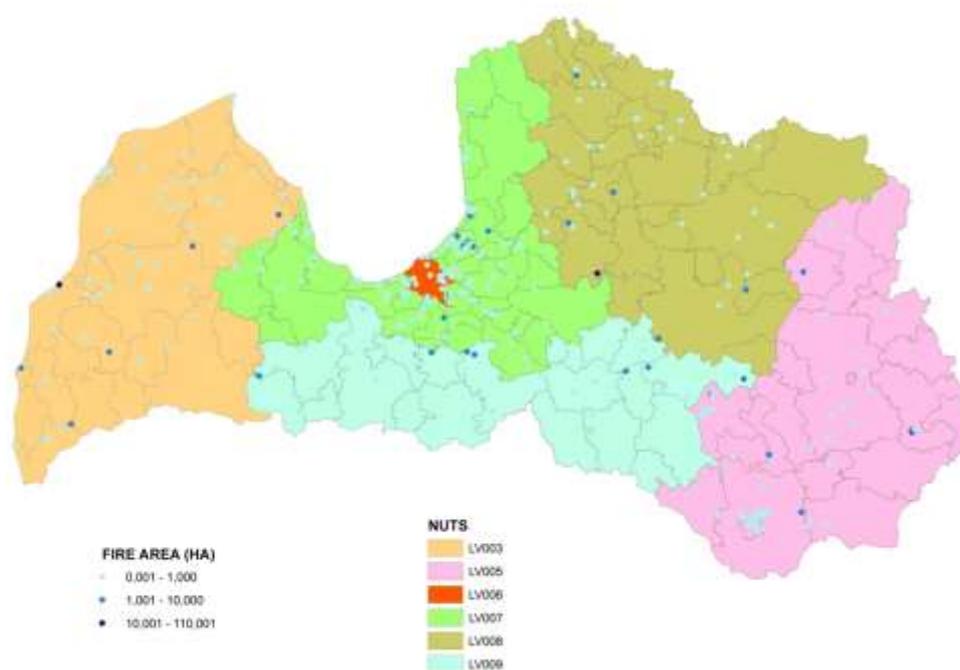


Figure 31. Map of forest fire locations in Latvia in 2013

#### Preventive measures

Under the acts of law, fire prevention measures are imposed on forest owners (managers). In 2013 joint stock Company "Latvian state forests" which manages state-owned forests (1.59 million hectares) spent 54922 LVL on fire preventive measures, and Ltd. company "Riga city forest" which manages forests belonging to Riga municipality (66.5 thousand hectares) spent 1600 LVL. (Table 14).

Table 14: Expenditure on fire prevention measures in Latvia in 2013

Title	Costs, LVL
<i>Latvian State forest</i>	
Creating new fire breaks, 15km	3268
Existing fire break cultivation, 3445km	48654
Water point, warning sign renovation	3000
<b>Total</b>	<b>54922</b>
<i>Riga City Forest</i>	
Creating new fire breaks, 6km	1600
Existing fire break cultivation, 504km	
<b>Total</b>	<b>56522</b>

#### Loss of human lives

No lives were lost in 2013, but wildfires destroyed 44 buildings and 2 vehicles.

#### New equipment

In 2013 the State forest service bought 1 new MB Unimog U4000 forest fire truck. The fire truck was equipped in Lithuania by the company JSC "Iskada". The State forest service is very excited about this investment, because in time we can slowly replace the Soviet made GAZ66 firetrucks, whose average age is almost 25 years.



(First from left side – Balvu forest fire station chief, Mr. J.Prancāns with fire-brigade and head of Austrumlatgales regional forestry, Mr. E.Upenieks)

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

### 2.2.15 Lithuania

#### *Fire danger in the 2013 fire season*

Forest fires during the year 2013 in Lithuania settled at a low level. The amount of wildfires and the total burnt area was very low. The number of fires was influenced substantially by the weather conditions in spring and summer.

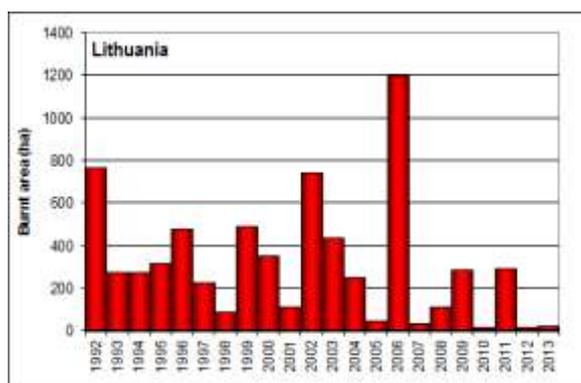
#### *Fire occurrence and affected surfaces*

In 2013, according to the data of the Directorate General of State Forests, 123 forest fires occurred and damaged 25 ha of forest.

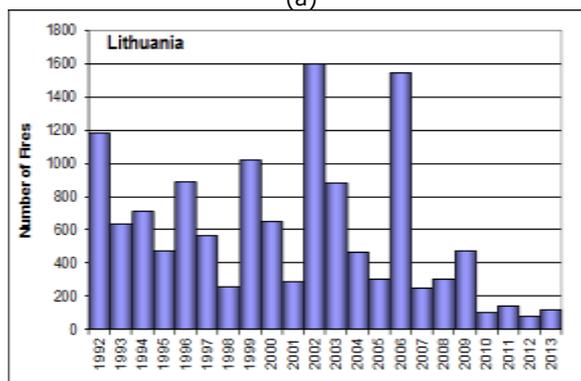
The average fire area in 2013 was 0.20 ha. All fires were less than 4 ha. The highest number of forest fires occurred in May (34 %). The total damage was estimated to be 21 000 euro. The yearly trends in terms of number of fires and burnt area during the last 22 years in Lithuania are shown in Figure 7 below.

#### *Fire prevention activities*

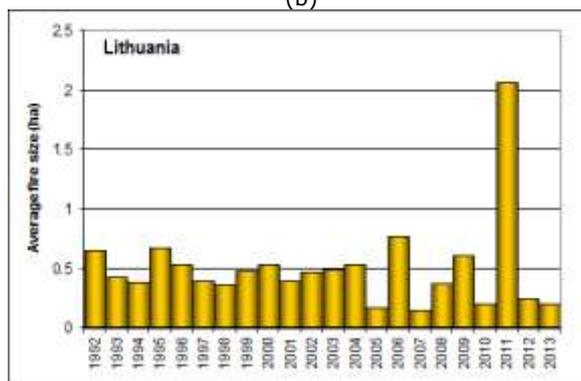
The Directorate General of State Forests under the Ministry of Environment organizes the establishment of the uniform system of state fire prevention protection measures. Annual contracts between Lithuanian Hydrometeorological Service and Directorate General of State Forests are signed concerning calculations 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/misku\\_gaisr\\_mu.php](http://www.meteo.lt/misku_gaisr_mu.php). 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 1 600 thousand EUR from their own funds in 2013, and 13 thousand km of firebreaks were mineralized.



(a)



(b)



(c)

Figure 32. Burnt areas (a), number of fires (b) and average fire size (c) in Lithuania from 1992 to 2013.

#### *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 2013.

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

## 2.2.16 Norway

### *Fire danger in the 2013 fire season*

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

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

In 2013 the average temperature was 1.1 °C above the normal for the Forest Fire season. April had normal temperature, May was the hottest month since records began, June was normal, July was above normal and August had normal temperature. The precipitation was 130% above the normal For the Forest Fire Season and June was very rainy with 160% above the normal. There were some dry periods at the end of May and in July. There were large variations across different parts of the country.

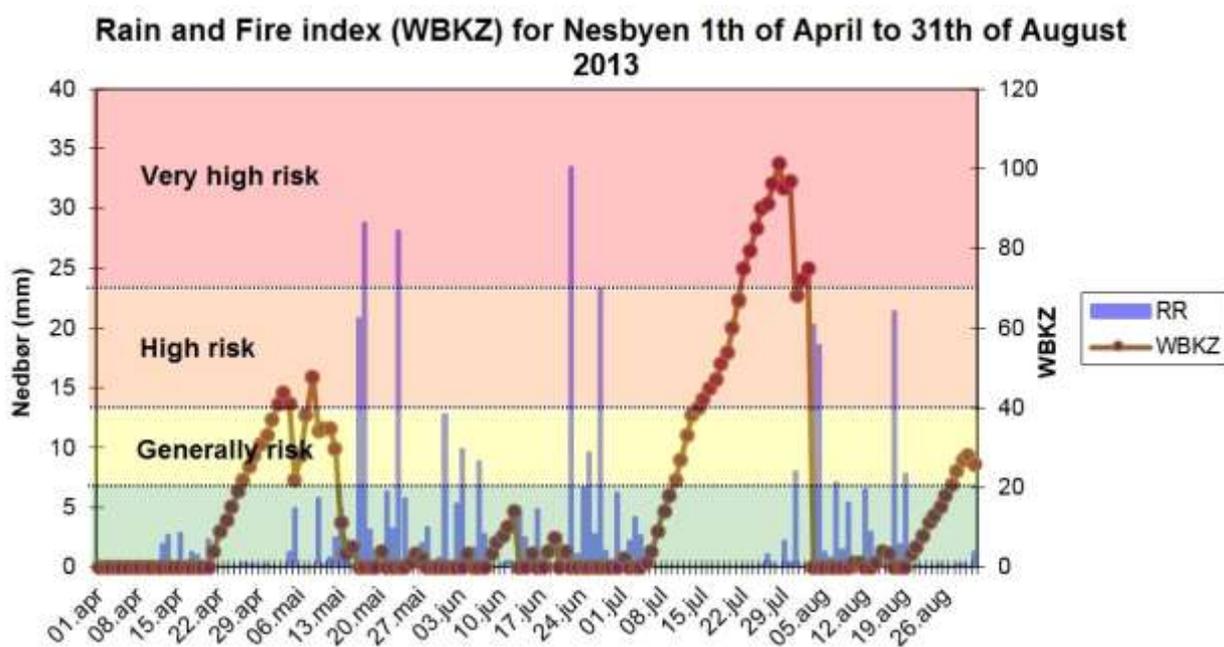


Figure 33 Fire Index WBKZ and rainfall in the southern part of Norway in 2013.

### *Fire prevention activities*

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

The Fire Services are responsible for the following activities:

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

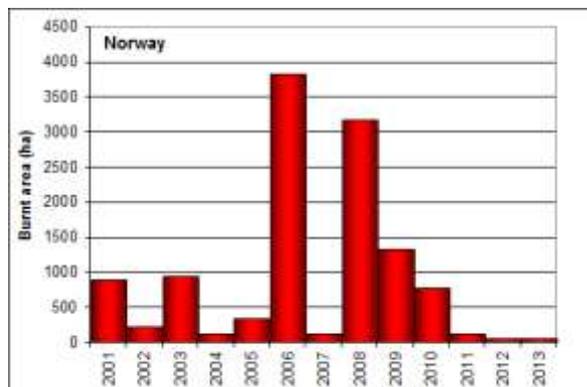
The Governmental Authorities are responsible for the following activities:

- a. Provide information on the forest fire index through the internet (The Norwegian Meteorological Institute);
- b. Provide information through television (Forecast) when the forest fire index is high (The Norwegian Meteorological Institute);
- c. General prohibition on lighting fires in the forest or wildland in the period from 15 April to 15 September, regulated by law. (Directorate for Civil Protection).

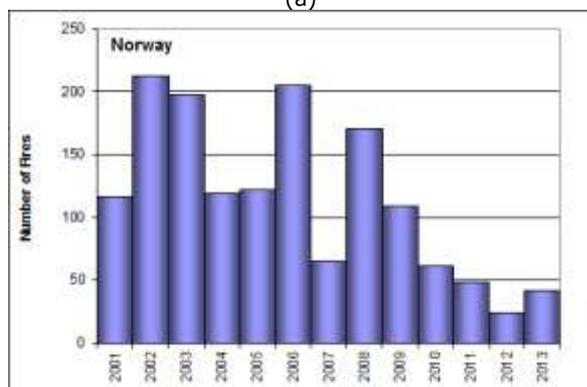
### Fire occurrence and affected surfaces

In 2013 there were 42 recorded fires in Norway; 16 ha of productive forest and 31 ha of other wooded land (wildland).

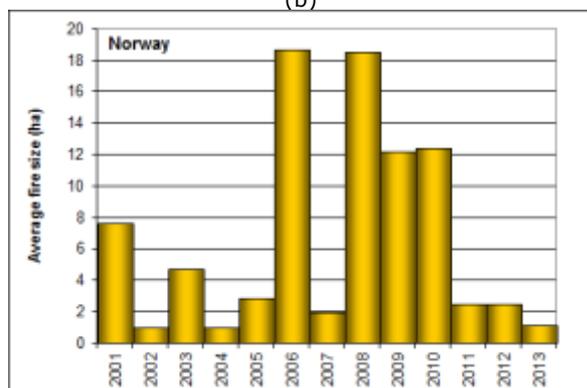
942 fires were recorded in brush and grass (non-forest).



(a)



(b)



(c)

Figure 34. Burnt areas (a), number of fires (b) and average fire size (c) in Norway from 2001 to 2013 (NB. Probably underreported).

### 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 dry periods the preparedness can be increased by involving more helicopters.

In 2013, the helicopter(s) were used in nine fires with around 36 hours in the air. The total use of helicopters came to 62 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 2013.

### Operations of mutual assistance

There were no operations of mutual assistance in 2013.

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

## 2.2.17 Poland

### Fire danger in the 2013 fire season

The seasonal nature of the occurrence of fires is strictly related to the weather conditions. The diagrams (Figure 35-Figure 39) show the variations of air temperatures, precipitation, pine (*Pinus sylvestris* L.) litter moisture, relative air humidity and the national degree of forest fire danger risk (NDFDR) in the 2013 fire season. They also present the number of fire outbreaks.

The mean monthly air temperatures were close to the long-term mean values in the entire country (2001-2010). In April air temperatures were lower than the long-term mean values for this month, which at 9 a.m. systematically increased during the month from 0 to 17°C, while not exceeding 10°C in the first half of the month. For the two first weeks the country was covered by snow, as the result of intensive snowfall at the beginning of the month. At 1 p.m. the air temperature rose from 2°C, and in the last days of the month exceeded 25°C. In May the air temperature significantly increased and was on average 16.5°C at 9 a.m. and 20.5°C at 1 p.m. In June the air temperature increased by over 3.1°C at 9 a.m. and 2.8°C at 1 p.m. In July the air temperature increased again and reached 21.2°C at 9 a.m. and 25.9°C at 1 p.m., and was the highest in the fire season. In August the air temperature was also on the high level and reached 19.7°C at 9 a.m. and 25.5°C at 1 p.m. Then it decreased in September to 12.1°C at 9 a.m. and 17.1°C at 1 p.m.

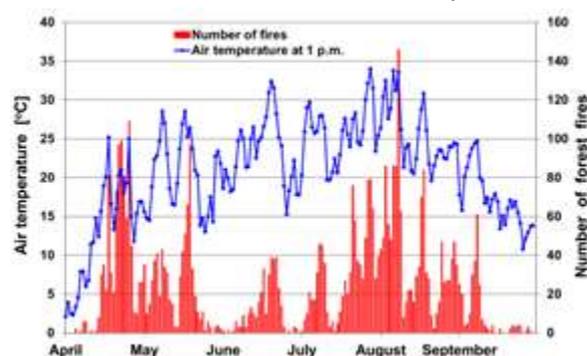


Figure 35. Air temperatures and numbers of forest fires in fire season 2013

The average precipitation level in the fire season was about 18.5% lower than the long-term mean value. In April and May it rained almost every day. The average daily precipitation in April was 1.4 mm, and 2.8 mm in May. In June there was violent rainfall which exceeded 20 mm daily (on 26th of June). The average rainfall in June was the highest (3.4 mm). July was a very dry

month, with average rainfall of 1.7 mm. It was similar in August, when the average rainfall reached 1.4 mm daily. In September the rainfall was double that of a year ago, with the daily average 2.7 mm.

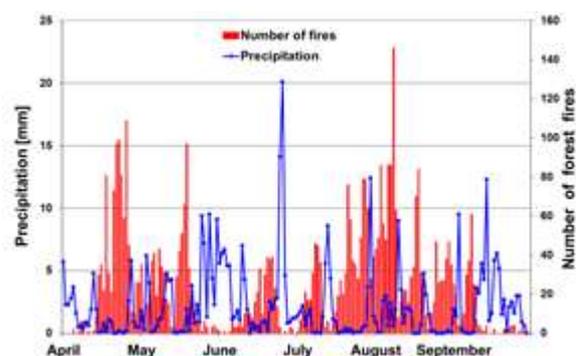


Figure 36. Precipitation and numbers of forest fires in fire season 2013

The measurement of litter moisture in all prognostic points was possible only from the second half of April, after snowmelt. Mean litter moisture values in the 2013 fire season were similar to long-term mean values. The lowest mean litter moisture values were in July and August, with values of 26-27% at 9 a.m. and 20-21% at 1 p.m.; however they were considerably greater in April, May and June, i.e. between 31-34% at 9 a.m. and 25-28% at 1 p.m. In September the litter moisture was the highest in the fire season: 43% at 9 a.m. and 39% at 1 p.m.

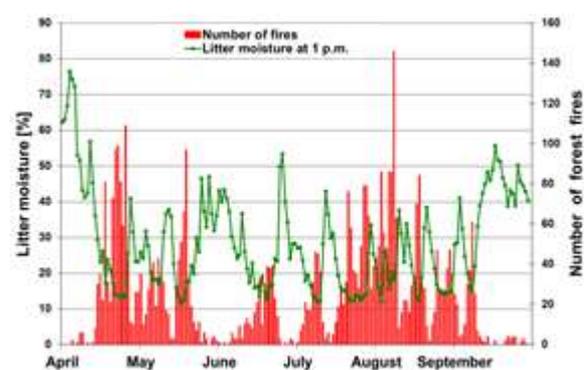


Figure 37. Litter moisture and numbers of forest fires in fire season 2013

The mean relative air humidity for the fire season 2013 was also similar to the long-term values. Relative air humidity was on similar levels in April, May and June, i.e. from 73-76% at 9 a.m. and 58-60% at 1 p.m.; however it was lower in July and reached 72% at 9 a.m. and 54% at 1 p.m. In August relative air humidity increased to 76% at 9 a.m., but decreased to 51% at 1 p.m., and it was the lowest average value in the fire season. The highest relative air humidity in the fire season was in September: 90% at 9 a.m. and 67% at 1 p.m.

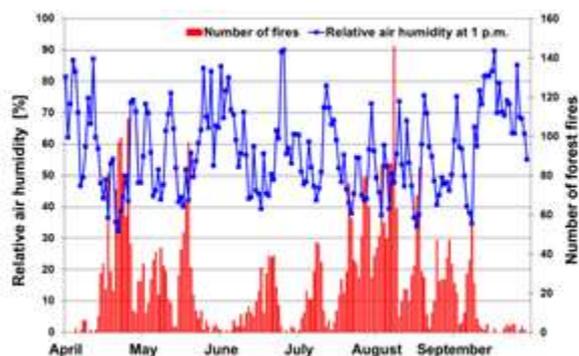


Figure 38. Relative air humidity and numbers of forest fires in fire season 2013

The average national degree of forest fire danger (NDFD<sub>r</sub> = 1.5) in the season 2013 was lower by 0.1 compared with the period 2001-2010. The highest forest fire danger occurred in July (NDFD<sub>r</sub> = 1.9). The lowest forest fire danger was in September (NDFD<sub>r</sub> = 0.7) and it was the lowest value compared with the long-term period. The share of occurrence in the third level of forest fire danger for the fire season was 26% on average, similar to the long-term period. In July it reached its maximum value of 37%. But in September it was only 6%.

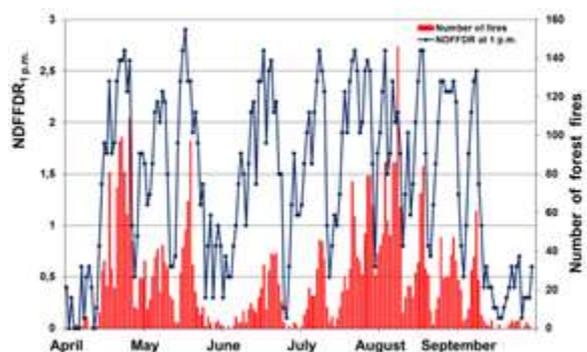


Figure 39. The National Degree of Forest Fire Danger Risk and numbers of forest fires in fire season 2013

*Fire occurrence and affected surfaces*

In 2013 in Poland, a total of 4 883 fires broke out (3 168 forest and 1 715 other non-wooded natural land), four thousand less than in 2012 (9 265 fires), with a surface area of 1 289 ha (810 forest and 478 ha other non-wooded natural land), about five times less than in 2012 (7 235 ha) - Table 15 and Figure 42.

The greatest proportion of fires occurred in August (26.8%; i.e. 1 307) - Figure 40. August was followed by July (19.2%), April (17.5%) and May (14.6%). The lowest number of fires in the fire season (April – September) occurred in September (5.3%) and June (7%). 90.4% of fires occurred in the fire season.

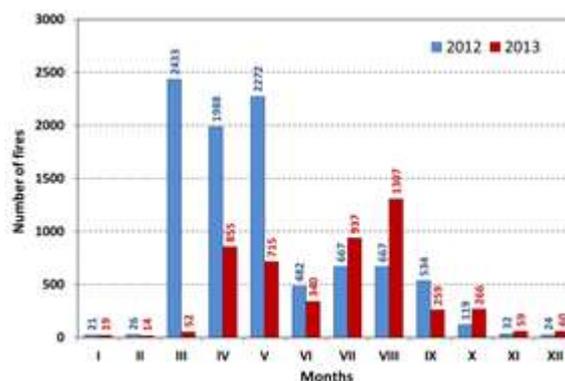


Figure 40. Distribution of number of forest fires by months in 2012 and 2013 in Poland

The largest number of fires in 2013, similar to last year, occurred in Mazowieckie Province (23%; i.e. 1 126 fires).

The lowest number of forest fires occurred in Opolskie Province (86) and Warmińsko-Mazurskie Province (120).

The largest burnt forest areas were recorded in:

- Mazowieckie Province (296 ha),
- Śląskie Province (196 ha),
- Podkarpackie Province (176 ha),
- Świętokrzyskie Province (169 ha).

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

Small forest fires; i.e. with a surface area of less than 1 ha, represented 95.8% of all the forest fires in 2013 (Figure 41), with the burnt area amounting to 50.7%.

The fires with a surface area of between 1 ha and 10 ha represented 38.9% of the burnt area, with their number representing only 4.1%.

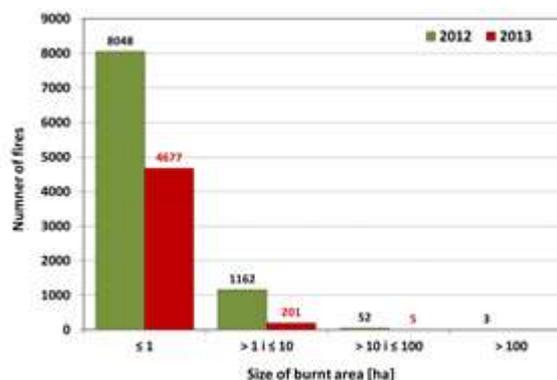


Figure 41. Distribution of the number of forest fires by size of burnt area in the years 2012 and 2013 in Poland

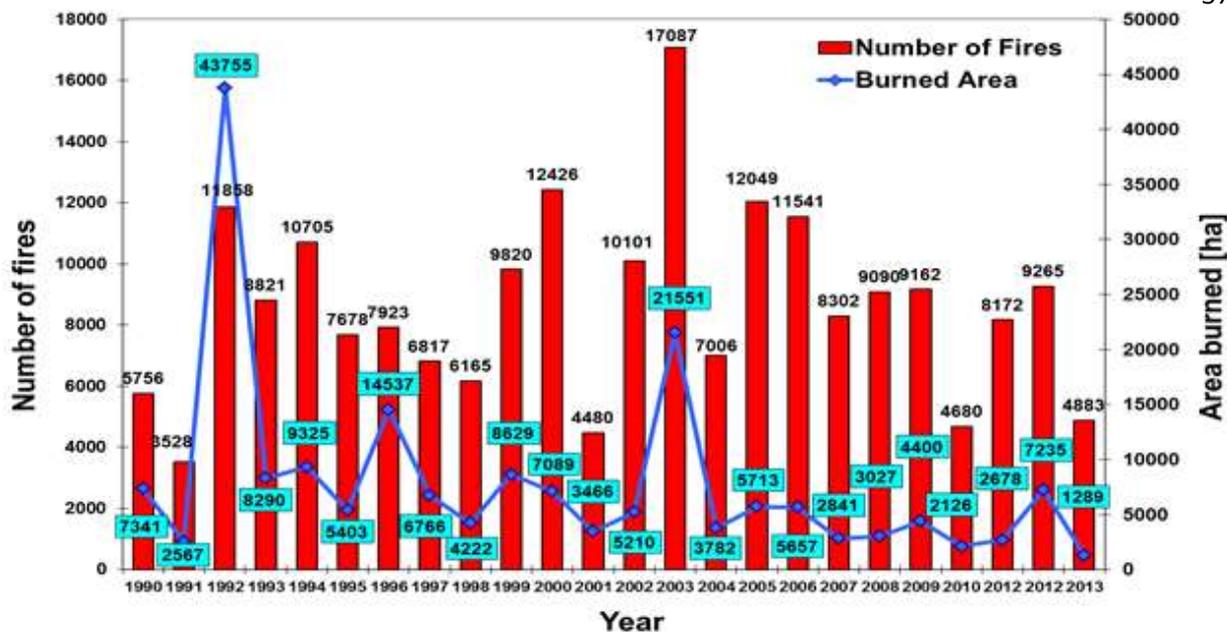


Figure 42. Total number of fires on high forest and area burned in Poland in the period 1990-2013

Table 15. Forest fires in Poland in the period 2007-2013

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

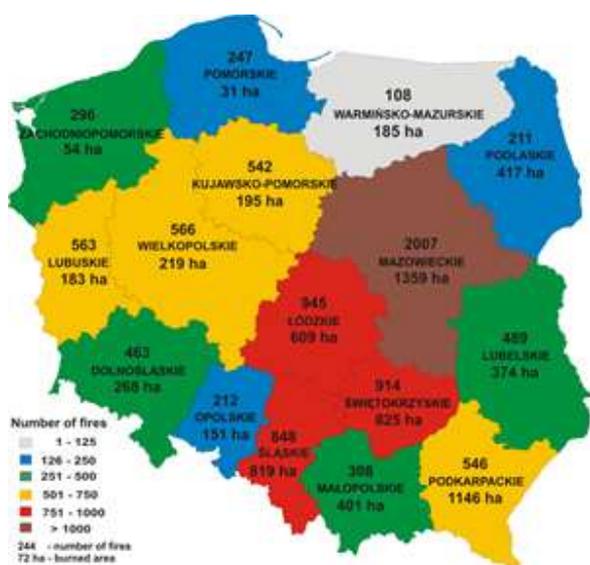


Figure 43. Number of forest fires and burned areas by provinces of Poland in 2012

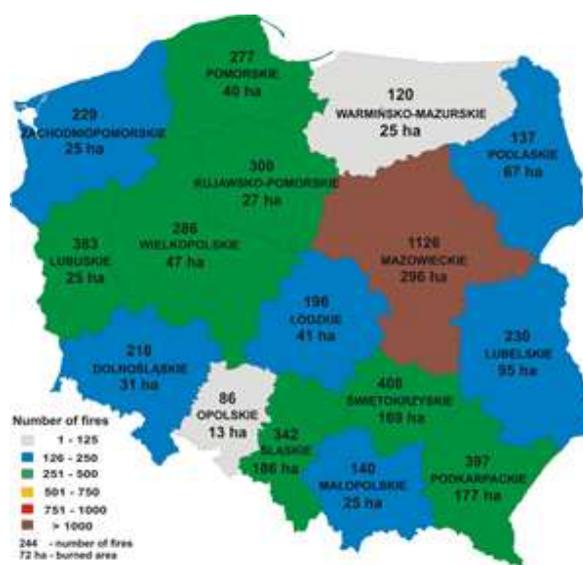


Figure 44. Number of forest fires and burned areas by provinces (NUTS2) in 2013

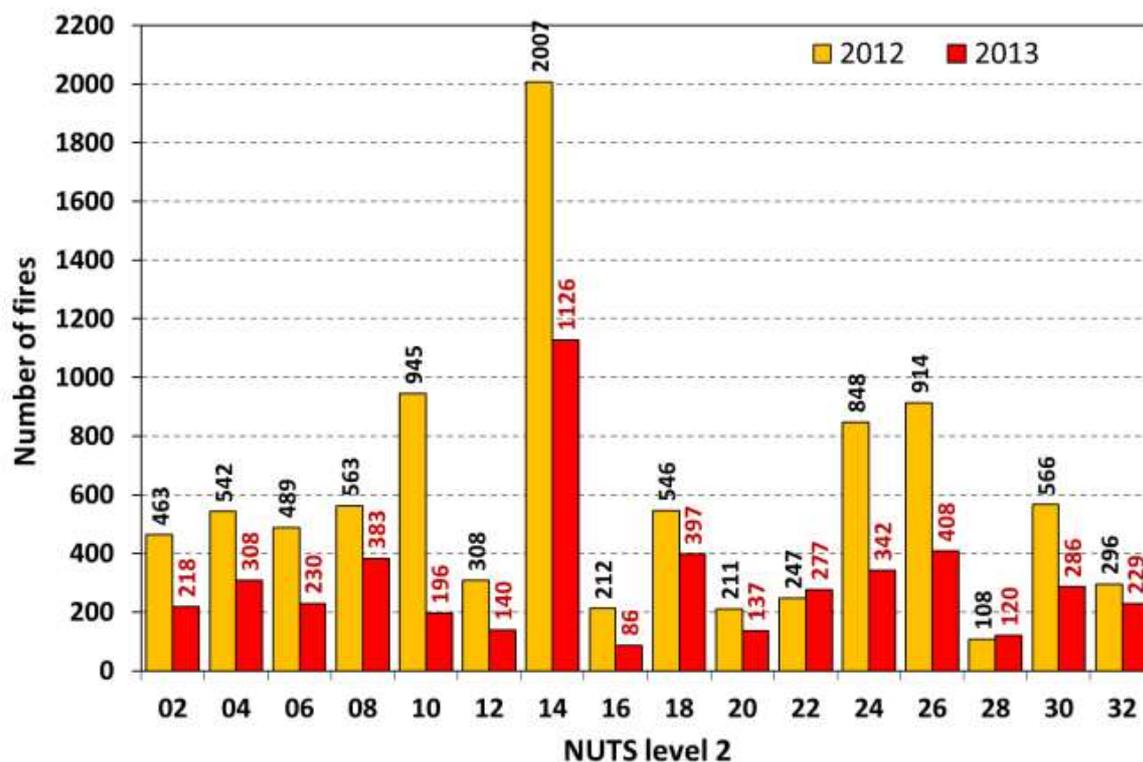


Figure 45. Distribution of the number of forest fires by province (NUTS2) in 2012 and 2013 in Poland

#### Fire fighting means and information campaigns

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

26 fire suppression airplanes and 7 helicopters,  
382 patrol and fire suppression vehicles,  
13 medium and heavy vehicles,  
262 portable pumps.

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

In 2013, as part of information and promotion activities, the following measures in the State Forests NFH were taken:

- about 10 thousand lectures in schools and youth camps,
- about 7 thousand information boards were erected,
- more than 400 interviews into the radio and the television were given,
- more than 1 000 communications were provided in the mass media on fire danger and the principles of safe behaviour in forests,
- about 120 thousand posters, information leaflets and calendars related to forest fires were disseminated.

#### Fire causes

Human activity was the main cause of forest fires; specifically arson represented almost half of the fires (42.4%), followed by negligence (26%) and unknown causes (22.1%). (Figure 46).

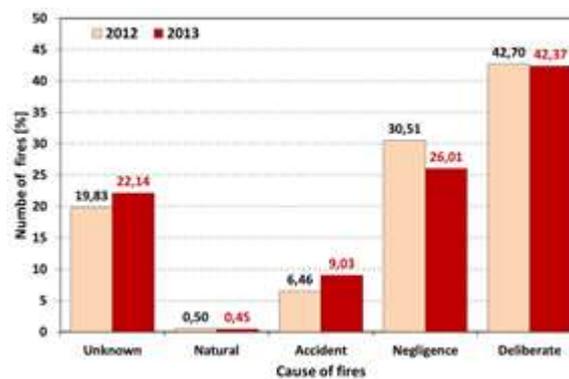


Figure 46. Distribution of the number of forest fires by causes in 2012 and 2013 in Poland

The burnt area, number of fires and average fire size for the years 1990 – 2013 are shown in Figure 47.

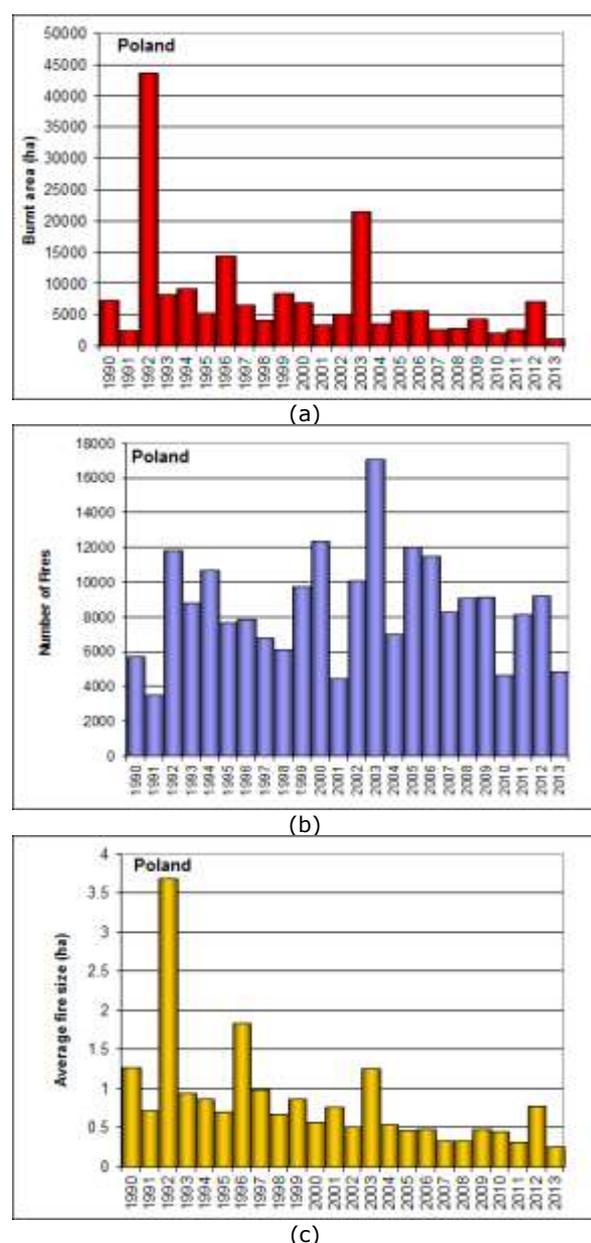


Figure 47. Burnt areas (a), number of fires (b) and average fire size (c) in Poland from 1990 to 2013.

### 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 5.2 thousand km of fuel breaks and building 67 km of new fuel breaks; in addition, forests were cleaned over a surface area of 25 thousand ha, by reducing the quantity of flammable biomass.

The observation system of the State Forests NFH consisted of:

- 656 fire protection lookout points, including 238 equipped with a system of TV cameras;
- 8 patrol airplanes,
- 382 ground patrols.

The effectiveness rate of fire detection by fire protection lookout points was 36%, airplanes detected 2% of fires and civilians notified of 55%. The other 7% of fires were detected by fire protection patrols.

The communication and alarm network in the State Forests NFH consisted of: 7 390 radio-telephones, including 1 225 base sets, 2 795 mobile sets and 3 370 hand held sets, as well as 119 converters to the frequency band used by the State Fire Service.

Water supply for fire suppression purposes was provided by 12 103 water supply points, including over 4.5 thousand natural points and 2.5 thousand artificial ones. Moreover, water was supplied by more than 4.7 thousand hydrants located in the vicinity of forests.

In 2013, the fire protection costs incurred by the State Forests NFH amounted to 70.7 million PLN (16.7 million EUR).

Information on Poland's National Forest Fire Information System can be found on [https://bazapozarow.ibles.pl/ibl\\_ppoz/faces/index.jsp](https://bazapozarow.ibles.pl/ibl_ppoz/faces/index.jsp).

Poland's Forest Fire Danger Map, which is updated daily from April 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 2013 fire season*

In 2013 the burnt area has increased to 152 756 ha which represents an increment of 6.4% on the average of the previous decennium, which was 142 583 ha. However regarding forest fire numbers, there was a decrease in 2013, to a total of 19 291 fires, representing a decrease of 17.7% when compared to the average of fire numbers of the last decennium and a decrease of 8.9% relating to 2012.

These outcomes had high impact mostly on shrubland (63.5%), rather than woodland (36.4%).

Because of the increased burned area Portugal was not able to meet the targets set on the National Fire Plan<sup>2</sup>, in regards to the total burnt area per year (100 000 ha annual burned area).

Accordingly to the information provided by the National Meteorological Institute, the meteorological daily severity index (DSR), derived from the Fire Weather Index, shows the evolution of the fire risk in an operational perspective for the year 2013 ( Figure 48).

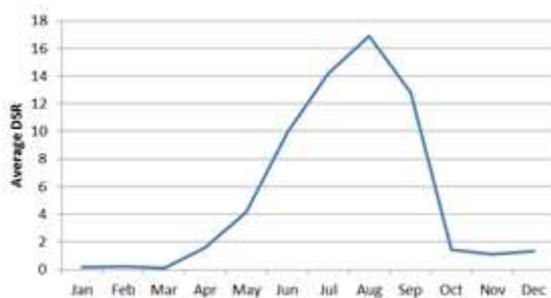


Figure 48. DSR variation in 2013

### *Fire occurrence and affected surfaces*

In 2013 Portugal registered a total of 19 291 forest fires (80% <1ha), responsible for the burning of 152 756 ha (Figure 49). Forest fires affected mainly shrubland (63.6%). Pinus pinaster, Eucalyptus globulus plantations and Quercus sp. stands were the forest cover most affected by fires.

18.3% of the occurrences (3 534) were reported January-June; they burned about 24 176 ha (15.8% of the total burned area); Table 16.

<sup>2</sup> In 2005 the Government, after the fire season, settled a reform on the national system for forest fire prevention and suppression, including the adoption of the National Fire Plan in May 2006, with the goal of 100 000ha burnt/annually by 2012.

In the summer period (July-September) there were 14 526 forest fires (47% total forest fires), which consumed approximately 120 782a (79% total burned area).

In 2013 the most critical month for forest fires was August with 6 678 forest fires (34.6% total forest fires) burning 99 195 ha (64.9% total burned area).

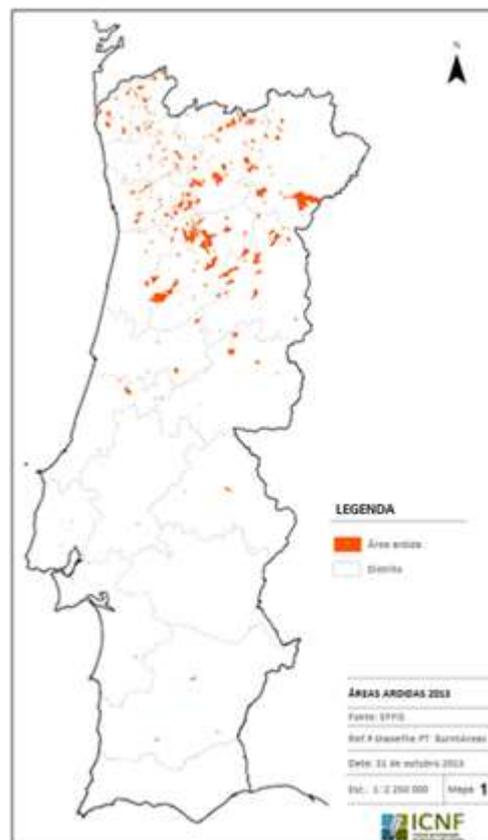


Figure 49. Burned areas in 2013, provisory data (Portugal).

Source: EFFIS/JRC, 2013)

Table 16. Forest fires in Portugal (monthly distribution)

Month	Number of Fires	Burnt Area (ha)		
		Wooded land	Shrub land	Total
January	16	0.6	0.5	1.1
February	86	1.9	34.3	36.2
March	188	33.5	206.5	240.0
April	693	650.9	727.9	1378.8
May	848	538.4	394.5	932.9
June	1703	935.5	988.6	1924.1
July	3138	4886.5	14776.2	19662.7
August	6678	38847.9	60347.7	99195.6
September	4710	8989.8	16883.7	25873.5
October	334	37.0	455.8	492.8
November	384	301.0	1054.8	1355.8
December	513	449.9	1212.6	1662.5
<b>TOTAL</b>	<b>19291</b>	<b>55672.9</b>	<b>97083.0</b>	<b>152755.8</b>

Fire occurrence prevailed mostly in the urban districts, such as Porto, Braga, Vila Real (Northern region), Aveiro and Viseu (Centre

Region), which registered 81% of the total number of fires (mainly very small fires). The Northern and Central regions of Portugal were the most affected by forest fires (148 602ha – 97.3% total), Table 17. In these regions are concentrated the main area of Eucalyptus and Pine stands and mountainous areas, where the usage of fire for pasture renewal of shrubs pastures still has a strong prevalence.

Table 17. Number of fires and burned area in Portugal (NUTSII - 2013).

NUTS II Region	Number of fires			Burnt area		
	≥ 1ha	< 1ha	Total	Shrub land	Wooded land	Total
Norte	2849	10256	13105	72970	31505	104475
Centro	624	2902	3526	22178	21949	44127
Lisboa e Vale do Tejo	271	1908	2179	1075	676	1751
Alentejo	84	147	231	349	1524	1873
Algarve	17	233	250	512	18	530
<b>TOTAL</b>	<b>3845</b>	<b>15446</b>	<b>19291</b>	<b>97083</b>	<b>55673</b>	<b>152756</b>

Portugal registered 216 large fires (≥100ha), which corresponded to 81.2% of the total burnt area. There were registered 56 fires larger than 500 ha, which burned 88 613ha. The largest fire of 2013 occurred in Bragança district, burning 13 706 ha on 9 July.

*Fire causes*

In 2013 the National Guard proceeded with the criminal investigation of 14 575 forest fires (75% of the total registered in 2013). Intentional fires corresponded to 25% of the determined causes and Accidents or negligence were present in the ignition of 31% (Figure 50).

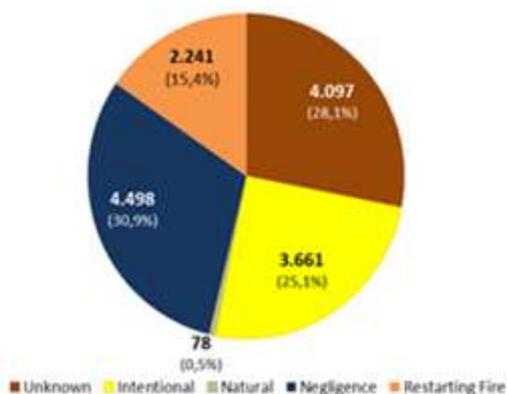


Figure 50. Main causes of PT forest fires in 2013

The analysis of the yearly trends in the number of fires and burnt areas in Portugal is shown in Figure 51.

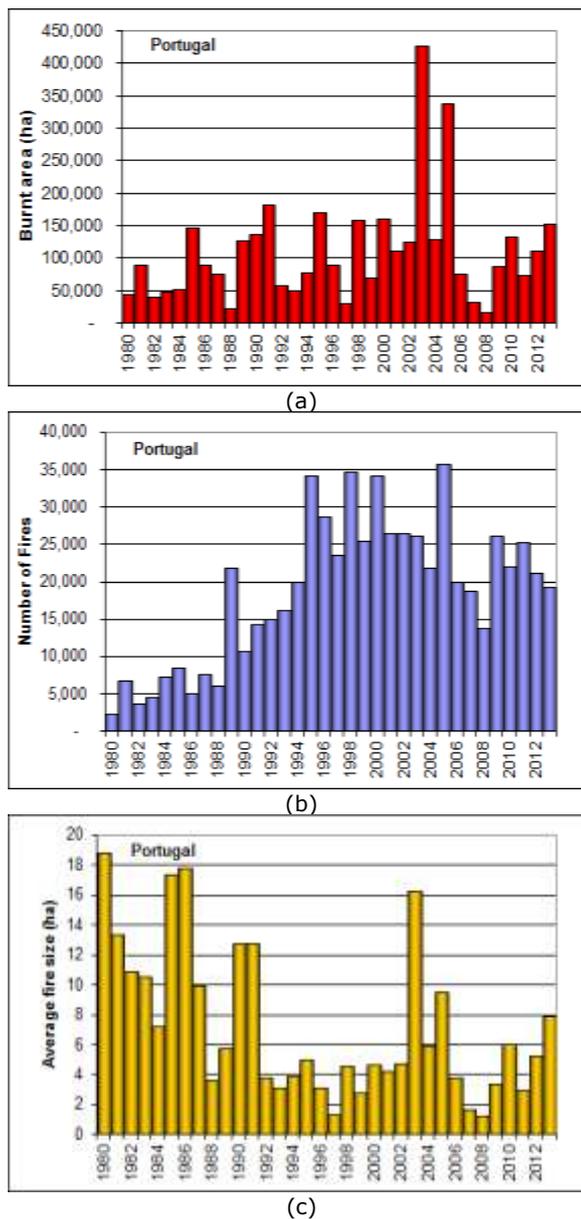


Figure 51. Burnt areas (a), number of fires (b) and average fire size (c) in Portugal 1980-2013.

### 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 2013, 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).

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:

- Unique command structure;
- Anticipation ability;
- Integrated response;
- Permanent safety;
- Dissuasive surveillance;
- Well-timed detection;
- Immediate dispatch;
- Strong initial attack;
- Unity of command;
- Operation maintenance;
- 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 2013. The number of means applied 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 9 337 human resources, 1 976 vehicles and 45 aerial means available.

Moreover, in order to improve and assure the fire fighting operations outside the critical period, terrestrial and aerial means were made permanently available during the Alfa and Echo phases.

In Table 18, there is a summary of all the fire-fighting means distributed by phases:

Table 18. . Fire-fighting means available per phase

Phases	Elements	Vehicles	Aerial Means
Alfa (< 15MAY)	Means available on demand		2 - 7
Bravo (15MAY-30JUN)	6 338	1 577	30
Charlie (1JUL-30SEP)	9 337	1 976	45
Delta (1OCT-15OCT)	5 323	1 335	20
Echo (> 15OCT)	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;
- 4 Amphibious aircraft for enlarged attack.

All means were guaranteed by different public and private entities/organizations (around 11) such as the National Authority for Civil Protection (ANPC), Fire Fighter Corps, National Guard (GNR), National Forest Authority (AFN), Biodiversity and Environmental Conservation Institute (ICNB), Police (PSP), Army and Forest Producers Associations (AFOCELCA).

Under the scope of the same Operational Directive, during 2013 the Portuguese National Authority for Civil Protection also established an operational order aiming to improve the Special Structure to Fight Forest Fires (DECIF) organization and readiness. Briefly the main purpose of this operational order was the reorganization of the structure to fight forest fires, grouping it in five main regions, in order to achieve a better management of the available resources to cope with forest fires overpassing the possible constraints resulting from the territorial administrative division. Each one of these operational regions, covering several and different districts, became responsible for managing all forest fire fighting operations happening in their respective region.

During August 2013 an abnormal number of ignitions were recorded per day; i.e. more than 300 per day for 11 days in a row.

## Forest fires planning

The Forestry and Nature Conservation Institute (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 technical support to the municipalities forest offices, based in the Municipal Plans for Forest Fire Prevention (5 years planning) and the Municipal Operational Plans, which are part of the previous plans and are updated on a yearly basis.

The municipalities' forest offices provide technical support to the Municipal Commission for forest defence. By the end of 2013 there were 271 municipal forest offices established and 272 Municipal Plans for Forest Fire Prevention (236 under review and 36 approved) and 245 Municipal Operational Plans approved.

The regional level planning is assured by 18 Regional Forest Plans (for the entire continental land) and by regional maps of fire pre-suppression, updated 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 26 264 ha was managed, of which 1 127 ha were with prescribed burning.

## Policy measures

1.1 Legislation "Decreto-Lei" n.º 124/2006 from 28 of June, with the changes introduced by the "Decreto-Lei" n.º 17/2009 from 14 of January

*In 2013 the publishing of Regulation no. 202/2013, established the period between 1st July and 30th September, as the critical period, where special preventive measures prevailed.*

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

*There was no follow-up progress in the Commission works.*

## *Loss of human lives in the 2013 fire campaign*

During 2013, forest fires in Portugal caused the death of 8 fire fighters and one civilian.

Some fire fighting vehicles were also destroyed after being caught by forest fires.

## *Operations of mutual assistance*

- Requested assistance through the EU Mechanism for Civil Protection on the August 29th, for reinforcement of 2 aerial means (CANADAIR).
- Requested assistance by bilateral agreement between Portugal/France for 3 aerial means operating on the August 22nd – 27th.
- Requested assistance by bilateral agreement between Portugal/Spain during July to August, with 6 aerial means.

*(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 2013*

In Romania, the summer of 2013 was warmer than in the reference period (1961-1990). The annual average temperature (10°C), was 1.1 °C higher than the standard climatological norm for 1961-1990 (Figure 53 and Figure 54). The increased values of high temperatures, with daily values of  $\Sigma T_{max}$  32°C, also periodically exceeded the thermal temperature-humidity comfort index ITU critical value, which resulted in tropical nights ( $\Sigma T_{min}$  17°C) for several days in a row during June, July and August. At just one meteorological station during August, the absolute maximum recorded value of temperature for that station was exceeded (compared with 82 meteorological stations, of the previous year), which did not however increase the drought effect in the country (Table 19), because of relatively high annual precipitation.

Table 19. Severe drought years in Romania since 1901

<b>Decade</b>	<b>Severe drought years</b>
1901-1910	1907-1908
1911-1920	1917-1918
1921-1930	1923-1924, 1927-1928
1931-1940	1934-1935
1941-1950	1945-1946, 1947-1948, 1949-1950
1951-1960	1952-1953
1961-1970	1962-1963, 1964-1965
1971-1980	1973-1974, 1975-1976
1981-1990	1982-1983, 1985-1986, 1987-1988
1991-2000	1992-1993, 1999-2000
2001-2010	2000-2001, 2001-2002, 2002-2003, 2006-2007, 2008-2009
2011-2020	2011-2012

The precipitation recorded a small excess in most of the country. The recorded annual mean average value of precipitation (683.2 mm), was 7% over the average. The high rainfall in the months January, February, March, May, June, September and October almost compensate the precipitation deficit from the other months mostly in summer. (Figure 54).

At the beginning of the year 2013, there was recorded a soil drought as a continuation of the previous year, but afterwards, because of the precipitation during the whole year, the soil humidity was increased and deficits were reduced (Figure 52).



Figure 52. Water soil reserve at the beginning of November 2013 in the depth layer of 0-20 cm

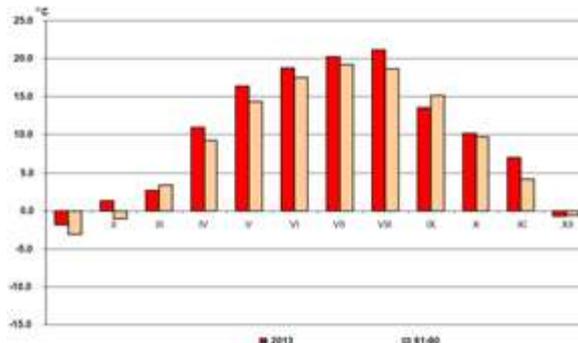


Figure 53. Average monthly temperature in Romania during 2013, compared with the climatological norm (1961-1990)

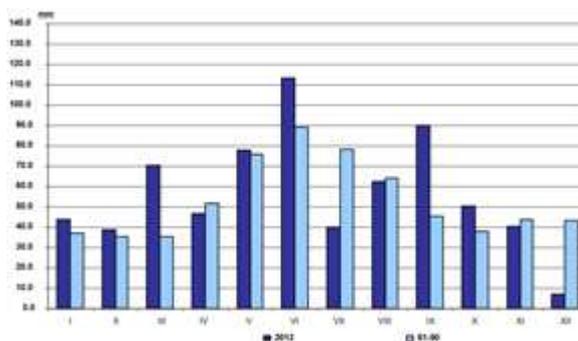


Figure 54. The monthly average precipitations recorded during 2013, compared with normal climatological values (1961-1990)

### *Fire fighting means and information campaigns*

The prevention and extinguish measures are assured by the Ministry of Environment and Climatic Changes, Ministry of Agriculture and Rural Development and by the Ministry of Administration and Interior, with their structures (ROMSILVA, Forest Inspectorates (ITRSV), Emergency Situation Inspectorate (ISU) and county and local responsible authorities). A collaboration protocol is also established between these structures at a national level, but also at a county level. The main legal base is assured by Law 46/2008 called also The Forest Code.

### Fire occurrence and affected surfaces

The trend of the burnt areas, number of fires and average fire size in Romania for the years 1986-2013 are shown in Figure 55.

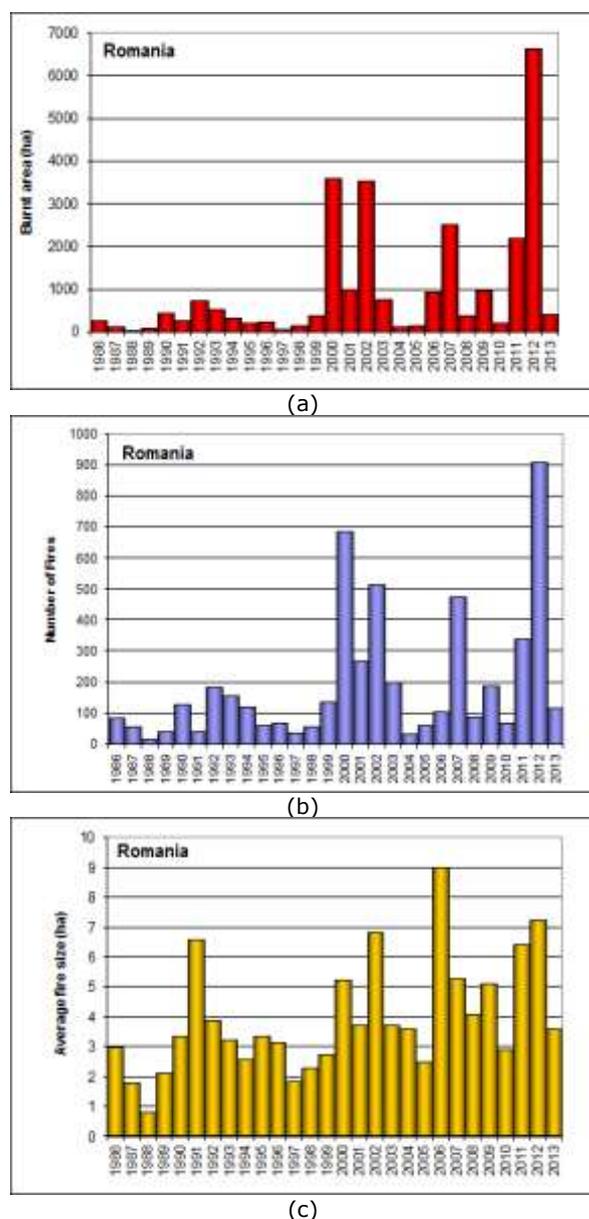


Figure 55. Burnt area (a), number of fires (b) and average fire size (c) in Romania from 1986 to 2013

In 2013, at the national level there were a total of 116 forest vegetation fires affecting an area of 421.16 ha, of which:

- 111 fires occurred in national forests and burnt 408.86 ha
- 5 fires occurred in forest vegetation located on land outside the national forest, burning 12.3 ha.

Following these fires the total damage was assessed at 587.4 thousand lei, produced by the burning of around 227 900 seedling trees in plantations and naturally regenerated forests and about 1,615 cubic metres of timber (either about to be harvested or already in the process of being harvested).

Firefighting actions involved a total of 5106 people, including:

- Forest rangers - 1443 persons
- Military and civilian firefighters - 1006 persons
- Police and gendarmes - 147 persons
- Citizens - 1264 persons

### Causes of forest fires

During 2013, the major causes of forest fires, as in recent years, was represented by the agricultural practices of the people from rural areas, represented by the cleaning of the fields by uncontrolled ignition of dried plant wastes. Detailed breakdown of causes is given below:

Unknown (EFFIS code 100) - 37 fires burning 97.5 ha

Natural - lightning (EFFIS code 201) - 4 fires (100.8 ha)

Accidental - Train (EFFIS code 302) - 1 fire (3.4 ha)

Negligence - 70 fires burning 190.1 ha, of which:

- open fires (EFFIS code 410) - 30 fires (101.5 ha)
- Propagation from fires on agricultural land (EFFIS code 411) - 31 fires (75.5 ha)
- stubble fires (EFFIS code 412) - 5 fires (8.1 ha)
- Propagation from burning rubbish (EFFIS code 413) - 1 fire (0.1 ha)
- Cigarettes (EFFIS code 422) - 4 fires (4.9 ha)

Intentional - 3 fires burning 5.5 ha, of which:

- Deliberate (EFFIS code 512) - two fires (5.4 ha)
- unattended children (EFFIS code 522) - 1 fire (0.1 ha)

Rekindle (EFFIS code 600) - 1 fire (23.9 ha)

### Land type affected:

1. State public land - 62 fires (219.0 ha)
2. UAT public land - 25 fires (98.8 ha)
3. Private land - 30 fires (103.4 ha)

### Type of fire:

1. Litter fires - 93 fires (243.1 ha)
2. Canopy fires - 18 fires (50.0 ha)
3. Mixed fires (ground, litter, canopy) - 5 fires (128.1 ha)

### Fire damages and injuries

The economic losses due to forest fires were low (Figure 56), compared with previous years, because the population and the authorities intervened for extinguishing the forest fires at an early phase. The lower level of economic losses is determined by the geographical condition of our country, and by the forest composition, compared with other European countries (especially the Mediterranean). The economic losses assessed are relatively small because the damage is calculated only as the value of young forest burned or as the timber value.

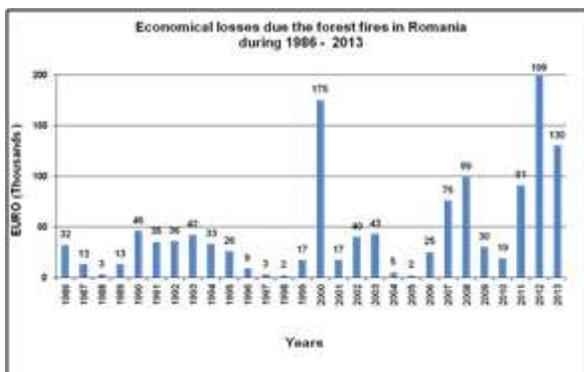


Figure 56. Economic losses due to forest fires in Romania from 1986 to 2013

Of the forest fires recorded in 2013, a significant one was the fire occurring in the National Park Domogled - Cerna Valley, which represented a challenge for all the forces of intervention in terms of coordination of efforts and the necessary equipment. This illustrated once again the urgent need to adopt a specific legal regulation for intervention in inaccessible mountain conditions.

As a result of a lightning strike on August 1, 2013, for a period of 8 days until complete liquidation of the fire was achieved, a total of 438 personnel, of whom 243 were ISU staff and 165 were forester staff, worked to extinguish the fire at Cerna Valley. Considering the terrain was inaccessible to vehicles and the extent of the intervention was over an area of 100 ha, two helicopters equipped with water lifts of the type "bambi bucket" were used to extinguish the fire. It is notable that the water supply could be accessed relatively easily from the Iron Gate reservoir and that without these means, the fire would have extended over a much larger area and resulted in property damage significantly higher than that recorded (amounting to 221 thousand lei, which is the equivalent of 100 000 seedling trees burned).



Image of the forest fire that occurred in August in the Domogled National Park

(Sources: Ministry of Environment and Climatic Changes; Department for Waters, Forests and Fishery, Romania)

## 2.2.20 Russian Federation

### *Forest fire season in the Russian Federation in 2013*

Forests in the Russian Federation occupy nearly 70% of the total territory. There are over 1 billion hectares of forests.

The Forest Fund of Russia is subdivided into the following zones of monitoring (Figure 57):

1) Zone of Ground monitoring (densely populated territories with a developed road network where detection and suppression is made mainly by Ground forces, who are able to arrive at a fire within 3 hours from the time of fire detection) – 90.0 million hectares;

2) Zone of Aviation monitoring (Forests with a low-developed road network; detection is made by aviation methods and suppression of fires is mainly made by teams of paratroopers-firefighters and aviation technologies) – up to 500 million hectares;

3) Zone of space monitoring (remote territories) – over 500 million hectares. The zone of space monitoring is subdivided into 2 levels. In the Zone of the 1st level, detection of forest fires is provided by application of remote sensing technologies and suppression is carried out by aerial means. In the Zone of the 2nd level, control of a fire situation is carried out by remote sensing and firefighting is provided only when there is a threat to settlements and economic entities.

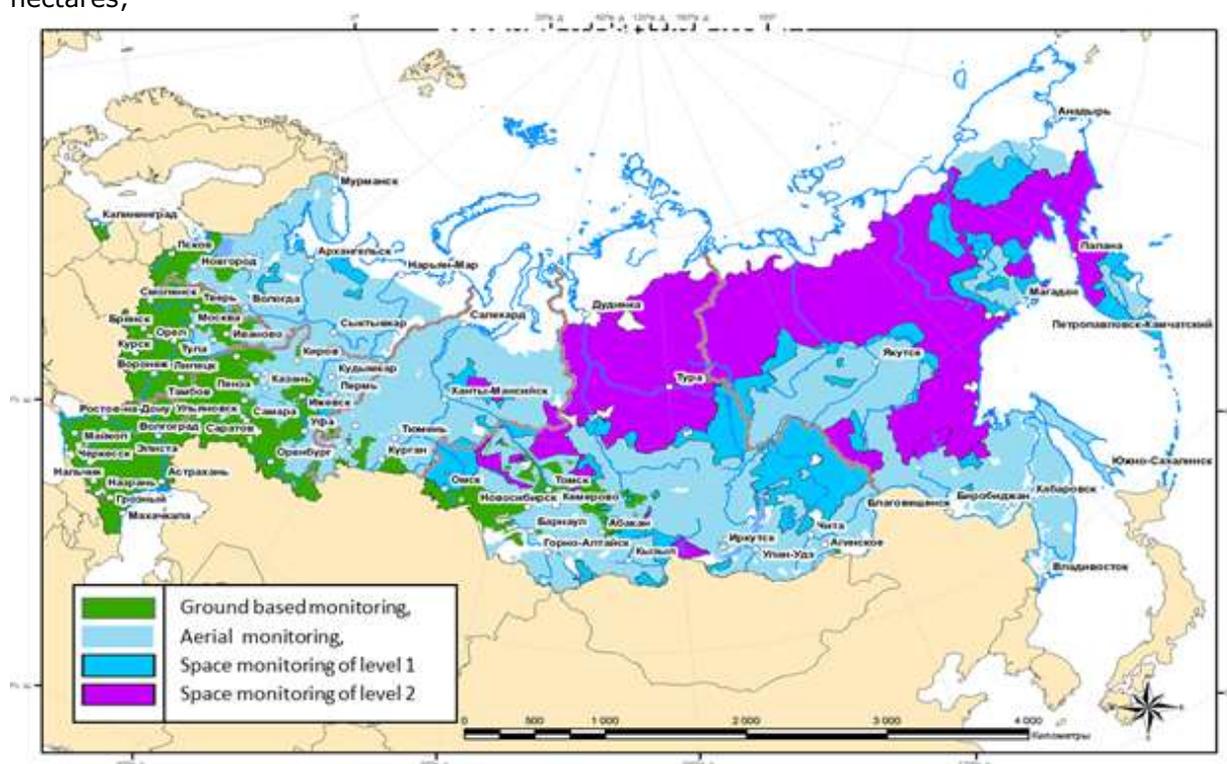


Figure 57. Zoning of forest monitoring

### *Fire danger in the 2013 fire season*

In the beginning of the fire season, high fire danger rating was observed in the Southern part of European Russia, in the Baikal region of Siberia and in the Far East (Republic of Saha- Yakutia (Figure 58).

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).

The greatest number of days with an extreme fire danger rating was recorded in the Southern Federal District (183 days); there were fewer days with extreme fire danger rating observed in the Central Federal District (43 days).



Figure 58. Fire danger rating as for April 20, 2013

*Fire occurrence and affected surfaces*

There were 9 754 forest fires in total in the Russian Federation in 2013, and the area burned is 1 416 659 ha including 242 345 ha non forest area.

In comparison with 2012 the number of fires decreased by 49% and the area burned by forest fires decreased by 37%.

In the aerial protected zones there was observed a decreased number of forest fires and area burned compared to long term information (Figure 59).

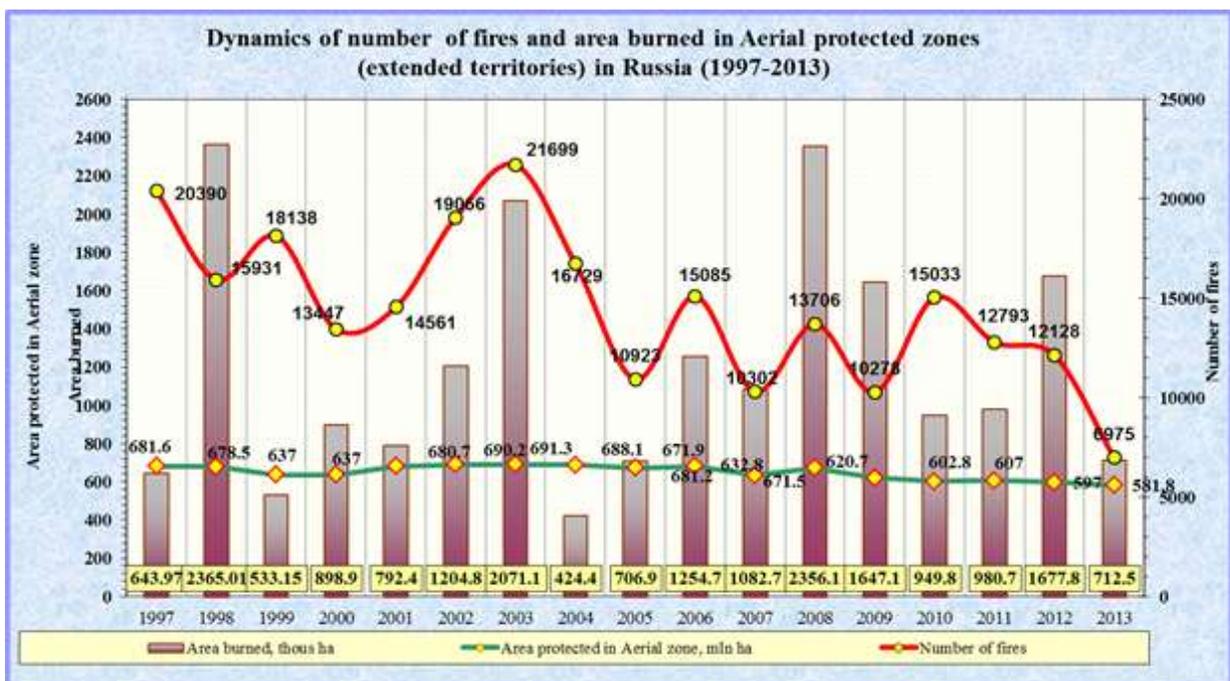


Figure 59. Number of fires and area burnt in aerial protected zones from 1997 to 2013

### Fire causes

Fire causes in 2013 are shown in Figure 60.

Carelessness was the cause of 36.7% of the total number of fires, which is an increase of 1.2 times compared with the data of 2012.

Lightning was very active in the 2013 fire season and caused 25.4% of total forest fires. That is an increase of 2.3 times in comparison to 2012.

Agriculture burning was a cause of 4.2 of fires; in comparison with 2012 that is decreased by 1.6 times.

33.7% of fire causes were unknown, but it is most likely that the majority of them were also caused out of carelessness.

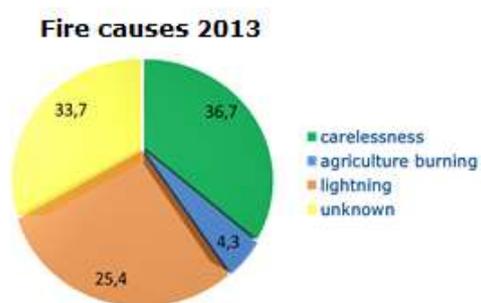


Figure 60. Forest fires causes in the Russian Federation in 2013

### Fire prevention activities

According to the Forest Code of Russia, fire prevention, mitigation and fire management is carried out by:

- The Ministry of Natural Resources and Ecology of the Russian Federation whose concern is the forests located in especially protected natural territories at Federal Level;
- The Authorities of Defence Ministry, whose concern is the forests located on the lands of the Ministry of Defence;
- Public authorities of the regions of the Russian Federation or local Governments concerning the forests located on the territory belonging to the regions and municipalities;
- Public Authorities of the Regions of the Russian Federation, concerning the Federal forests located in the regions of Russia, implementation of responsibilities that were transferred to Authorities of the Regions of the Russian Federation according to Part 1 of article 83 of the Forest Code of the Russian Federation (97% of all forests).

On the Forest lots provided for a long term use&rent for "Forest Users", prevention and mitigation activities were carried out by the users based on the Forest Use Project, but firefighting operations were carried out by special fire centres and brigades built up in every region with the support of forest users.

The most important activities on fire prevention and preparation include:

fire-prevention activities in the forests (construction and reconstruction of forest roads, maintenance of observation towers, prevention fire lines; creation of fire-prevention water reservoirs, etc.);

providing acquisitions of fire-prevention equipment and engines, communication systems, etc.);

providing fire management publicity for use of mass media.

In the Russian Federation, the following fire prevention activities were undertaken as preparation for the fire season of 2013:

Construction of forest roads for fire prevention: 6 000 km

Reconstruction and maintenance of roads for fire prevention: over 9 000 km

Construction of fire breaks and barriers: over 231 400 km.

Care of the fire breaks and barriers: over 645 500 km.

Prescribed burning: 1.14 million ha.

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

### 2.2.21 Slovak Republic

#### Fire danger in the 2013 fire season

The 2013 fire season was not critical from the point of view of fire danger. The number of wildfires decreased and the average size was similar to 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 number of 233 forest fires were reported in Slovakia in 2013, corresponding to a total burnt area of 270.26 ha. The average burned area per fire was 1.16 ha.

Figure 61 and Figure 62 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 1999-2013 are shown in Figure 63.

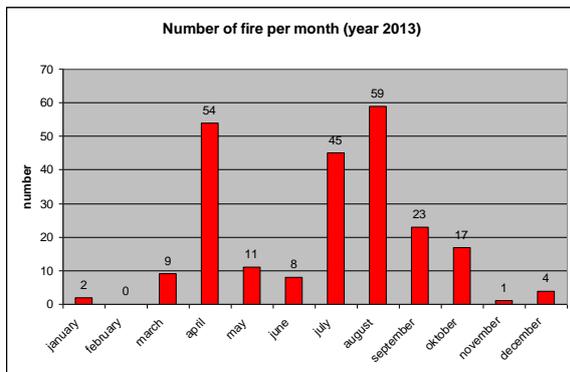


Figure 61. Fire frequency by month in 2013

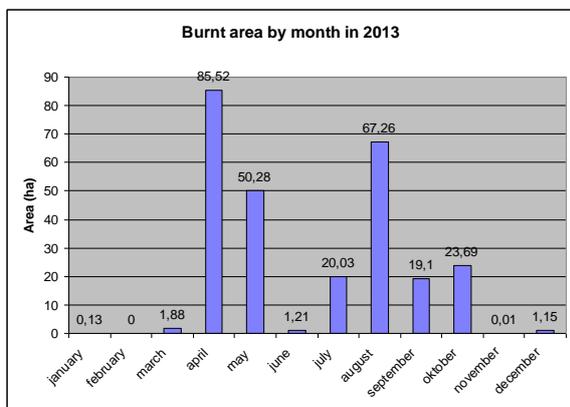
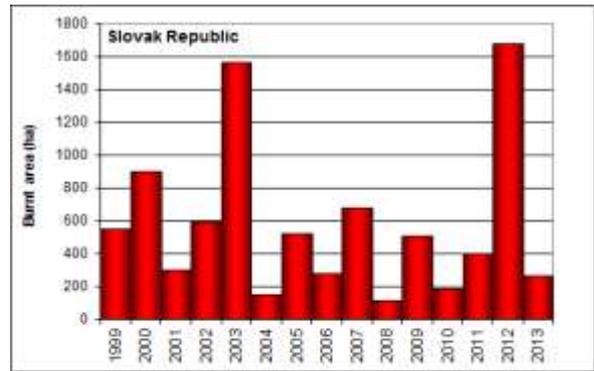
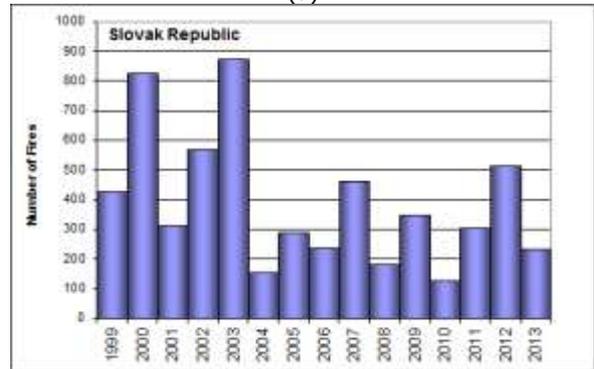


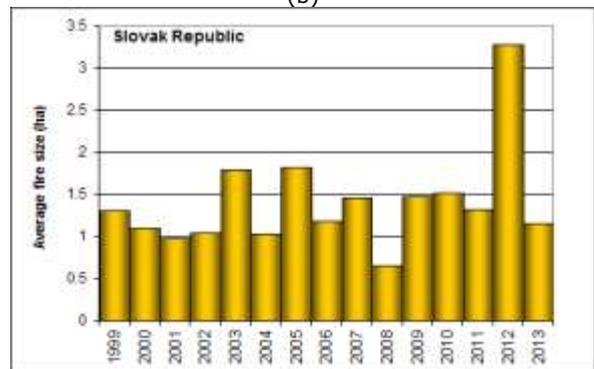
Figure 62. Burnt area by month in 2013



(a)



(b)



(c)

Figure 63. Burnt areas (a), number of fires (b) and average fire size (c) in the Slovak Republic from 1999 to 2013.

#### Injuries and loss of human lives

One injury was reported in Slovakia during the fire season of 2013.

#### Fire causes

Forest fire causes in 2013 are shown in Figure 64, and causes for the years 2002-2013 are shown in Table 20.

Table 20 Fire causes in Slovak Republic in 2002 – 2013 (number of forest fires).

	Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Basic information</b>	Total fires	570	852	155	286	237	463	182	347	123	303	517	233
Known causes (Human)	Arson	18	31	8	7	8	11	7	18	6	8	42	33
	Negligence (see also B below)	525	780	138	261	201	416	154	286	94	244	409	177
Known causes (Natural)	Lightning	4	3	1	2	3	6	1	3	2	1	8	4
Unknown causes	Unknown	23	38	8	16	25	26	20	40	21	50	58	19
<b>Supplementary information: Total negligence</b>	Agricultural operations	239	280	38	91	22	110	25	51	25	59	135	26
	Logging and forest operations	4	2	2		10	23	19	52	25	21	56	15
	Other industrial activities	13	12	0	1	3	2	20	12	5	0	1	7
	Communications (railways, electricity lines, etc.)	2	3	1	2	2	3	3	7	2	1	7	3
	General public (campers, other visitors, children)	263	477	96	163	163	278	81	161	66	222	208	125
	Other (military, etc.)	4	6	1	4	1	0	6	3	0	0	2	1

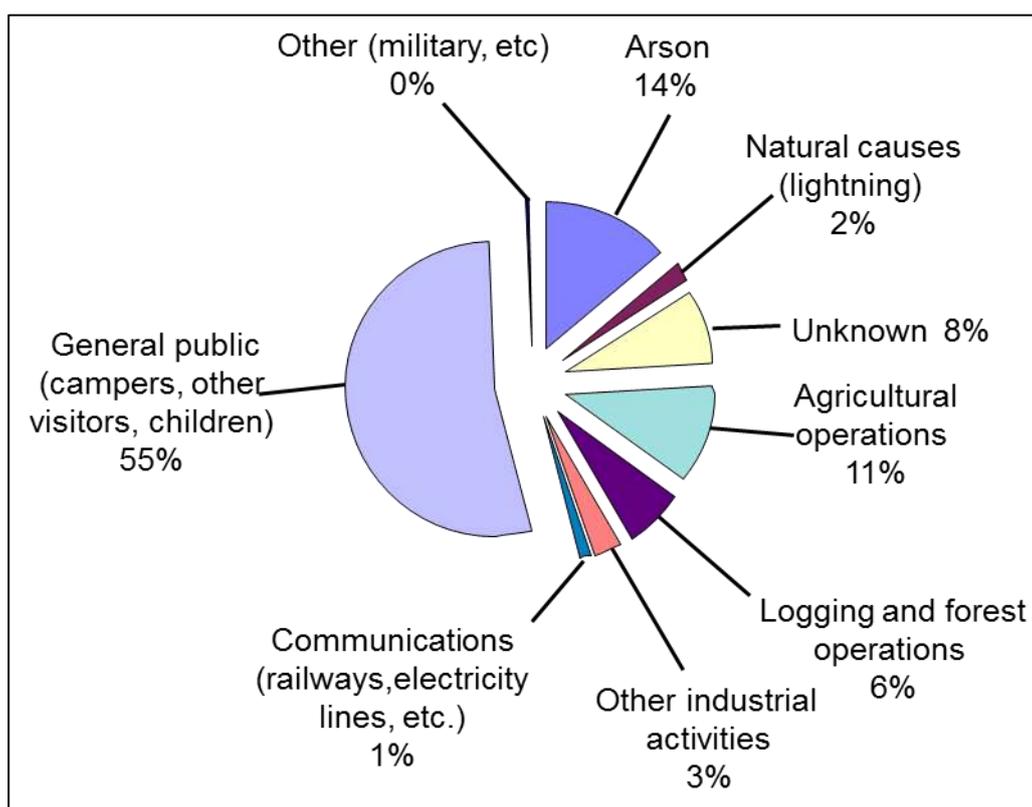


Figure 64. Causes of forest fires in 2013

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

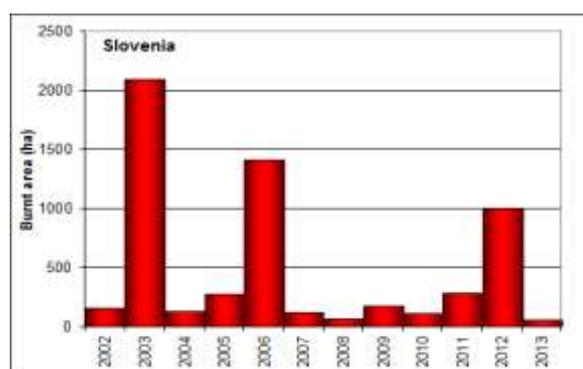
## 2.2.22 Slovenia

In 2013, according to the data of the Forest Service, 75 forest fires were reported, with a total burnt area of 66.33 ha, of which 47.92 ha were in forest land (Table 21). Both the number of fires and the burnt area are lower than have been reported in the last 2 years. There were only 8 fires over 1 ha during the year, and the total burnt area and average fire size (0.9 ha) were the lowest recorded in over 10 years. Figure 7 shows the trends in terms of number of fires and burnt area during the last 10 years in Slovenia.

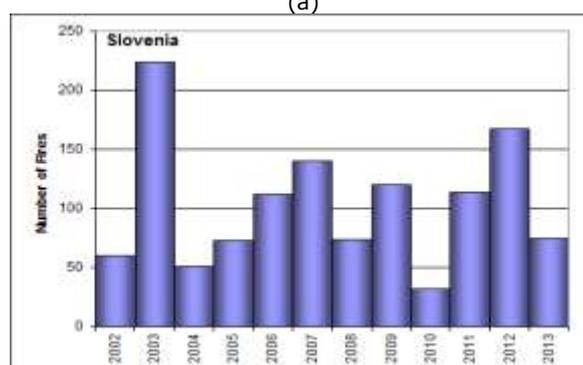
Table 21. Number of fires and burnt area in Slovenia in 2013

Number of fires	
< 1 ha	67
≥ 1 ha	8
≥ 100 ha	0
≥ 500 ha	0
<b>Total</b>	<b>75</b>
Burnt area	
Woodland	47.92
Bushes	0.44
Non woodland	17.96
<b>Total</b>	<b>66.33</b>

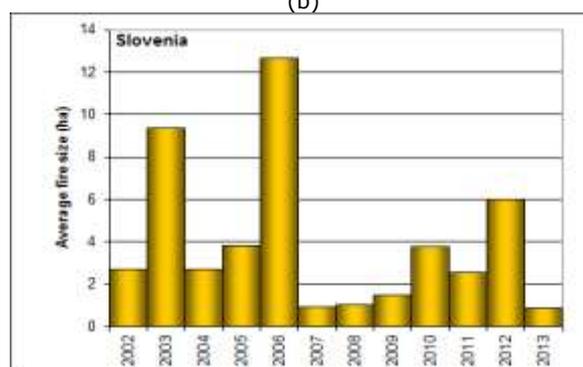
As was the case in previous years, the worst affected region was Sežana, in which 47% of the fires (69% of burnt area) occurred (Table 22).



(a)



(b)



(c)

Figure 65. Burnt areas (a), number of fires (b) and average fire size (c) in Slovenia from 2002 to 2013.

Table 22. Number of fires and burnt area by forest management unit in Slovenia in 2013.

Region	Number of fires			Burnt area (ha)			
	<1 ha	≥1 ha	Total	Forest	Scrub	Non wooded	Total
Tolmin	2	1	3	2.47	0.00	1.64	4.11
Bled	0	0	0	0.00	0.00	0.00	0.00
Kranj	3	1	4	0.55	0.00	1.23	1.78
Ljubljana	6	0	6	1.98	0.00	0.08	2.06
Postojna	0	0	0	0.00	0.00	0.00	0.00
Kočevje	0	0	0	0.00	0.00	0.00	0.00
Novo mesto	4	0	4	0.02	0.44	0.00	0.46
Brežice	2	0	2	0.12	0.00	0.00	0.12
Celje	7	0	7	0.19	0.00	0.37	0.56
Nazarje	6	1	7	8.60	0.00	0.24	8.84
Slovenj Gradec	4	0	4	0.01	0.00	0.00	0.01
Maribor	2	1	3	2.35	0.00	0.01	2.36
Murska Sobota	0	0	0	0.00	0.00	0.00	0.00
Sežana	31	4	35	31.63	0.00	14.39	46.02
<b>Total</b>	<b>67</b>	<b>8</b>	<b>75</b>	<b>47.92</b>	<b>0.44</b>	<b>17.96</b>	<b>66.32</b>

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

## 2.2.23 Spain

### *Fire danger in the 2013 fire season*

High rainfall in the first three months of the year meant that the fire risk remained low, even though temperatures were above average in January. In March the rainfall was three times the normal value.

In April the fire risk was variable depending on the weather. Although rainfall was normal (65 mm), there was dry weather during the second and third week. Meanwhile, temperatures were above normal, with an average monthly temperature 0.5°C above the average for this month.

Compared to other years, the month of May was cooler and drier than normal. Fire risk remained low throughout much of the month except for the first week in the northern third of the mainland, where high risk was registered. On 14<sup>th</sup> May, the first major fire of the season occurred, which took place in Valdefresno (León).

June was also slightly cooler and drier than normal, which allowed the fire risk to stay low during most of the month. The risk gradually increased to moderate or even high levels during the last week of June, due to rising temperatures, especially in the western half of the peninsula.

In July it was very warm. Precipitation was at normal levels. This month there were some episodes of very heavy rainfall, the most significant being on the 13<sup>th</sup>, which affected areas of inland Catalonia.

The month of August was very warm in Galicia, Navarra, Madrid, Extremadura, Andalusia, Castilla la Mancha, Canarias and eastern Catalonia. In the rest of Spain temperatures were normal or slightly warmer than normal. Precipitation distribution was normal but uneven.

In September, temperatures were above normal and there was no heavy widespread rainfall until the end of the month (from 27<sup>th</sup>) with the input of the first Atlantic front. This weather situation raised fire danger in most regions of the peninsular west, while in the east of the peninsula there were thunderstorms. In Galicia in particular, the fire danger rose throughout the month due to lack of rainfall and some episodes of drying winds, especially in areas of the Rias Baixas and the province of Orense.

Despite the high temperatures recorded during the month of October, the risk of fire remained generally low. Only during the

second half of the month and in certain locations was this risk moderate or high, mainly in the eastern third of the peninsula, around Biscay and the Canary Islands, and mainly caused by the prolonged absence of rain and offshore winds.

The risk of forest fires in November was high in the first two weeks and was limited geographically to the Mediterranean area. In the second half of the month the risk virtually disappeared, remaining slightly higher on 21-23 in areas of Murcia and Valencia.

In December fire risk was generally low throughout the month. Only on some days, due to strong winds, the risk rose in localized areas of Galicia, Valencia and Andalusia.

### *Number of fires and affected surfaces*

In 2013, both the total number of fires and the burnt area was well below the average for the previous decade. The total number of fires was 35% less than the decade average, with small fires ( $\leq 1$  ha) down by 28% and fires of  $>1$  ha down by 50%.

Table 23. Number of fires in 2013 compared with 10 year average

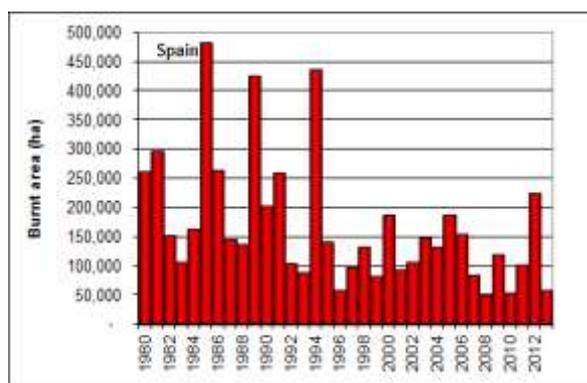
	Average 2003-2012	2013
Number of fires <1ha	10 772	7 744
Number of fires $\geq 1$ ha	5 800	2 882
Total	16 572	10 626

There was a 60% reduction in forest burnt area and a 53% reduction in total burnt area with respect to the mean.

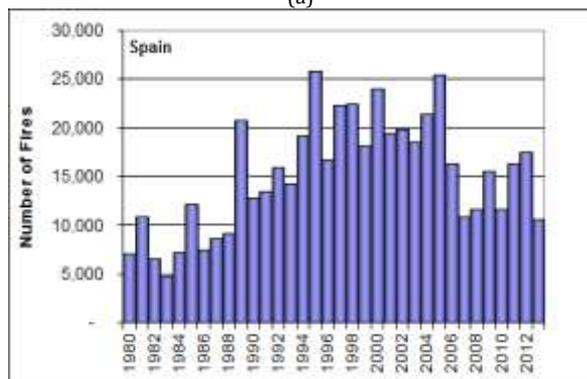
Table 24. Burnt area in 2013 compared with the 10 year average

	Average 2003-2012	2013
Burnt area forest (ha)	43 714.44	17 273.60
Total burnt area (ha)	126 600.21	58 985.02

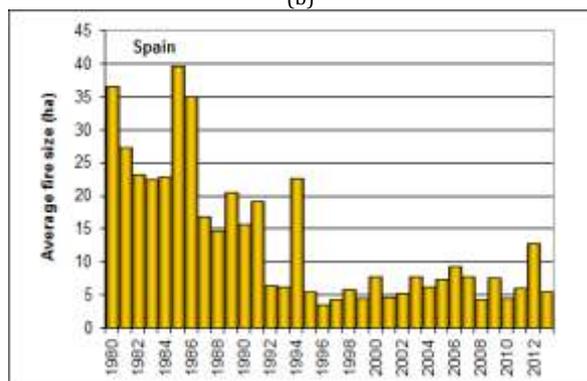
The yearly trends in terms of numbers of fires and burnt areas during the last 32 years in Spain are shown in Figure 66.



(a)



(b)



(c)

Figure 66. Burnt areas (a), number of fires (b) and average fire size (c) in Spain for the last 34 years.

### Large fires

According to the statistics compiled by the relevant departments, there were 17 Large Fires (GIF: defined as burnt area  $\geq 500$  ha) in 2013. Most of them occurred in the summer months; only one occurred outside the period of maximum reinforcement means. These fires account for 33% of the total area affected and 1.16% of the number of fires. The area most affected by large fires was the Northwest, where 64% of the burnt area occurred. However, the largest fire of the year was in Andraxt (Balearics). The annual GIF was 43% less than the average of the decade. Table 25 gives the location, date and burned area of large fires.

Table 25. Large fires in 2013

Province	Municipality of origin	Start date	Burnt area (ha)
León	Valdefresno	14-05	600
Toledo	Almorox	16-07	1251
Baleares	Andraxt	26-07	2335
Valencia	Ayora	25-07	607
Cáceres	Trujillo	26-07	1378
Guadalajara	Tortuero	31-07	919
Ávila	Cebreros	03-08	1095
Zamora	Alcañices	01-08	838
Zamora	Villardiegua de la Ribera	22-08	1643
Orense	Cualedro (Vilela)	24-08	873
Orense	Cualedro (A Xironda)	24-08	700
Pontevedra	Oia	26-08	1824
Pontevedra	Pontecaldelas	04-09	600
Zamora	Hermisende	04-09	1592
A Coruña	Carnota	11-09	2166
A Coruña	Negreira	11-09	663
Orense	Carballeda de Valdeorras	26-09	641
<b>Total burnt area</b>			<b>19726</b>



Figure 67. Brigada de Refuerzo en Incendios Forestales (BRIF-A) fighting the fire in Andraxt in July 2013.

The distribution of the total number of fires by geographical area is shown in Figure 68. The largest number of fires and the greatest amount of damage occurred in the Northwest Peninsula (Galicia, Asturias, Cantabria, Basque Country, Zamora and León), with 53.77% and 61.87% of the respective totals. This is followed by the interior communities, then the Mediterranean, and finally the Canary Islands (Figure 68).

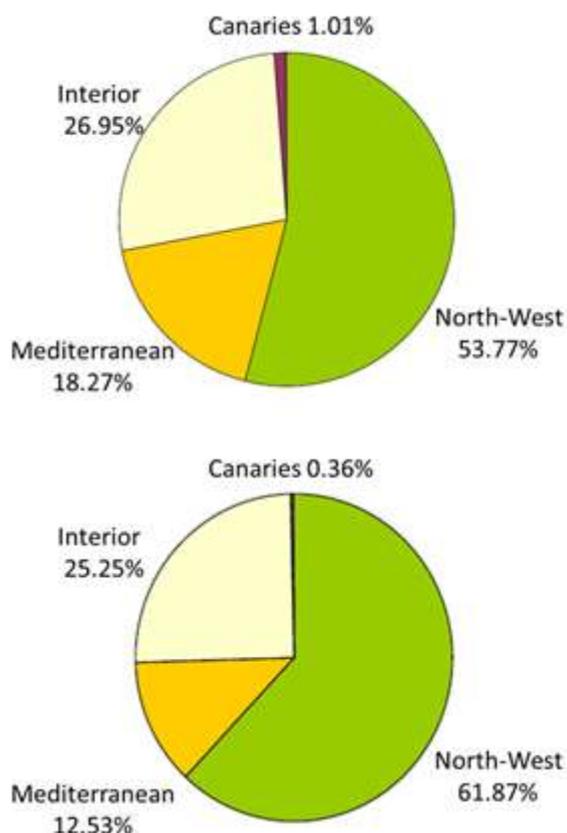


Figure 68 Number of fires and burnt area in 2013 by geographic region

### Prevention measures

#### Training in fire management

In 2013 the ADCIF (*Área de Defensa contra Incendios Forestales*) organized four technical seminars about wildfires, dedicated to issues relevant to the prevention and suppression of forest fires in Spain. The objective set by MAGRAMA was creating an open forum, through participation, sharing experiences and knowledge and debate, to search for the best working techniques, methods of intervention, safety, training and progress technology, to continue developing the best techniques to fight forest fires.

Other training activities include:

- \* Training Days for the Integral Prevention Teams (*Equipos de Prevención Integral: EPRIF*) organized annually by MAGRAMA, are intended for EPRIF personnel, for their continuing education.

- \* Training for members of the Preventive Work Brigades (*Brigadas de Labores Preventivas*): various training activities such as driving off-road, road safety and driving in forestry and emergency fire suppression

operations, manoeuvres for safety and self-protection in fire engines, first aid fire and forestry work, rescue and evacuation of wounded in the bush, forest fuel management for fire prevention, etc.

- \* Advanced Course on Safety and Accident Investigation: aims to train participants as safety officers in extinguishing forest fires and was directed at technicians from relevant departments of the regional administrations.

- \* Basic courses in defence against forest fires: aimed at final year students.

- \* Fire Extinction Management Course: for staff of the Military Emergency Unit.

- \* Training Days on forest fire prevention for communication professionals.

- \* Training Days on forest fire prevention for teaching professionals.

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

In 1998, the Ministry of Agriculture, Food and Environment (MAGRAMA) created 18 Integral Forest Fire prevention Teams in collaboration with regional administrations located in counties with wildfire problems, to perform forestry related tasks. This work includes planning and execution of controlled burns and scrub clearance, giving technical advice on fire extinction, making efforts to raise awareness and conciliation of interests in rural work areas.

In 2013 the EPRIF were operational from 14 January to 31 May and then resumed work from November to mid-December, completing by the end of the year a maximum of 6 months of work.

In the first period of action during the year EPRIF conducted 268 controlled burns of 1 546 hectares, 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.

They also ran training activities and meetings with various groups such as ranchers, farmers, hunters, municipalities, neighbourhood associations and teachers, to raise awareness on the prevention of forest fires.

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

The Preventive Work Brigades (*Brigadas de Labores Preventivas*) work over 6 months divided into two periods, from mid-January to the beginning of the summer season and the months of November and December, in collaboration with regional administrations, performing fire prevention work in over 1 370 hectares of forest land.

In total over 400 employees distributed in 10 Preventive Work Brigades carry out preventive silvicultural work.

They are organized into smaller, independent functional units, with a variable number of components as appropriate, always with a foreman in charge. They occasionally work together with EPRIF in the implementation of prescribed fires, and in 2013 worked together on more than 540 ha of controlled burns.

Also of note is the work on experimental plots of prescribed burns carried out by the Preventive Work Brigade of Lobia (Soria) since 2011, in order to evaluate the effectiveness and impacts of this type of preventive treatment. It is intended to extend this work to other Brigades operating in the Mediterranean in the coming years.

### 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.

These highly specialised heliborne units can act anywhere in the country where they are needed. The BRIF are highly specialized teams whose 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 total, BRIF teams worked a total of 2 371 hours in fire interventions and extinguished a front length of 350 482 metres.

The greatest activity for the BRIF during the 2013 campaign was in Laza (Ourense) and Tineo (Asturias) with a total of 96 and 77 interventions respectively.

### Aerial means

In the period between January 1 and December 31, 2013, the MAGRAMA air assets were involved in 744 fires and made a total of 2 188 interventions. They flew for a total of 4 828 hours, making 24 399 discharges. The location of all actions taken in 2013 is shown on the map below.

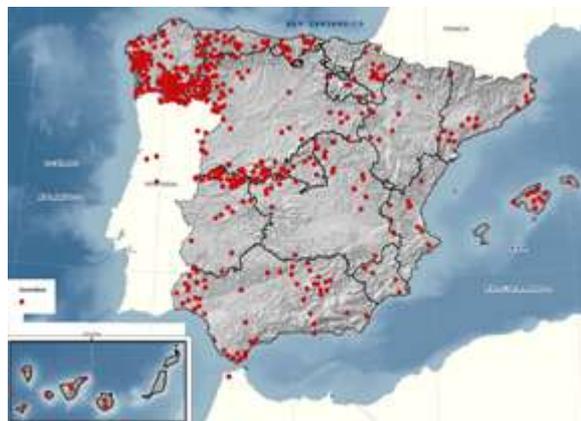


Figure 69. Location of intervention actions made by air in 2013

### Budget

The summary budget for ADCIF (*Área De Defensa Contra Incendios Forestales de la DGDYPPF*) for 2013 is shown in the table below.

Type	Amount (Euro)
Prevention	12 740 792
Human resources	14 465 219
Aerial means	51 444 675
Total	78 650 868

### *Operations of mutual assistance*

During the 2013 campaign, the MAGRAMA aircraft conducted a total of 24 interventions in Portugal, totalling 287 discharges.

(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 2013 fire season

The grass fire risk seems to start earlier recent years and already in the beginning of March the grass fire risk was high in 1/3 of the country (Figure 71). The forest fire danger varied in risk over the season with only some short periods with high risk (Figure 70). March was colder and drier than normal. The mean temperature was close to normal for April and drier than normal in most parts of the country. May was warmer than normal and on average the precipitation was higher than normal, but the pattern varied over the country with both drier and wetter conditions compared to the normal precipitation. The summer (June, July and August) was warmer than normal. June was wetter, July drier and August drier than normal disregarding the middle part of Sweden where instead the precipitation was greater than normal.

The fire season of 2013 had fewer fires but more area burned than the mean of the last 15 years. Most of the fires in 2013 occurred in March to May and July.

- Very low fire risk (FWI value <1)
- Low fire risk (FWI value 1-6)
- Normal fire risk (FWI value 7-16)
- High fire risk (FWI value 17-21)
- Very high fire risk (FWI value 22-27)
- Extremely high fire risk (FWI value 28-)

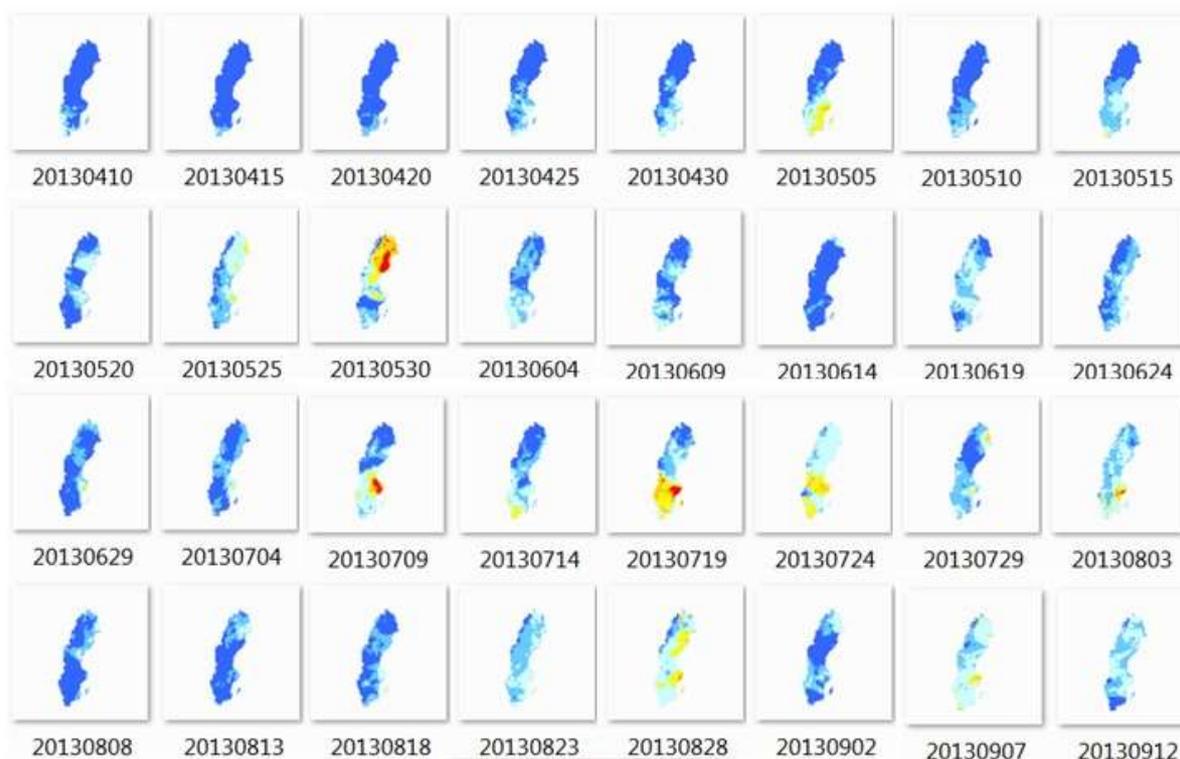


Figure 70. Maps of Forest fire danger shows a rather low fire danger season 2013 except for some short periods

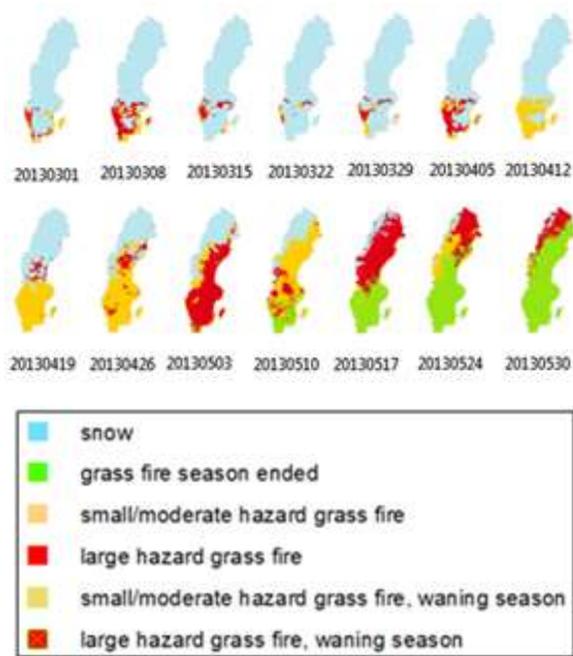


Figure 71. Maps of grass fire danger in the 2013 season

*Fire occurrence and affected surfaces*

During 2013 there were 4878 fires recorded, burning 477 ha of forest, 316 ha of other wooded land and 715 ha of other land.

The largest fire which was recorded started on 17<sup>th</sup> of May. In this fire, about 155 ha burned and blocked the traffic on one Highway for two days because there was heavy smoke from a peat bog area where the fire started. The second largest fire started on the 31<sup>st</sup> of May and affected about 80 ha of forest. The burnt area, number of fires and average fire size for the years 1998-2013 are shown in Figure 73.

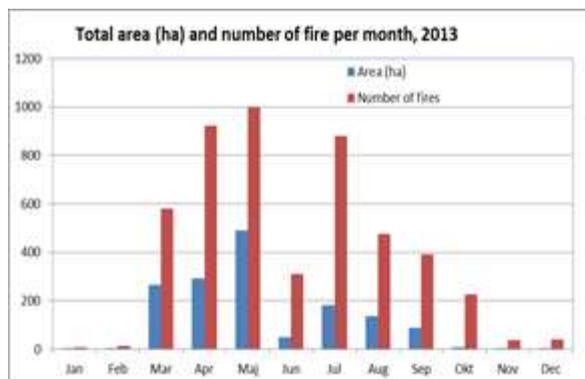
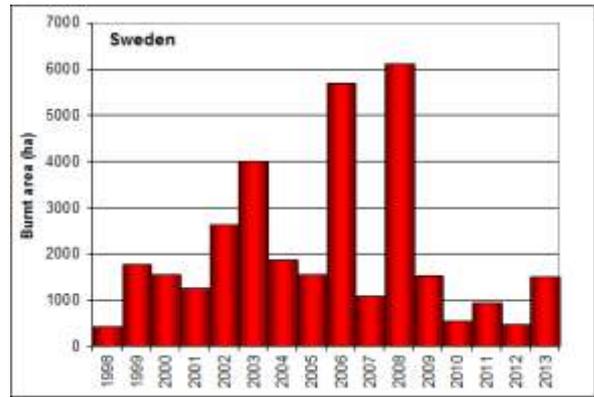
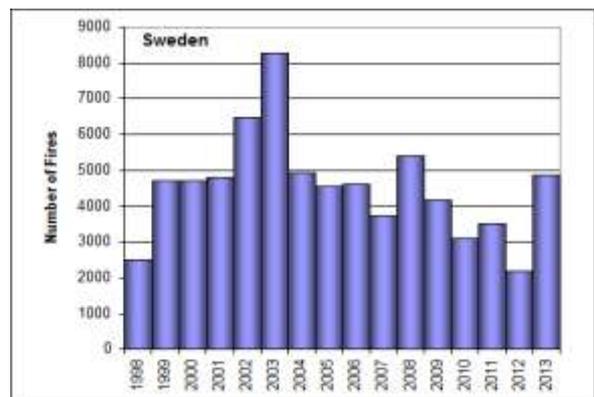


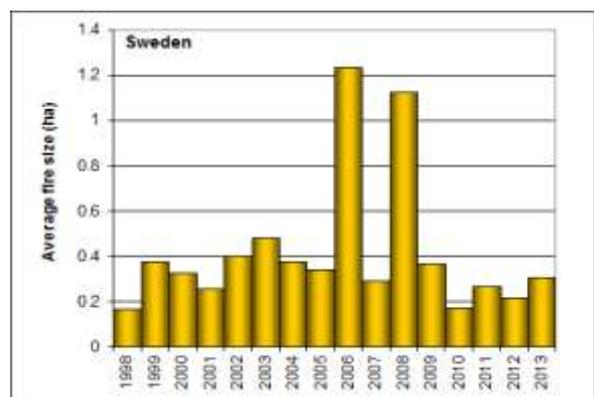
Figure 72. Total burnt area (ha) and number of fires by month in 2013



(a)



(b)



(c)

Figure 73. Burnt areas (a), number of fires (b) and average fire size (c) in Sweden from 1998 to 2013.

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

## 2.2.25 Switzerland

### *Fire occurrence and affected surfaces*

For 2013, fires from Canton Bern, Grisons, St Gallen, Schwyz, Ticino, Uri and Valais were recorded in the database.

A total of 54 forest fires were registered in 2013 (as reported by May 2014), burning 27.04 hectares, which corresponds to a low occurrence compared to the yearly average since 1980. Average fire size was 0.61 ha and median fire size 0.03 ha. 31% of the fires happened during the winter season (November to April), when 10% of the burned surface occurred.

Surprisingly, about one fifth of fires in 2013 were due to natural causes (lightning), which is exceptional. The yearly trends in terms of number of fires and burnt area during the last 32 years in Switzerland are shown in Figure 7 below.

### *Fire prevention activities*

Prevention and information are in the focus of the federal forest fire prevention strategy. The Federal Office for the Environment website has an updated table with an overview of fire danger and measures decreed in the regions:

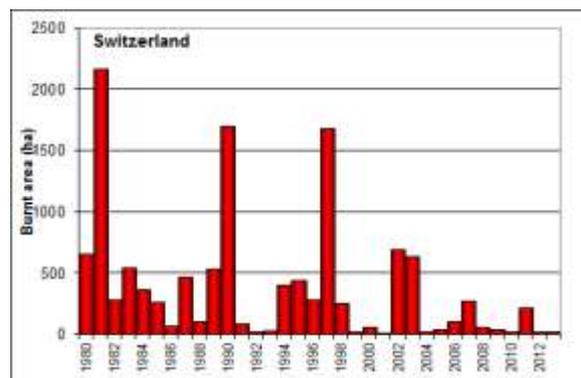
<http://www.bafu.admin.ch/waldbrandgefahr>

In 2013, warnings were issued over short periods and mostly in the southern territory. There were fire bans in Ticino and Grisons in January. Then the moist conditions throughout the spring kept the fire danger at low levels up to mid-end of July. Many Cantons such as Argovia, Basel-City and Basel-Landschaft, Grisons, St Gallen, Schaffhausen, Solothurn, Ticino and Valais reminded their population of the fire risk in relation to the dry and mild conditions prior to the National day (1st August) and asked them to be cautious with fires and fireworks.

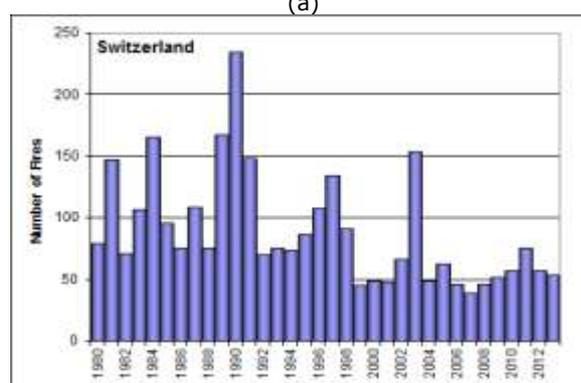
Ticino and the southern Valleys of Grisons issued fire bans at the end of July. Those bans were lifted at the End of August. Also the Principality of Liechtenstein issued a precautionary reminder at the beginning of August. At the beginning of Autumn (September), the dry conditions in Eastern Switzerland led to precautionary measures and messages by Authorities in St Gallen and Grisons.

At the end of the year, the particularly dry conditions in southern Switzerland led to a fire ban at the beginning of December in Ticino, which was lifted just before Christmas

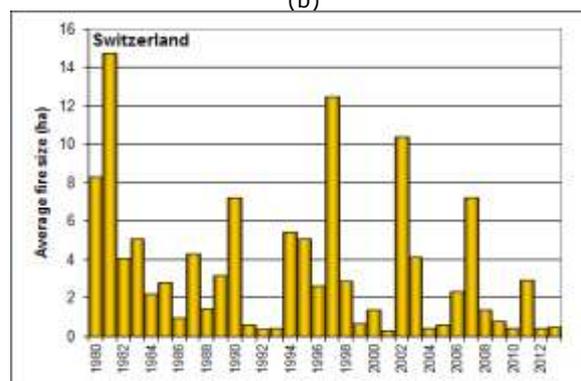
with the first showers and snowfall, which occurred to be very abundant throughout the Winter (2013-2014) for this region.



(a)



(b)



(c)

Figure 74. Burnt areas (a), number of fires (b) and average fire size (c) in Switzerland from 1980 to 2013.

### *Loss of human lives*

No losses of life or major damage to buildings were reported in 2013.

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

### 2.2.26 Turkey

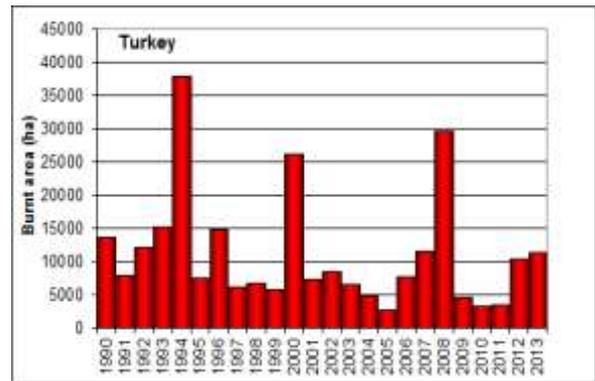
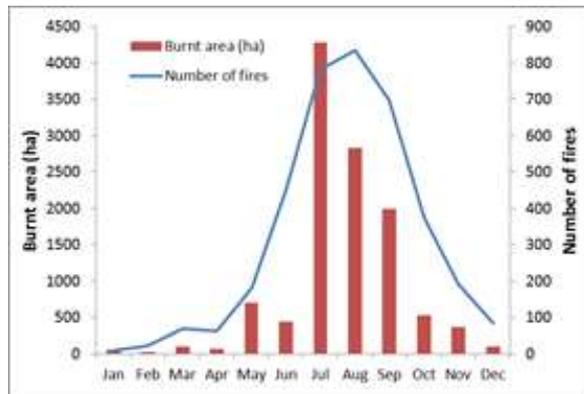
#### Fire occurrence and affected surfaces

According to data received from the Antalya Metropolitan Municipality Fire Brigade Department, in 2013, there were 3755 fires, burning a total burnt area was 11 456 hectares.

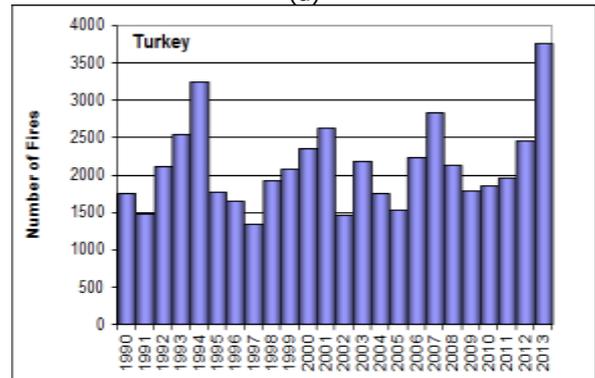
Over three-quarters of the damage occurred between July and August: see Table 26.

Table 26. Monthly distribution of forest fires in Turkey

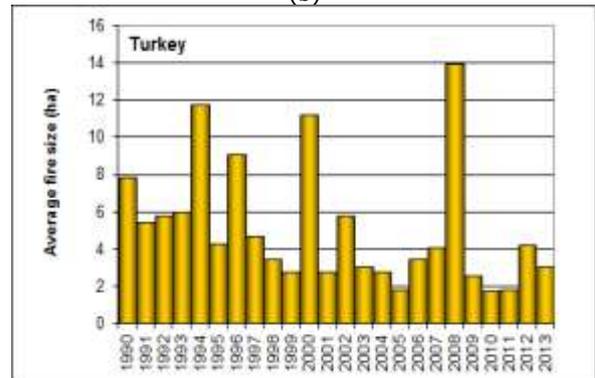
Month	Number of Fires	Burnt Area (ha)
Jan	8	50
Feb	21	21
Mar	69	92
Apr	62	68
May	181	703
Jun	449	440
Jul	782	4283
Aug	836	2826
Sep	697	1989
Oct	374	525
Nov	192	366
Dec	84	94
<b>TOTAL</b>	<b>3755</b>	<b>11456</b>



(a)



(b)



(c)

Figure 75. Burnt areas (a), number of fires (b) and average fire size (c) in Turkey from 1998 to 2013.

Around 72 % of the fire incidences were controlled before exceeding 1 ha. There were two fires bigger than 500 hectares: one in Balikesir and one in K.Maraş (Table 27).

The burnt area, number of fires and average fire size for the period of 1990-2013 are shown in Figure 75.

Most of the fires were caused by human activities (87 % of known causes). The causes of forest fires in 2013 are shown in Figure 76.

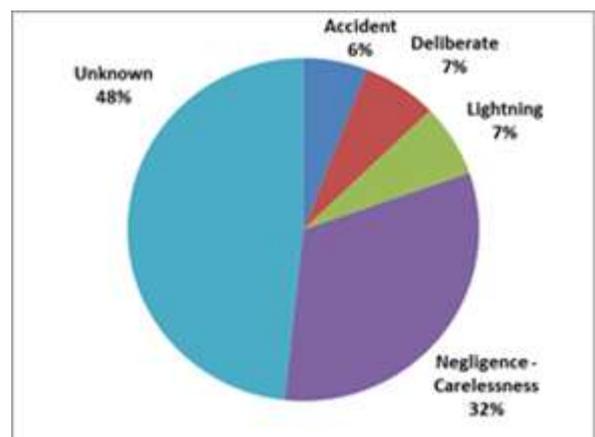


Figure 76. Main causes of forest fires in 2013.

Table 27. Number of fires and burnt area in 2013 by region and fire size class

Region	<1.0 Ha		1.1 - 5.0 Ha		5.1 - 20.0 Ha		20.1 - 50.0 Ha		50.1 - 200.0 Ha		200.1 - 500.0 Ha		>500.0 Ha		TOTAL	
	Nr Fire	Br Area	Nr Fire	Br Area	Nr Fire	Br Area	Nr Fire	Br Area	Nr Fire	Br Area	Nr Fire	Br Area	Nr Fire	Br Area	Nr Fire	Br Area
ADANA	120	26.1	34	55.8	12	72.0	4	104.6	2	162.4	1	454.0			173	874.9
ADAPAZARI	45	13.0	27	57.5	6	46.0									78	116.5
AMASYA	65	23.4	63	109.8	16	146.3									144	279.5
ANKARA	190	48.8	41	89.7	1	5.0	1	33.1							233	176.5
ANTALYA	250	41.9	50	91.0	12	106.1	5	176.5	2	277.3	2	619.3			321	1312.1
ARTVİN	1	0.5	4	7.0	2	12.0									7	19.5
BALIKESİR	60	12.2	19	36.0	12	114.7	1	27.0	2	210.0	1	339.8	1	1610.5	96	2350.2
BOLU	43	6.1	10	22.0	3	19.1	1	30.0							57	77.2
BURSA	75	14.8	28	49.7	11	98.5			4	369.4					118	532.4
DENİZLİ	112	21.3	27	48.0	7	52.8									146	122.1
ELAZIĞ	54	21.3	16	19.8	2	12.0									72	53.1
ERZURUM	8	3.0	10	23.5	3	28.9									21	55.4
ESKİŞEHİR	47	12.2	25	48.6	5	49.5	2	45.0							79	155.3
GİRESUN	16	5.4	16	33.8	8	52.3									40	91.5
ISPARTA	83	9.1	34	58.0	3	30.0									120	97.1
İSTANBUL	242	17.8	27	46.9	2	11.9									271	76.6
İZMİR	264	45.4	62	103.2	13	85.2	3	103.4	1	130.0	1	395.0			344	862.2
K.MARAŞ	201	42.1	48	74.7	9	73.0	1	25.0	2	181.7			1	1183.0	262	1579.5
KASTAMONU	120	19.1	24	39.8	2	17.9									146	76.8
KAYSERİ	11	4.6	49	101.0	8	67.5	1	30.0							69	203.0
KONYA	56	16.1	26	49.5	7	67.9	2	49.0							91	182.5
KÜTAHYA	72	9.7	13	21.3	5	40.6									90	71.6
MERSİN	112	22.0	30	56.2	8	63.0	2	55.5	3	312.5					155	509.2
MUĞLA	338	49.8	42	72.8	9	92.5	3	96.5	1	156.3	2	503.6			395	971.5
Ş.URFA	31	14.4	42	102.0	25	206.7	3	64.0							101	387.1
TRABZON	11	2.7	20	48.4	9	80.1	1	35.3							41	166.4
ZONGULDAK	68	8.3	15	26.9	2	21.5									85	56.7
<b>TOTAL</b>	2695	511.2	802	1492.6	202	1672.9	30	874.9	17	1799.6	7	2311.7	2	2793.5	3755	11456.5
<b>%</b>	71.8	4.5	21.4	13.0	5.4	14.6	0.8	7.6	0.5	15.7	0.2	20.2	0.1	24.4		

(Source: Antalya Metropolitan Municipality Fire Brigade Department, Turkey).

### 2.3 Comparison of Southern EU Countries with longer time series (1980 – 2013)



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

During 2013, forest fires burned a total area of 291 101 ha in these five countries. This is well below the average of the last 20 years (which is about 400 000 ha) and comparable with the mild years of 2010 and 2011. The number of fires (35 938) is also below the average and is the lowest for more than 2 decades (see Table 28 and Annex 1 for details).

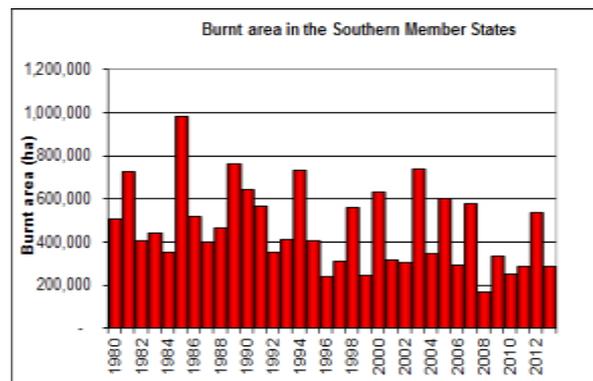
Figure 77a shows the total burnt area per year in the five countries considered since 1980. The statistics vary considerably from one year to the next, which clearly indicates how much the burnt area depends on seasonal meteorological conditions. Considering the five countries together, 2013 reverts to the pattern seen in recent years of a relatively low level of damage, after a more severe fire season in 2012.

Figure 77b 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 recent years the trend has been slightly upward. However, the total for 2013 was below the long term average.

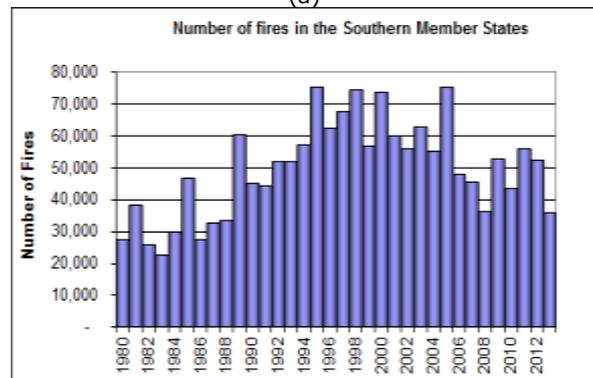
Figure 77c shows the yearly average fire size in the five countries since 1980. There is a clear difference in average fire size before and after 1990.

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). But it is also largely due to the improvements of the fire protection services of the countries.

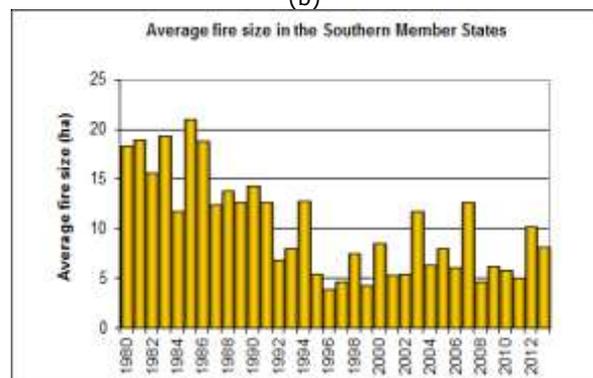
In 2013 the average fire size was lower than in 2012, but slightly higher than was recorded in the previous 4 years. The value is very close to the average of the last 2 decades.



(a)



(b)



(c)

Figure 77. Burnt area (a) number of fires (b) and average fire size (c) in the five Southern Member States for the last 34 years.

Figure 78 compares the yearly averages of burnt areas, number of fires and average fire size for the periods 1980-89; 1990-1999 and 2000-9 with the figures for 2013. It shows each of the five countries separately and also their total. It shows that 2013 was a positive year for all the countries apart from Portugal, which suffered significant damage.

Table 28 gives a summary of the burnt areas and number of fires for the last 33 years, the average for the 1980s, the 1990s and the 2000s, and the average for the last 3 years, together with the figures for 2013 alone.

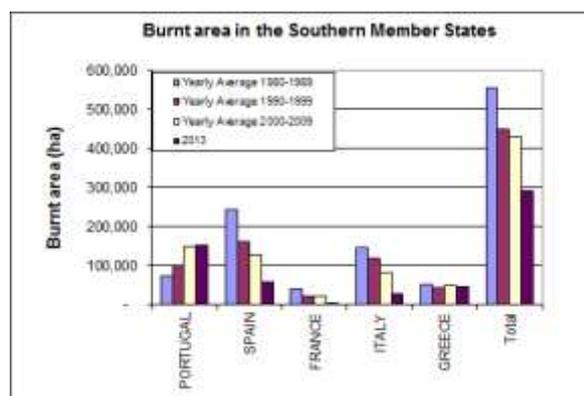
The 291 101 ha burnt over the five countries is around two-thirds the average values from previous decades (1990-1999 and 2000-2009). Looking at the individual countries, Portugal had an unusually bad year, Greece was around average and the others (Spain, Italy, and France) had unusually good years (Figure 78b).

The number of fires was also lower than the average values for previous decades for all 5 countries.

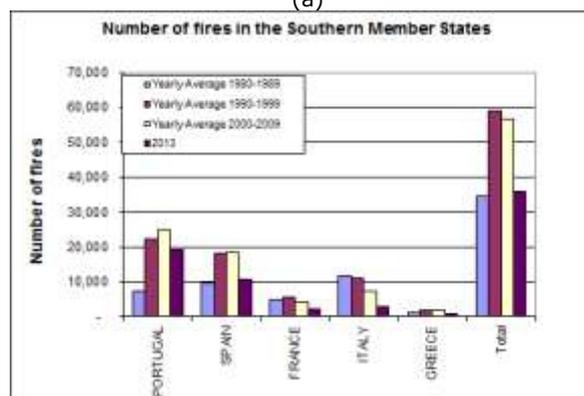
Figure 79 shows the contribution of each of the five Member States in terms of burnt areas and number of fires to the overall figures for all five countries in 2013.

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.

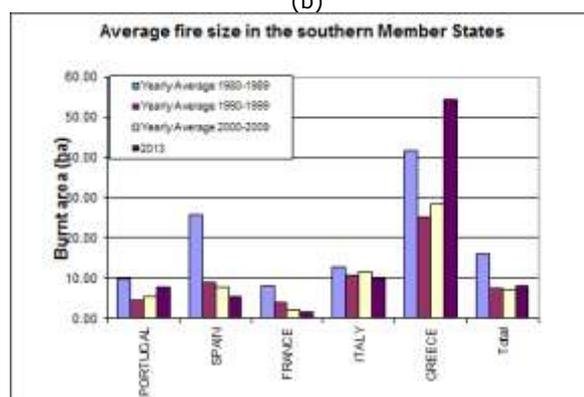
During 2013 Portugal was by far the most affected country, recording over 50% of both the burnt area and the total number of fires for the five countries.



(a)



(b)



(c)

Figure 78. Burnt areas (a), number of fires (b) and average fire size (c) in the five Southern Member States in the year 2013 as compared with average values for previous decades.

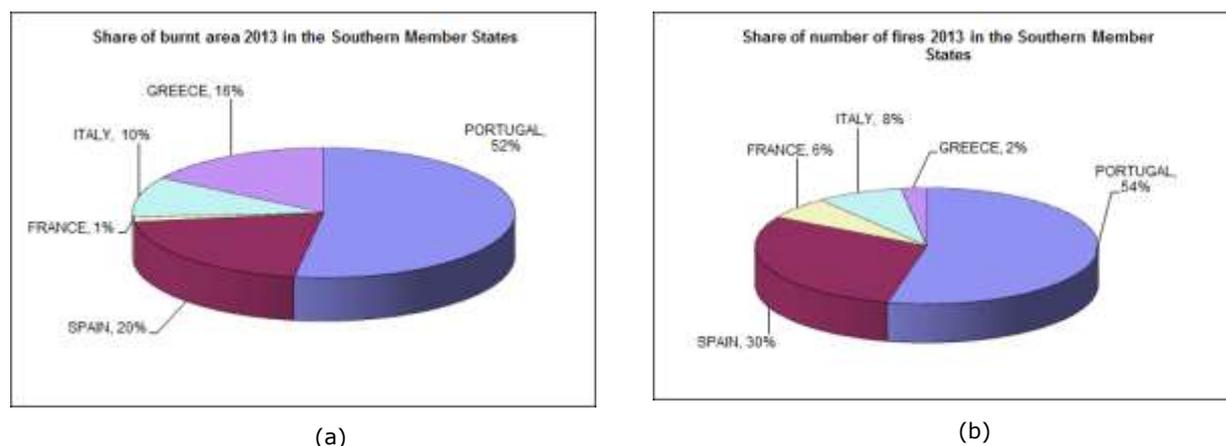


Figure 79. Share of the total burnt area (a) and the total number of fires (b) in each of the Southern Member State for 2013

Table 28. Number of fires and burnt area in the five Southern Member States in the last 33 years.

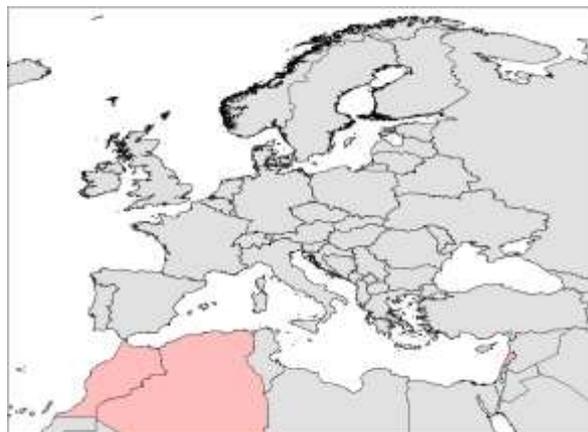
<i>Number of fires</i>	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE <sup>(*)</sup>	TOTAL
2013	19 291	10 626	2 223	2 936	862	35 938
% of total in 2013	54%	30%	6%	8%	2%	100%
Average 1980-1989	7 381	9 515	4 910	11 575	1 264	34 645
Average 1990-1999	22 250	18 152	5 538	11 164	1 748	58 851
Average 2000-2009	24 949	18 369	4 406	7 259	1 695	56 677
Average 2010-2013	21 929	14 066	3 682	6 063	1 272	47 011
Average 1980-2013	18 633	15 195	4 802	9 536	1 534	49 699
TOTAL (1980-2013)	633 519	516 619	163 259	324 230	52 144	1 689 771

<i>Burnt areas (ha)</i>	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
2013	152 756	58 985	3 608	29 076	46 676	291 101
% of total in 2013	52%	20%	1%	10%	16%	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	22 342	83 878	49 238	432 788
Average 2010-2013	117 473	110 510	7 977	69 608	36 178	341 745
Average 1980-2013	109 640	169 865	25 713	111 013	47 128	463 359
TOTAL (1980-2013)	3 727 776	5 775 402	874 240	3 774 436	1 602 335	15 754 189

(\*) Numbers of fires are incomplete since 2009

## 2.4 Middle East and North Africa Countries



### 2.4.1 Algeria

#### *Introduction*

In Algeria, the massifs of forest and maquis cover about 4.1 million hectares, distributed very differently in terms of forest coverage over the forty provinces of the country. In effect, the highest forest coverage is about 57.51% (in the wilaya of El Tarf), and the lowest rate is 0.36% (wilaya Naama). Eight provinces in the South are totally devoid of forest formations. Regarding forest area, the most forested wilaya (Batna) has an area of 314 565 ha, while the smallest area is about 5 000 ha (wilaya of Algiers). This distribution is largely explained by the climate, because the most humid north-east coastal massifs are also the most forested regions.

#### *Fire danger in the 2013 fire season*

During the summer of 2013, Algeria did not experience any major "Sirocco" heat waves or strong warm currents from the Saharan regions to the north of North Africa and Western Europe. Temperatures generally did not exceed the seasonal average and the risk of forest fire only reached very high levels during short periods in the month of August.

Accordingly, this stable weather situation was unfavourable for the initiation and propagation of forest fires. In addition the campaign was well-prepared, with a wide involvement of the sectors concerned, each dealing with the phenomenon of forest fires in their own sphere of activity.

#### *Forest fire prevention*

Several actions were carried out in preparation for the forest fire campaign of 2013, particularly in the work of prevention,

public awareness and operational organization. Below is a list of the main actions carried out:

#### Preventive work

Prevention Actions	Amount
Maintenance of firewall trenches	1160 ha
New firewall trenches	190 ha
Maintenance of road verges	6536 km
Buffer zones around farms	7454 ha
Maintenance of clearings under high voltage lines	230 ha
Maintenance of railway verges	149 km
Maintenance of forest trails	2965 km
New forest trails	1408 km
Maintenance of water points	110 units
Construction of new water points	149 units
Silvicultural activities	20125 ha

#### Awareness campaigns

Awareness raising activity	Number
Promotion of conferences and debates	420
Organisation of exhibitions and open days	280
Television broadcasts	61
Radio broadcasts	954
Sermons and religious lectures	543
Organisation of local meetings	5250
Distribution of posters and leaflets	38150

#### Operational Organisation

- Updated "Forest Fire" plans for the 40 wilayas affected by this risk: the plan lays down procedures for the implementation of preventive measures and the mobilization of resources in the fight against forest fires.
- Enabling operational committees, responsible for coordination of control operations at national level, also at the level of wilayas, daïras and communes.
- Set up local committees composed of farmers and citizens, which play an important role in fire prevention and first intervention in remote and isolated communities.
- Implementation of numerous simulation exercises "fight against wildfire".
- Organization of a cycle of continual improvement of training on simulated forest fires for the benefit of civil protection officers, in order to upgrade their knowledge of command control operations.

### Monitor, alert, and response reinforcement

The arrangements put in place for monitoring, alert and first intervention were provided by the Forest Service. However, the numerous interventions on reported fires were performed by means of civil protection units, reinforced by mobile columns, located conveniently at wilaya level to arrive at the scene in a timely manner.

In addition, during the 2013 campaign, local resources comprising civil protection means, were mobilized regularly at certain areas deemed critical, especially to large plots about to be harvested during the harvest season, and inside many sensitive forest regions that are heavily frequented by citizens for recreation.

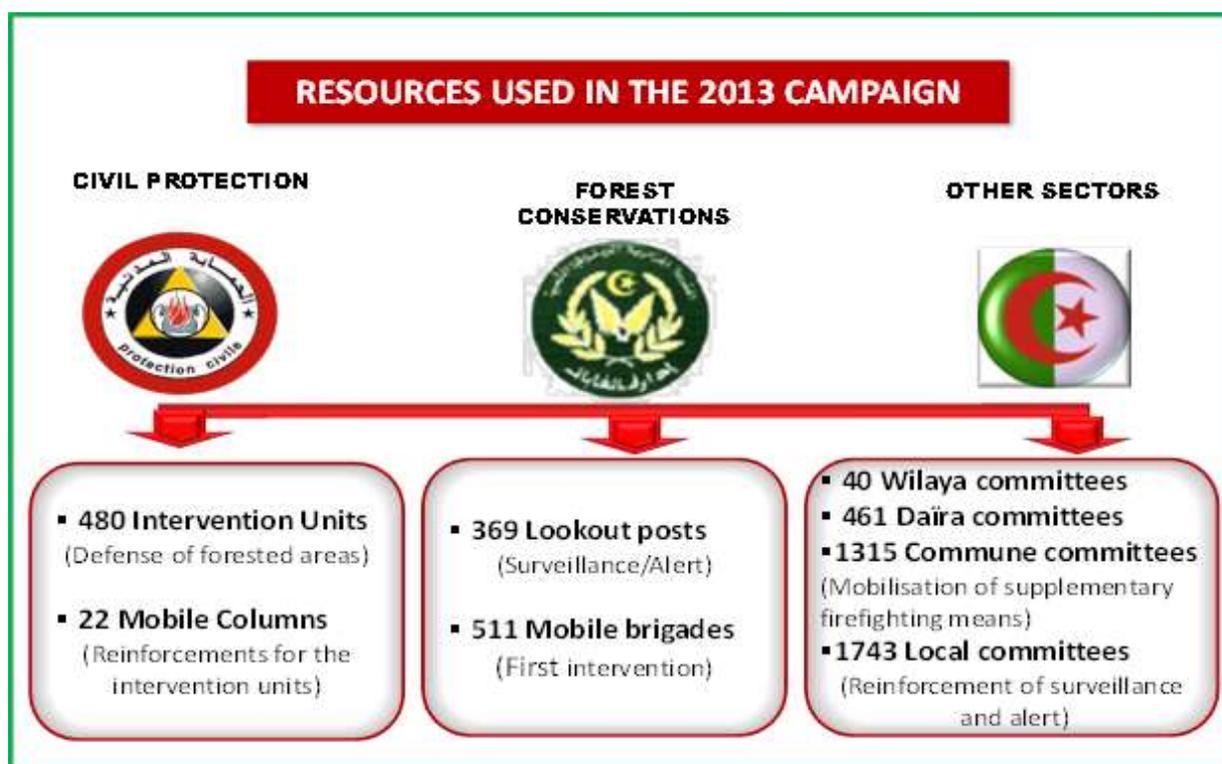


Figure 80. Resources used in the 2013 campaign in Algeria

### Fire occurrence and affected surfaces

The total area burnt by fire during the 2013 season is estimated at 13 396 hectares, caused by a total of 2 443 fires. This area is significantly lower than the annual average of the past decade (2003-2012), which is in the order of 29 228 hectares.

The distribution of burnt area by vegetation type (Figure 81) shows that no species type was particularly affected. The burnt area is shared almost equally between forest, maquis and scrub.

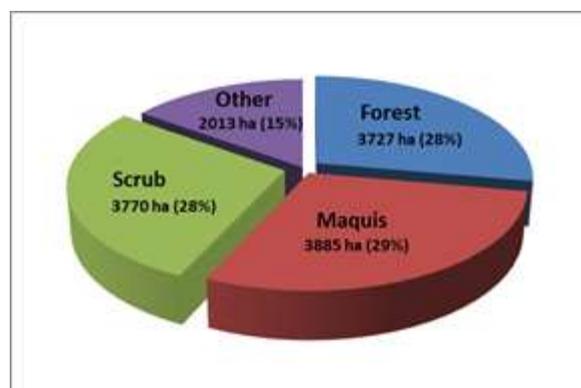


Figure 81. Burnt area classified by vegetation type

It should be also be noted that during the 2013 campaign, few fires with very large burned areas were recorded (Figure 82); in fact, over 84% of fires burnt less than 5 hectares. This shows in general, the

effectiveness of the new measures taken, particularly in the areas of early warning systems and proximity devices deployed as preventive measures for the detection and rapid response to fire outbreaks.

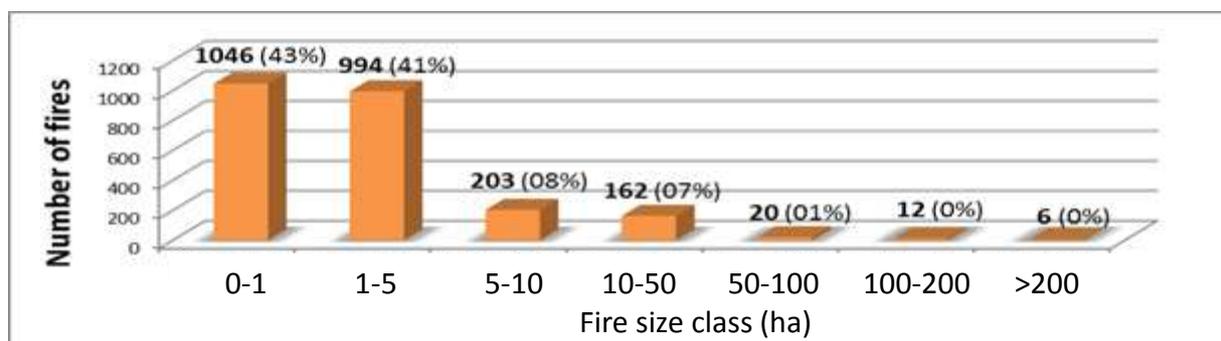


Figure 82. Number of fires in Algeria in 2013 classified by fire size

In contrast to 2012, the distribution of area burned by region of the country (East/Central/West) during the 2013 campaign (Figure 83) shows that the centre region (13 wilayas) is most affected by fires, with the burnt area representing 42% of the national total.

The West region (12 wilayas) and the Eastern region (15 wilayas) recorded almost the same amount: each with 29% of the total area burnt. It is notable that the East region did not experience many fires even though it is the most forested region.

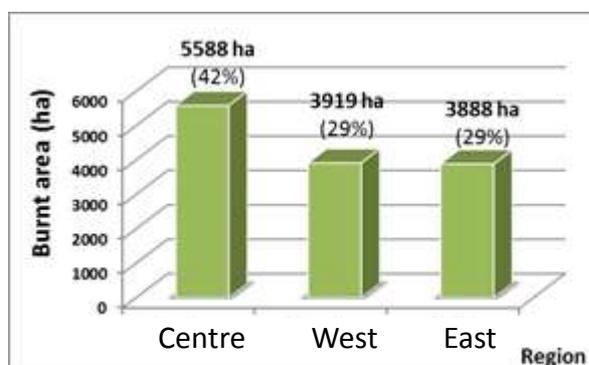


Figure 83. Burnt area classified by regions of the country

The monthly distribution of the burnt area (Figure 84) shows that the largest area burned was during the month of August when an average of 7ha/fire was recorded. This can be explained by the short heat-waves that were recorded during that month.

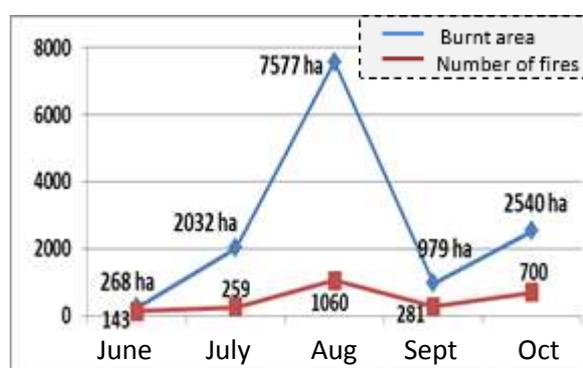


Figure 84. Number of fires and burnt area by month

#### Loss of life

During the 2013 season, there were no recorded deaths either among citizens or firefighters during forest fires. However, a dozen less serious accidents, in the form of fractures, respiratory problems, injuries and minor burns, occurred among members of the Civil Protection intervention teams in the course of their activities.

#### Mutual assistance operations between states

Algeria did not request any international assistance in the fight against forest fires in the 2013 campaign; nor did the General Directorate of Civil Defence participate in any operation in response to forest fires outside Algerian territory.

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

## 2.4.2 Lebanon

### Introduction

No major change in forest fire reporting has been achieved since last year. Data on fire occurrence and affected surfaces in Lebanon are still not mutually consistent, homogenized and unified at the National level. In 2013, a collaborative work was initiated between the Ministry of Environment (MOE) and the Biodiversity Program, Institute of the Environment, University of Balamand (BP-IOE-UOB), regarding the execution of the data analysis related to wildfires in Lebanon. The main goal of this collaboration was to produce a yearly report on wildfire occurrence and the extent of burned areas in the country. The reports come in line with the highlights of the technical requirements of Lebanon's National Strategy for Forest Fire Management (endorsed by Council of Ministers Decision No. 52 dated 13/5/2009) by working towards the unification of fire information and data as a means to empower efforts in understanding better the problem of wildfires in Lebanon. The analysis is done based on the data provided in the fire ID cards filled in by the Internal Security Forces (ISF) and copied to the MOE, knowing that the fire ID cards format was issued through the notification of the Presidency of Council of Ministers number 256 dated on 1/3/2008. In this context, the state of Lebanon's forest fires for 2008 was completed in 2013.

### Fire preventive activities

National fire prevention measures were only limited to few initiatives including the publication by the Directorate of Civil Defense of a daily bulletin for prediction and prevention of forest and rural fires, in addition to the requests of MOE from institutions and citizens to be on the top of readiness to address fire risk. More specifically, the MOE appealed to citizens not to set fires during the fire season and to immediately report any possible risk. It also addressed municipalities with high risk of fires to be properly equipped with firefighting tools, to secure water sources for firefighting operations, and to intensify police patrols in the neighbouring and surrounding areas of their forests.

### Fire danger

Based on the recently conducted assessment of 2008 fires (MOE/BP-IOE-UOB, 2013) it was found that the main fire causes in Lebanon were unknown. Negligence was reported as the main cause of fires followed by human activities on natural lands. Arson fires represented only a small fraction of the total causes. According to the same assessment report, it was found that local residents reported the highest percentage of fire incidents, while the remaining fire incidents were reported by internal security patrols, farmers, and by others.

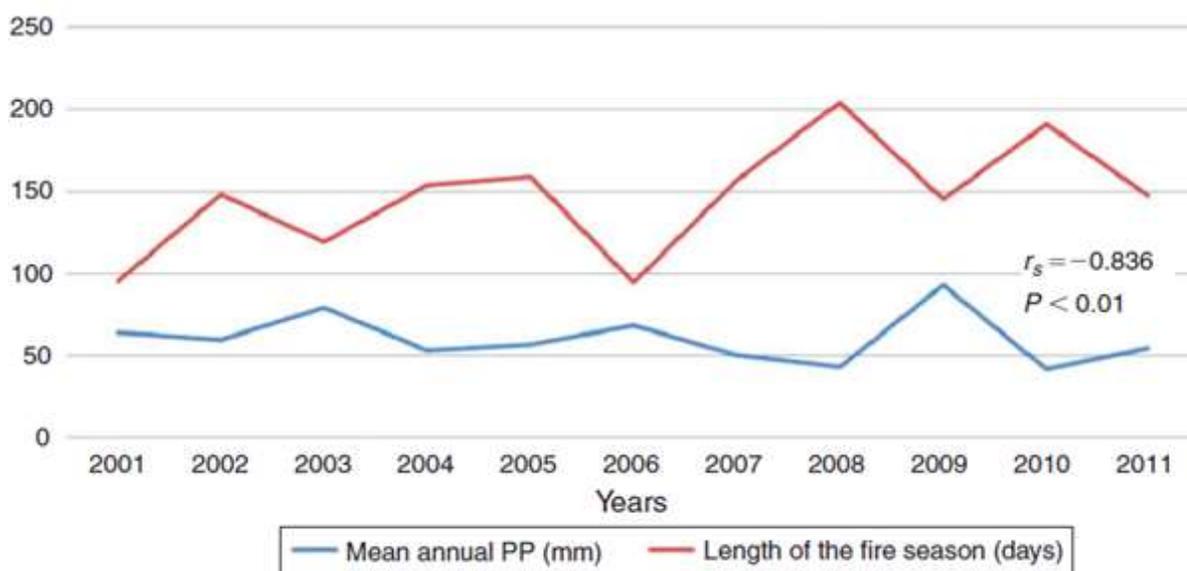


Figure 85. Change in length of the fire season (days) and mean annual precipitation (mm) between 2001 and 2011 (Salloum and Mitri, 2014).

In another study conducted at the BP-IOE-UOB (Salloum and Mitri, 2014), it was shown that the average length of the fire season was 146.6 days, the average start date was 14 June, and the average end date was 12 November. Fire occurrence was positively correlated with mean monthly temperatures and negatively correlated with mean monthly precipitation and mean monthly wind speed. The length of the fire season was negatively correlated with mean annual precipitation (Figure 85). In addition, an increasing fire occurrence risk was observed in association with high maximum temperatures and long dry seasons.

New activities and results have been achieved within the framework of a research project entitled: "Towards a better assessment and management of Wildfire Risk in the Wildland-Urban Interface in Lebanon: gaining from the US experience" managed by BP-IOE-UOB and funded by the United States Agency for International Development (USAID) in agreement with the US National Academies of Science (NAS), and within the Programme Partnerships for Enhanced Engagement in Research (PEER). Accordingly, the Project team conducted an exchange visit to the USA between June 5 and 16, 2013 in collaboration with Montana State University, the project's US collaborator. The visit was intended to start an open exchange of ideas, knowledge, and sound practices in wildfire management. Also, a workshop entitled "Research on managing wildfire risk in Lebanon" was conducted in Beirut on 26 June 2013. The participants from different institutions, ministries, and organizations discussed how the conducted wildfire research represents one of the necessary steps to help in developing the capacity of stakeholders in assessing and managing wildfire risk in Lebanon. In addition, the conducted research resulted in mapping Wildland-Urban Interface (WUI) in relation to wildfire hazard and collecting data on different socio-economic variables at the Caza level (a judicial and administrative district in Lebanon): this included the use of satellite remote sensing images, Geographic Information System (GIS) data and other ancillary data (e.g. National Agricultural statistics, economic reports, etc.) (Figure 86). This was followed by 1) conducting a socio-economic analysis to assess fire risk in the country, 2) producing the current and future (2020's conditions) climate-based fire potential

index of Lebanon (Mitri et al, 2014a; 2014b), and 3) developing a web-application as part of a decision framework that the community of interest can use to adaptively manage future wildfire risk in the WUI. The web-application is supposed to provide a modern and user-friendly alternative that can help in improved wildfire risk knowledge and decision-making. A trial version of the web-application was made available at the following addresses: <http://Ioe-firelab.balamand.edu.lb> and <http://home.balamand.edu.lb/wildfire>.

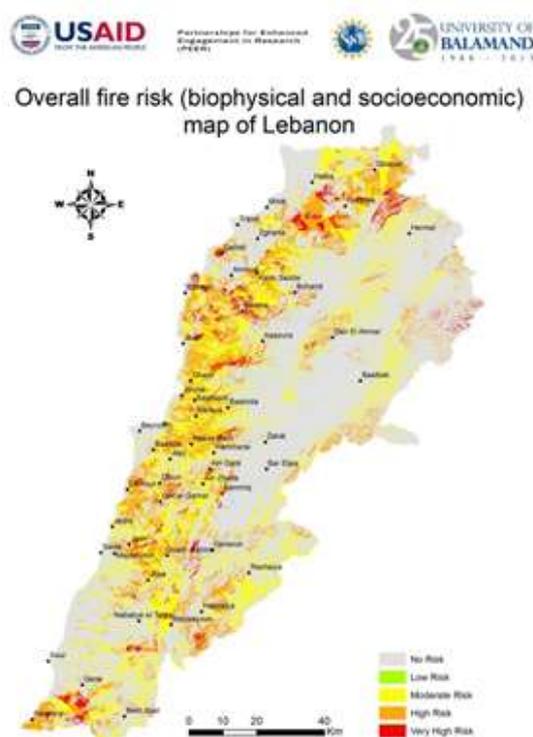


Figure 86 Overall fire risk map in Lebanon (USAID\_PEER project – BP-IOE-UOB)

Another study (MOE/UNDP/UOB, 2013) involved assessing Greenhouse Gas emission (GHG) from forest fires during the past decade. Accordingly, GHG were assessed on a yearly basis for both burned forests and burned cropland (Figure 87). The main findings revealed that wildfires mainly affecting broadleaf, conifer, and mixed forests were the highest contributors to GHG emissions (between 60 Gg and 400 Gg CO<sub>2</sub> per year).

Another project conducted in 2013 by BP-IOE-UOB in partnership with Lebanon Reforestation Initiative (LRI), which is a project funded by the United States Agency for International Development (USAID) and implemented by the United States Forest

Service (USFS), resulted in the production of 1) a fuel type map of Lebanon, 2) a fuel combustibility map, 3) burned area maps of Lebanon over the past 10 years, 4) fire severity assessment of recent large burned areas, 5) monitoring post-fire vegetation recovery (El Halabi et al., 2014), and 6) designing an adapted Firewise demonstration site. The adapted Firewise program mainly consists of reducing wildfire risks and their negative economic, social and ecological impacts by 1) creating a "Firesmart" Landscape in the wildland/urban interface based on wildfire risk assessment, and 2) involving the local community (homeowners, landowners, community leaders, firefighters etc.) in the effort to reduce the risk of wildland fires.

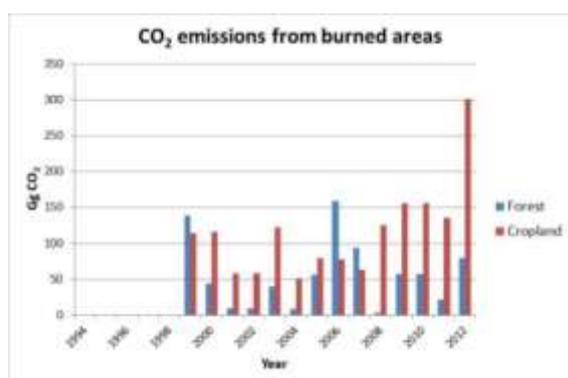


Figure 87. GHG emission from burned areas in Lebanon (MOE/UNDP/UOB, 2013)

### *Fire occurrence and affected surfaces*

No official reports have been published on the number and extent of burned areas for 2013 in Lebanon. However, based on a desk study conducted by the BP-IOE-UOB, it was found that a total of 640 ha of vegetation cover were affected by fire. In general, fire-affected type of forests consist of needle forest (e.g. Pinus sp.), followed by mixed forest, grassland, mixed forest/agricultural land, and mixed grassland/agricultural land (MOE/BP-IOE-UOB, 2013). In addition, mountainous areas are generally affected by the largest number of fires and the largest extent of burned areas, followed by valleys and plains respectively.

### *Firefighting means and information campaigns*

Fire control in 2013 mainly involved the use of Lebanese Army helicopters, fire engines of the Directorate of Civil Defense, small

fire trucks owned by Non-Governmental Organizations, and local residents.

### *Loss of human lives*

No official data is published on incurred injuries and/or the total loss of human lives in relation to forest fires in Lebanon. However, a desk study conducted at the BP-IOE-UOB revealed at least 5 individuals injured in activities associated with forest fires during 2013.

### *Operations of mutual assistance*

One of the most prominent fires was the Sfira-Btormaz fire in North Lebanon, which burned large pine forests over a period of four days. This large fire broke out on July 30, 2013 and approached residential areas in the town of Sfira, and prompted the government to seek mutual assistance in battling the blaze. In reference to the Lebanese press, Cyprus agreed to send a helicopter to assist the Lebanese Army putting out the fire.

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(Source: Biodiversity Program, Institute of the Environment, University of Balamand, Lebanon).

### 2.4.3 Morocco

#### Introduction

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

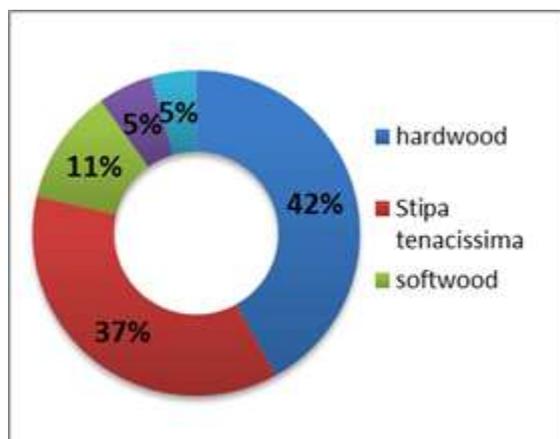


Figure 88. Composition of forest land in Morocco

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 2012, an average of 277 fires per year is calculated for an annual average area affected of 3 114 ha (HCEFLCD, 2012).

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 2012

Through the analysis of the available data on forest fires in Morocco during the period 1960s to 2011, a total of 14 205 outbreaks of fire (Figure 89) and a total area damaged (but not lost) of 158 338 ha are reported, giving an average of 273 fires per year for an annual average area of 3 045 ha affected, with maxima of 11 000 ha in 1983 and 8 660 ha in 2004 (Figure 90). The absolute minimum is recorded in 2002 with 593 ha (Figure 91).

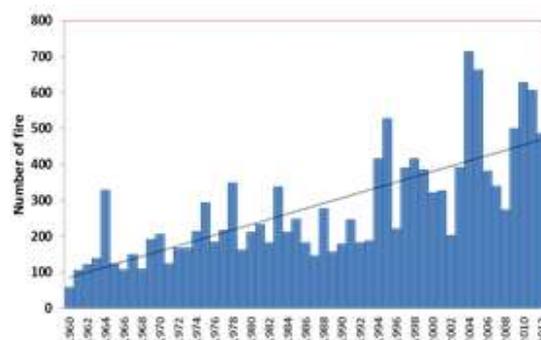


Figure 89. Evolution of forest fire numbers from 1960 to 2012 (HCEFLCD, 2012)

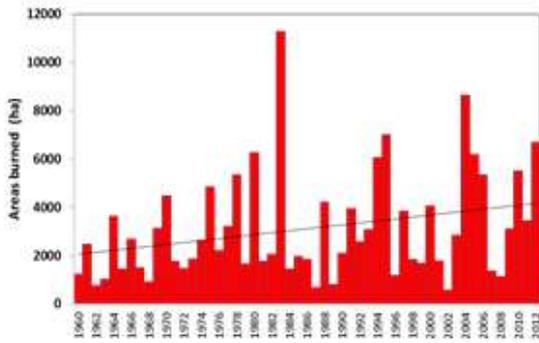


Figure 90. Evolution of the areas burned from 1960 to 2012

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 498 forest fires in the last decade (2003-2012) (Figure 92).

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 1960 to 2012 (277 fires and 3 111 ha). We note that the area affected per fire, which reached the value of 8 ha during the period 2005-2012, has decreased by 37% compared to the national average recorded since 1960, which is 12 ha per fire (Figure 93).

Over the past decade, the years 2004, 2005, 2010, 2011 and 2012 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.

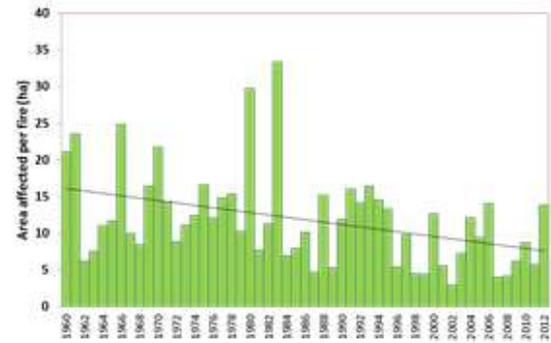


Figure 91. Evolution of the area affected per fire from 1960 to 2012

2013 fire season

During 2013, a total of 411 fires affecting an area of 2 207 ha was recorded, an average of 5.37 ha per fire.

Both the number of fires and the total burnt area have decreased in comparison to the average for the last decade 2003-2012, by 10% and 50% respectively (Figure 92, Figure 93).

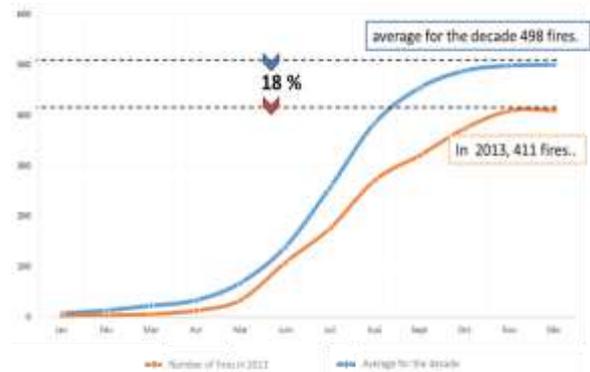


Figure 92. Evolution of the number of fires in 2013 compared to the last decade

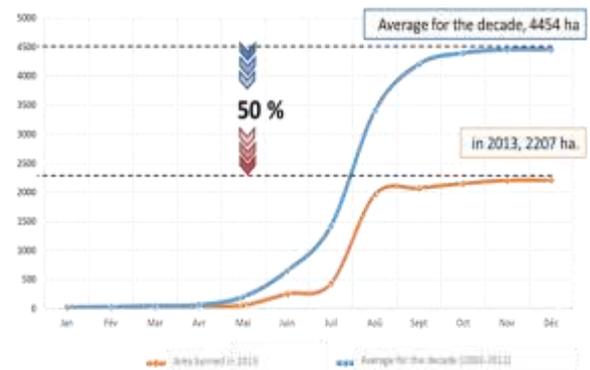


Figure 93. Evolution of burnt area in 2013 compared to the last decade

The distribution of fires recorded in 2013 (Table 29), based on the type of vegetation affected, is as follows:

- For wooded land, an area of 1 102 ha (50% of the total area burned) was affected by 208 fires (50% of the total number of fires), averaging 5.2 ha per fire;
- The shrub and herbaceous covers were affected by 203 fires that covered an

area of 1 104 ha, equivalent to 50% respectively of the total number of reported fires and 50% of the total area burned.

- For wooded stands, the Thuja is in first place with an area of 627 ha affected, equivalent to 28% of the total area burned in this category, followed by Argan (*Argania Spinosa*) trees with an area of 184 ha affected (8%).

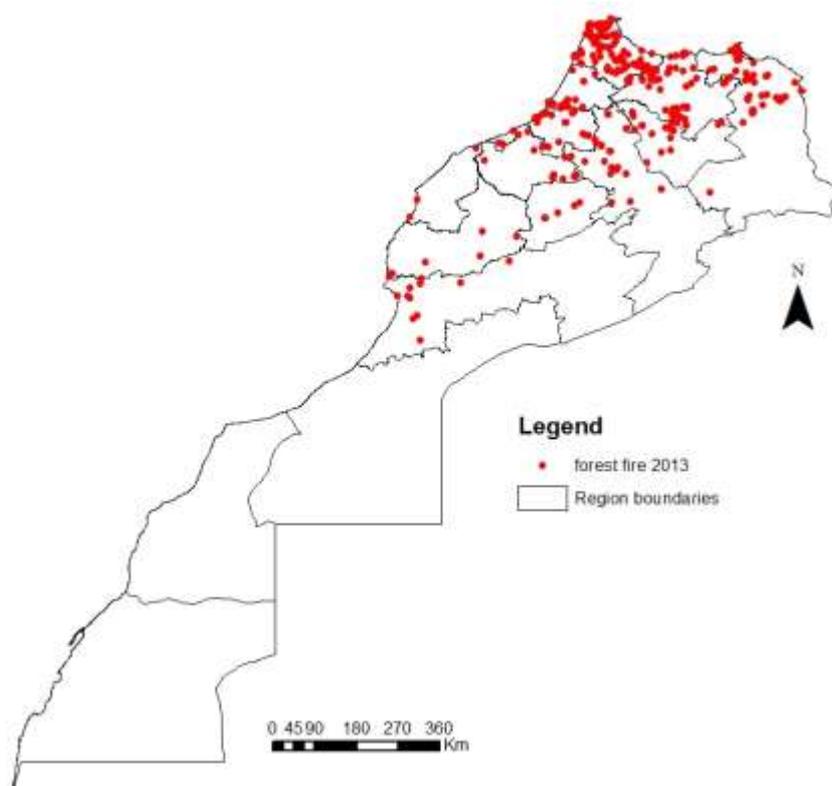


Figure 94. Location the forest fires recorded in 2013 in Morocco

Table 29. Distribution of fires based on the type of vegetation affected in 2013

<b>Category</b>	<b>Species</b>	<b>Area</b>	<b>% Area</b>	<b>Number</b>	<b>% Number</b>
<b>Broadleaves</b>	Argan	184	8	5	1
	Cork oak	91	4	35	8
	holm oak	35	2	25	6
	Eucalyptus	24	1	20	5
	Other <b>broadleaves</b>	1	0.02	3	1
<b>Subtotal broadleaves</b>		<b>334</b>	<b>15</b>	<b>88</b>	<b>21</b>
<b>Conifers</b>	Thuja	627	28	17	4
	Pinus halepensis	81	4	51	12
	Pinus pinaster	40	2	11	3
	Pinus pinea	14	1	14	3
	Others (Cedar, Juniperus oxycedrus...)	6	0.3	27	7
<b>Subtotal coniferous</b>		<b>768</b>	<b>35</b>	<b>120</b>	<b>29</b>
<b>Others</b>	Shrub and herbaceous	897	41	168	41
	Alfa	207	9	35	9
<b>Subtotal others</b>		<b>1 104</b>	<b>50</b>	<b>203</b>	<b>50</b>
<b>General total</b>		<b>2 207</b>	<b>100</b>	<b>411</b>	<b>100</b>

The data relating to the distribution of fires according to size classes of affected areas are represented in the table below (Table 30). 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 (0.2% of the total number of fires) affected an area of over 100 hectares, representing over 54% of the total area burned.

Table 30. Distribution of fires according to size classes of affected areas

Size Class (ha)	Area (ha)		Number	
	Area	%	Count	%
0-5 ha	343	16	380	92
5-10 ha	113	5	13	3
10-20 h	105	5	7	2
20-50 ha	307	14	8	2
50-100 ha	140	6	2	0.5
>100 ha	1 200	54	1	0.2
<b>Total</b>	<b>2 207</b>	<b>100</b>	<b>411</b>	<b>100</b>

The data showing the distribution of fires by forest region are reported, below, in Table 31.

Table 31. Fire numbers and area affected by forest region

Region	Number		Area (Ha)	
	Count	%	Area	%
Sud-Ouest	13	3	1217	55
Rif	130	32	259	12
Nord-Est	67	16	186	8
Centre	19	5	172	8
Oriental	72	18	150	7
Rabat-Sale-ZZ	32	8	84	4
Fés-Boulemane	20	5	77	3
Moyen-Atlas	23	6	21	1
Nord-Ouest	24	6	18	1
Haut-Atlas	6	1	15	1
Tadla-Azilal	5	1	8	0
<b>Total</b>	<b>411</b>	<b>100</b>	<b>2207</b>	<b>100</b>

Region Southwest (Agadir, Taroudant...) ranks first in terms of area affected with 1 217 ha (55% of the total area recorded nationally) (Figure 95 and Table 31).

In the Rif region, there was once again recorded, considerable performance in terms of actions on incipient fires in 2013. Indeed, the 130 fires reported in this region (32% nationally), burnt 259 ha (only 12% nationally). Therefore, despite the large number of fires, the area affected by each fire was only 2 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.

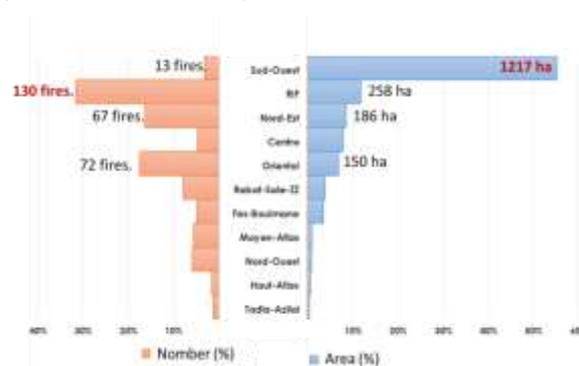


Figure 95. Number of fires and area affected by forest region.

### Fire Causes

Natural fires (lightning) are very rare. forest fires of unknown origin represent a dominant share (97%). Almost all forest fires result from human action, either intentionally or by negligence (Table 32).

Table 32. Causes of fires

Origin	Cause	Area		Number	
		Area	%	Count	%
Accidental	Landfill	2.0	0.1	2	0.5
	High tension line	1.0	0.0	1	0.2
unknown	unknown	926.0	42.0	400	97.3
Natural	lightning	0.5	0.0	1	0.2
Carelessness	Honey extraction	1200.0	54.4	1	0.2
Intentional	Land clearing	51.6	2.3	3	0.7
	Vandalism	0.0	0.0	1	0.2
	Vengeance	26.0	1.2	2	0.5

### Fire fighting means

The means mobilized by the different departments in 2013 in Morocco for the operations against forest fires are as shown in Table 33:

Table 33. Fire fighting means in 2013.

<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 1100 watchers]
<b>Ground intervention</b>	High Commission of Forests, Water and combating Desertification	<b>300</b> forest fighters with <b>90</b> 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	Ten <b>(10)</b> Turbo Trush aircraft
	Royal Air Forces	Two <b>(2)</b> C130 aircraft and Four <b>(4)</b> Canadairs

**NC** : Not Communicated

### *Information campaigns*

In Morocco 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 2013, 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.

### *Loss of human lives*

No lives were lost in the 2013 season.

*(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 fires 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 Coordination Centre (ERCC), 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 40 ha or larger. The burned area mapped by EFFIS corresponds, on average, to about 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: 2013 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 2013 fire season are presented, comparing them with previous years.

The first part of the 2013 fire season was relatively mild, due to relatively cool and wet weather in southern Europe during spring and early summer. Nevertheless, unusually hot weather brought severe fire episodes to the UK and Ireland in March-April, and some relatively large fires were observed in Greece in May. Significant fire activity in the Mediterranean countries started only in July, with some large fire episodes in Portugal, Spain, Greece and Italy. During August and the rest of the fire season moderately mild conditions continued in most of the EU, with the exception of Portugal, which was severely affected by several major fires. During August, in addition to Portugal, critical fire episodes were monitored in Turkey, Italy, Corsica, Bulgaria, Algeria, Cyprus, Bosnia and Herzegovina, Greece and Spain.

Overall, despite the very high-to-extreme fire danger level reported in early August in large portions of the south-eastern EU, the Balkan region and North Africa, the 2013 fire season was well below the historical average, except for the remarkable fire activity observed in Portugal especially during the second part of the season.

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

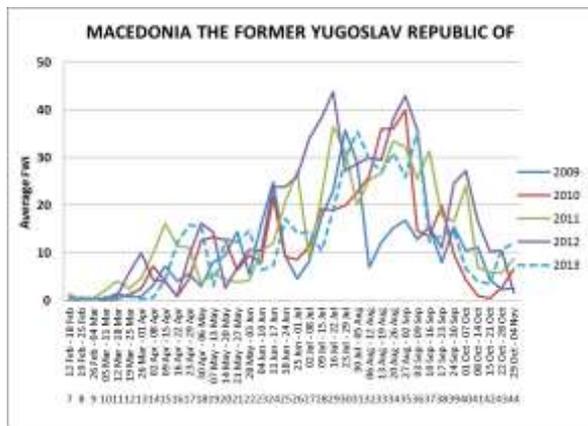
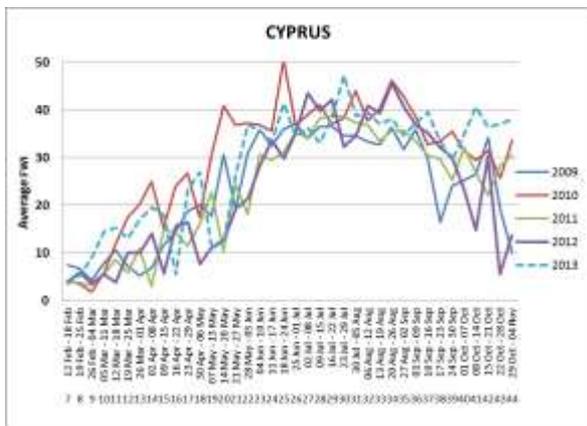
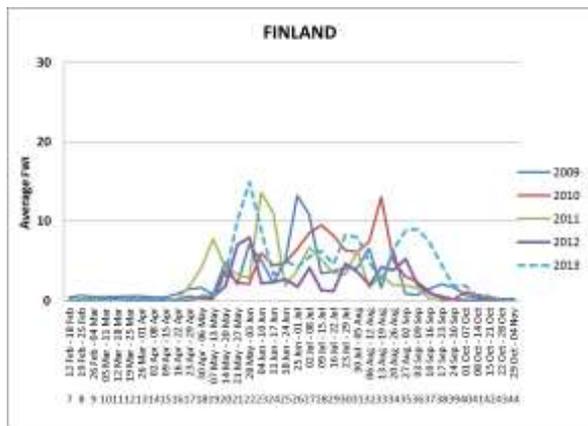
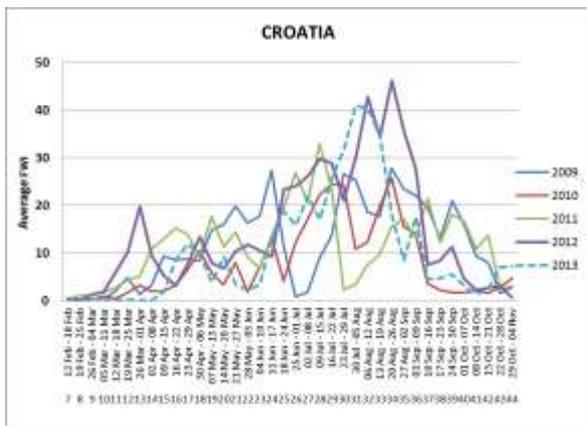
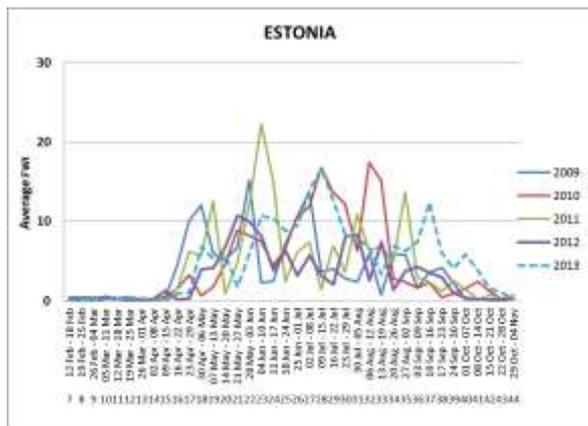
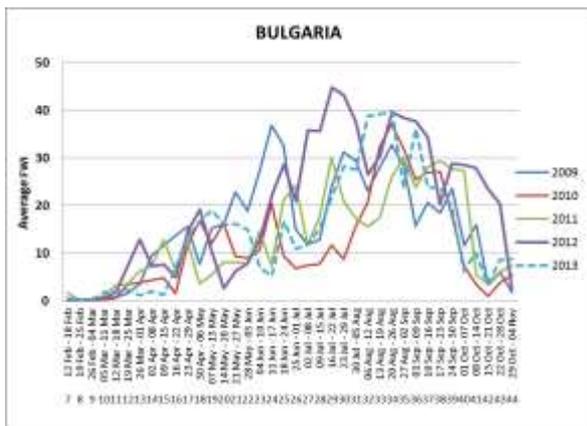
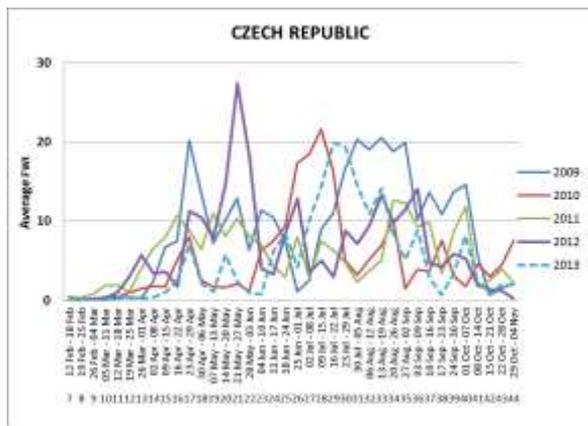
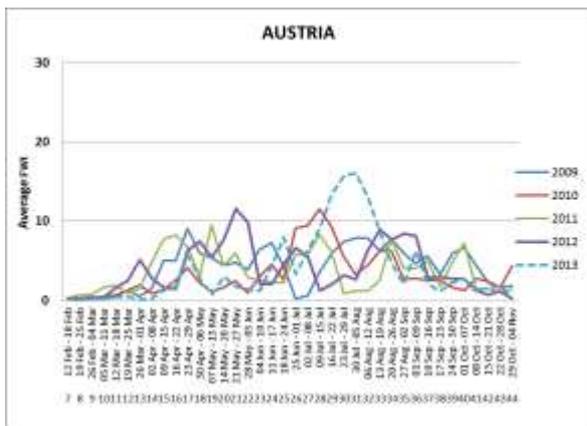
The following figures show fire danger through 2013 as determined by the average FWI values assessed during the fire season in the individual countries.

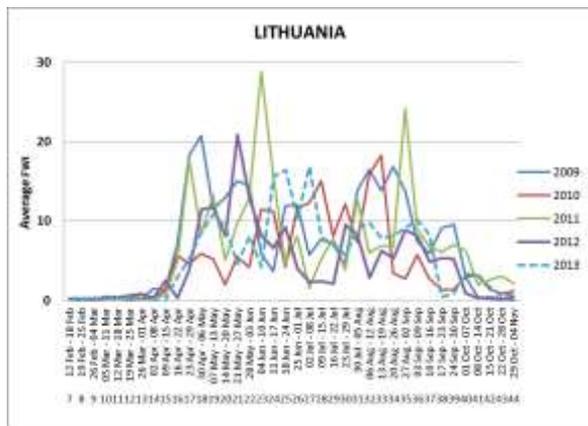
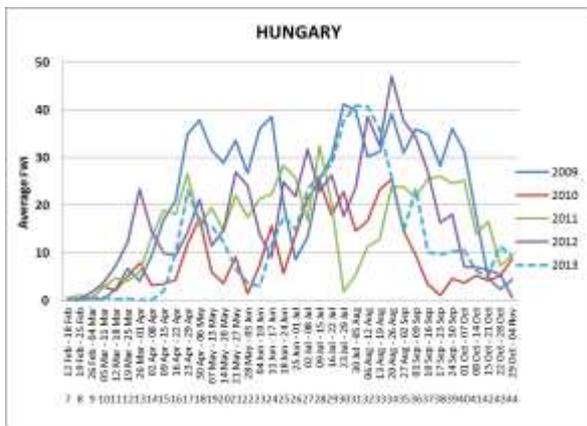
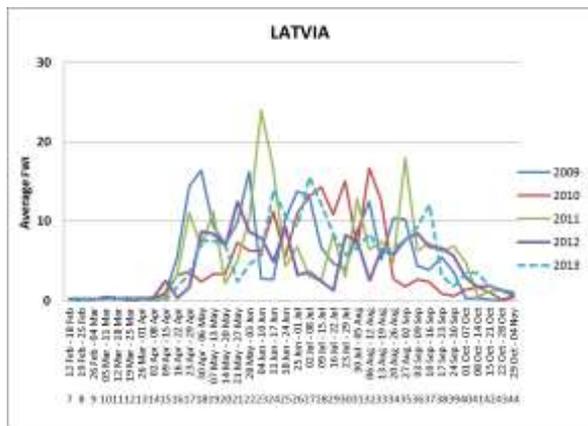
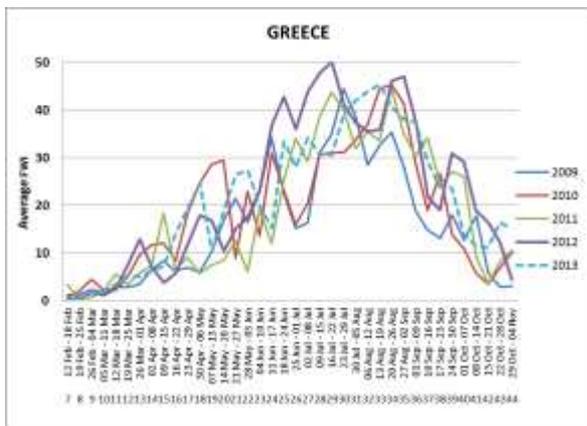
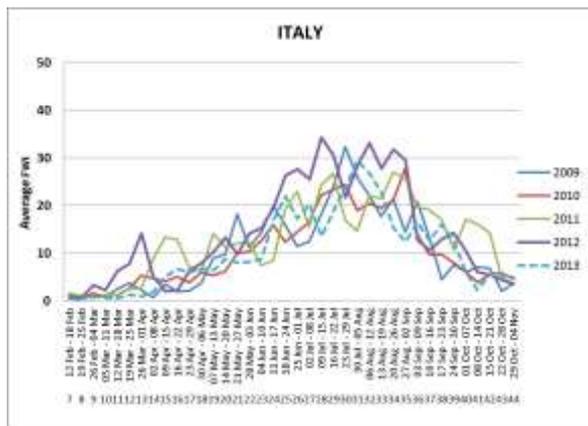
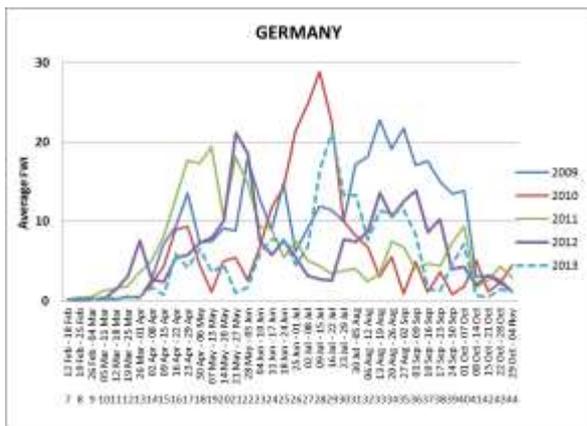
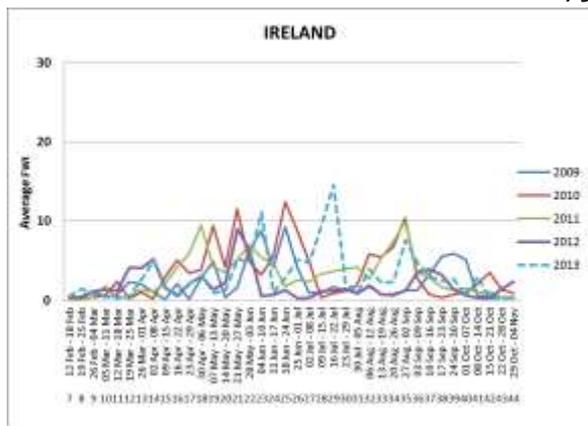
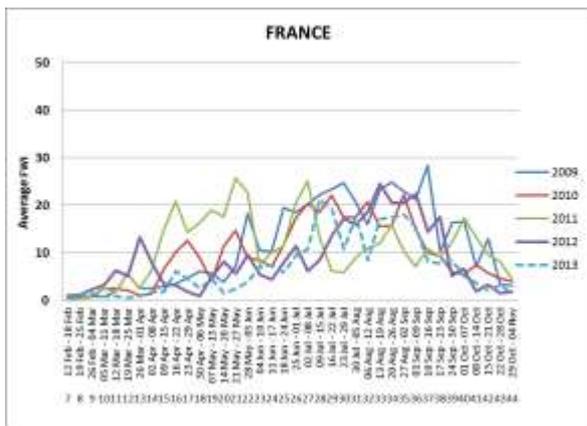
The graphs show the weekly averages of FWI over entire countries; therefore local peaks might have been flattened, especially in those countries such as France or Italy, where there are strong differences in fire danger level with changing latitudes; nevertheless the general trend is depicted providing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

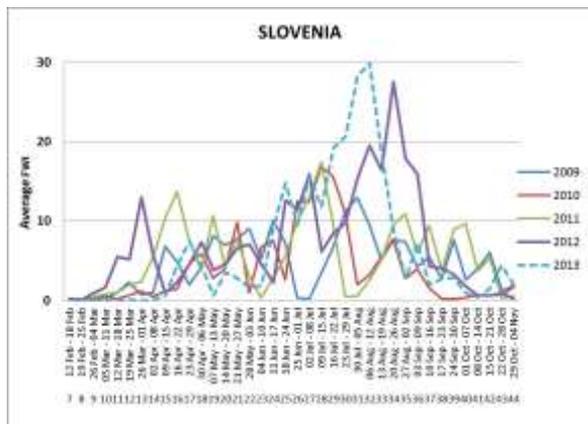
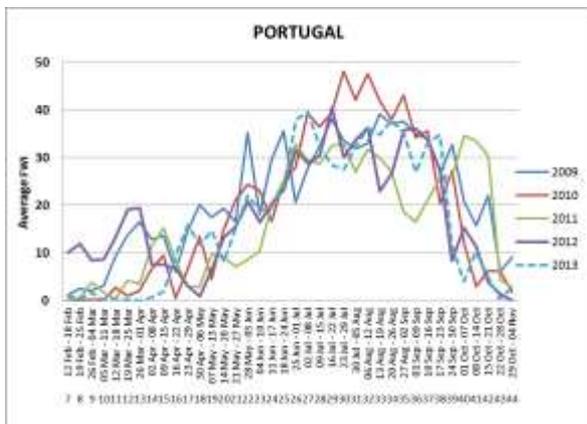
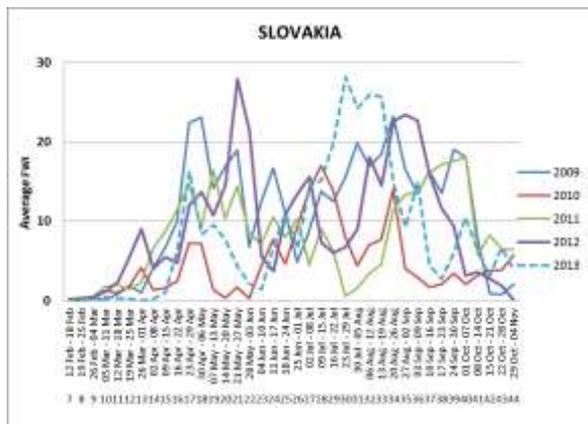
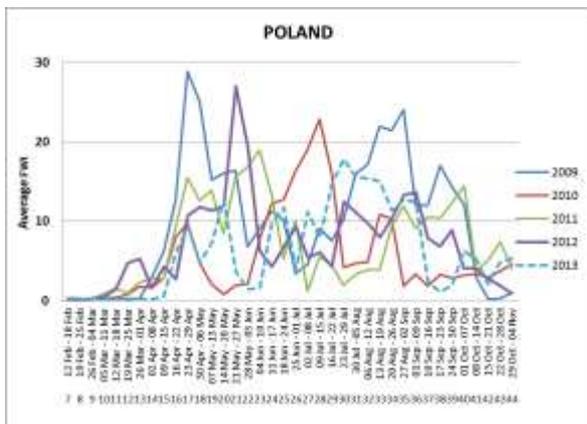
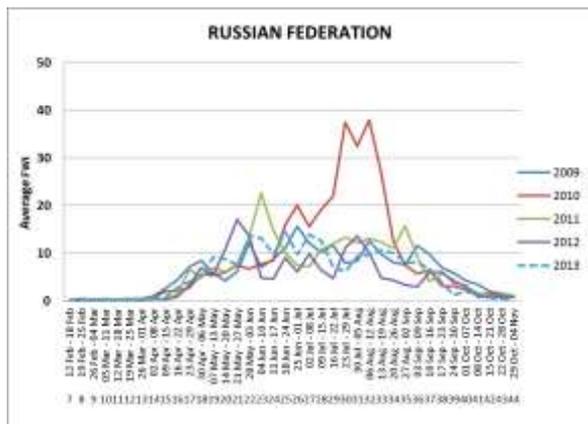
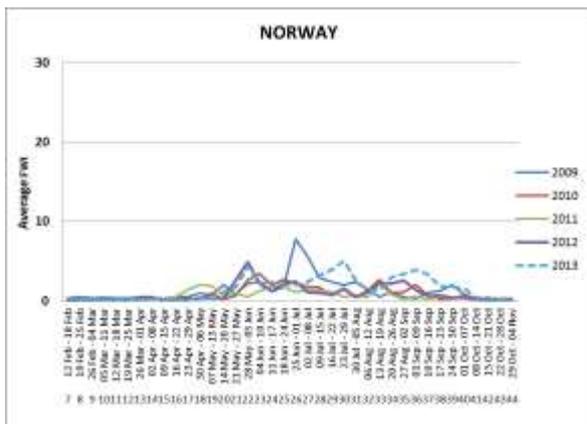
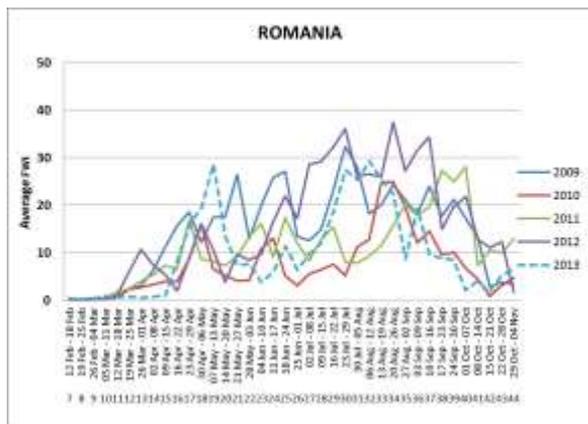
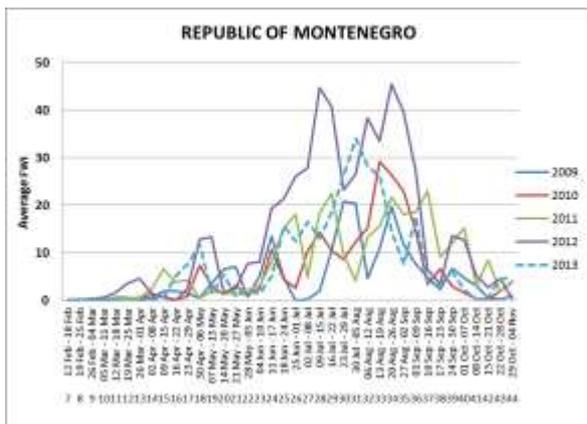
To allow a better comparison with past seasons, the curves of 2009-2012 are presented in conjunction with 2013 for all countries.

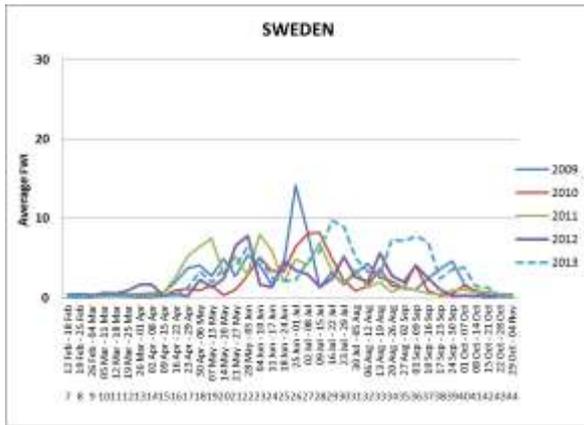
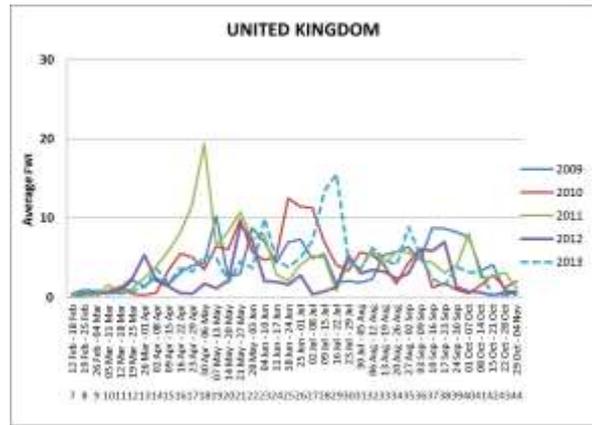
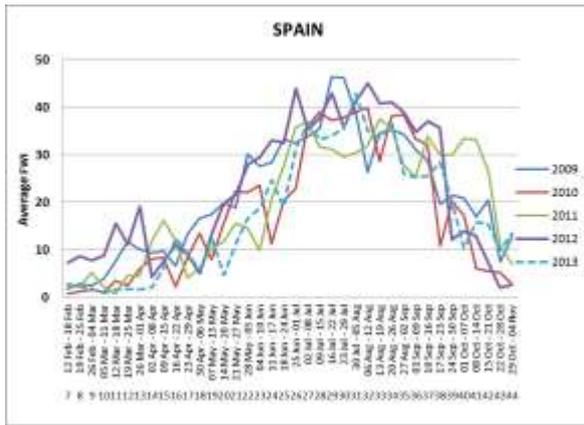
The countries analysed are those participating in the EFFIS network and are presented in alphabetic order within the two groups (European countries and MENA countries) in the graphs that follow.

**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.

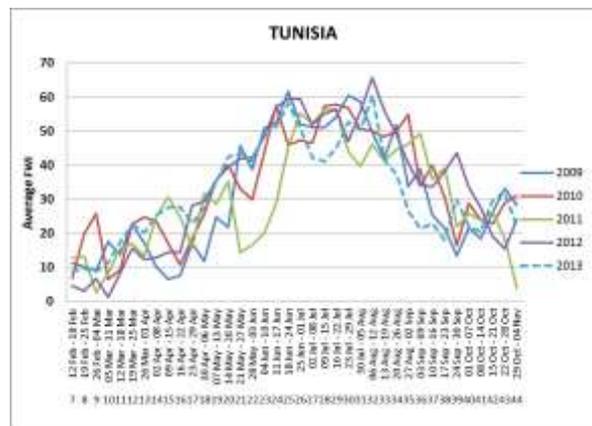
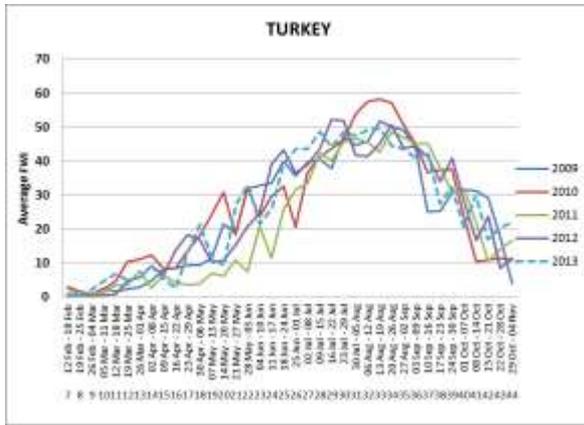
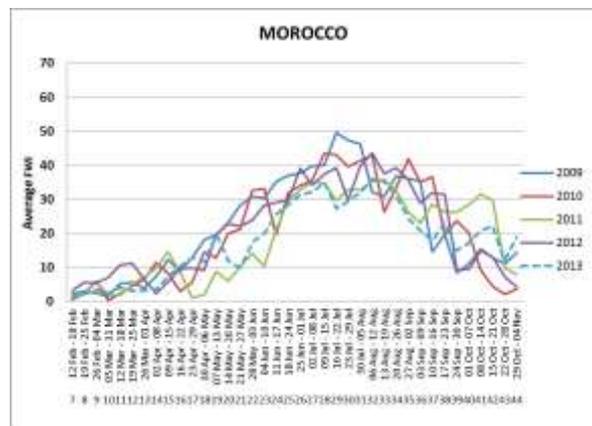
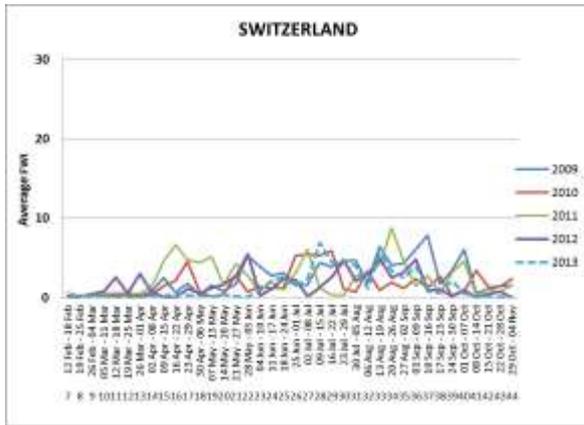
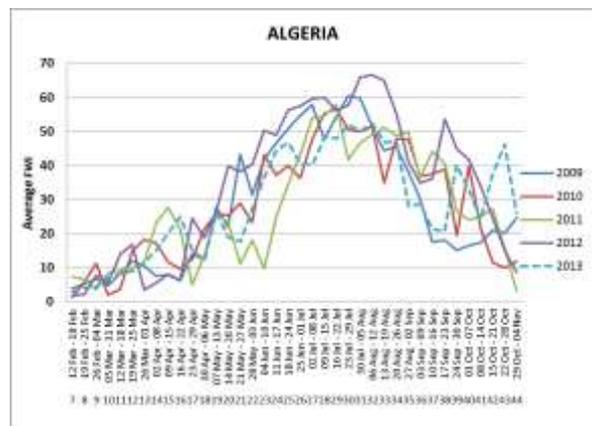








### MENA Countries



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

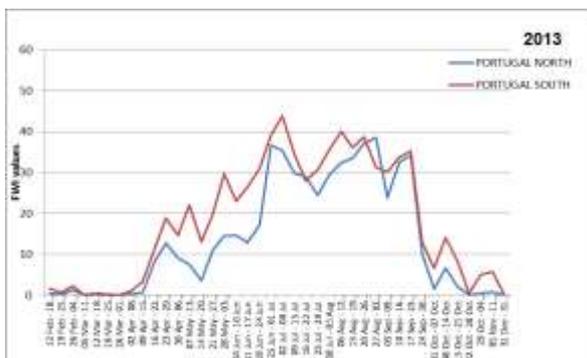


Figure 97. Fire danger trends in 2013 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal.

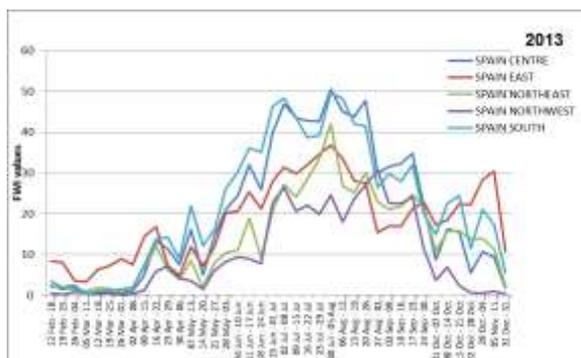


Figure 98. Fire danger trends in 2013 as determined by the Fire Weather Index (FWI) in the regions identified for Spain.

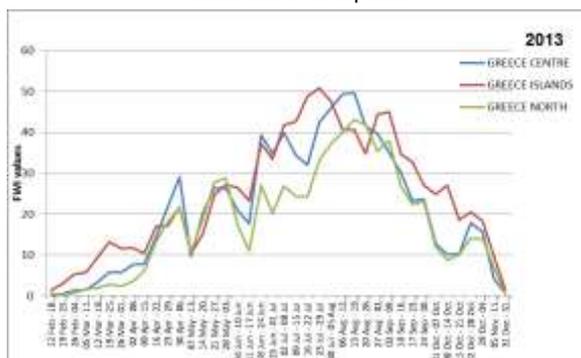


Figure 99. Fire danger trends in 2013 as determined by the Fire Weather Index (FWI) in the regions identified for Greece.

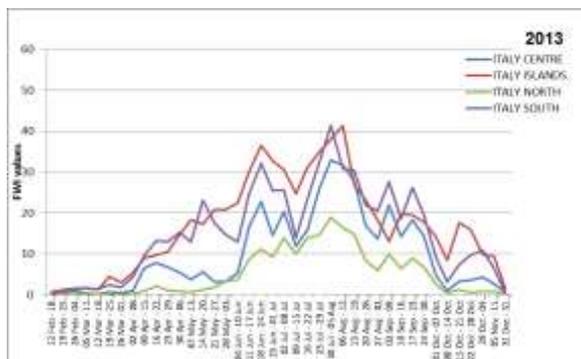


Figure 100. Fire danger trends in 2013 as determined by the Fire Weather Index (FWI) in the regions identified for Italy.

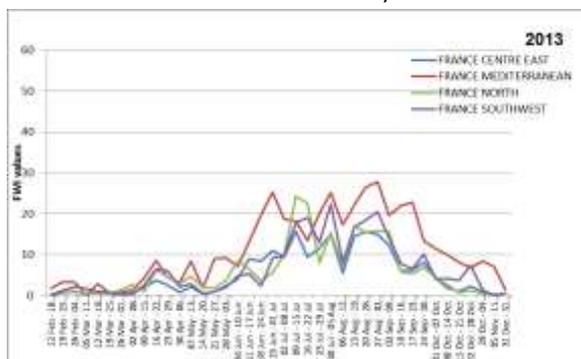


Figure 101. Fire danger trends in 2013 as determined by the Fire Weather Index (FWI) in the regions identified for France.

To facilitate the comparison among the different countries in EU, in the next graphs (Figure 102 to Figure 108), 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 2011 to 2013.

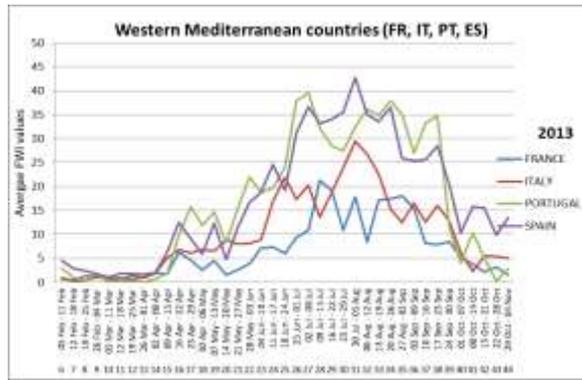
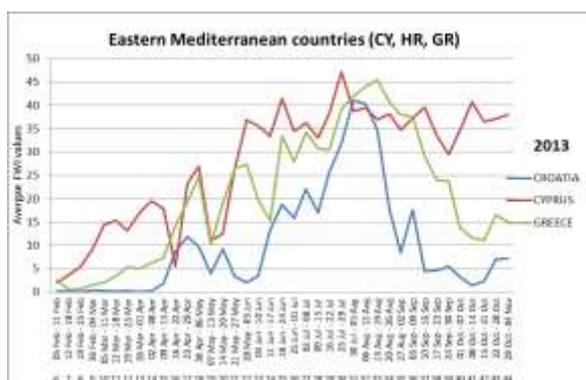
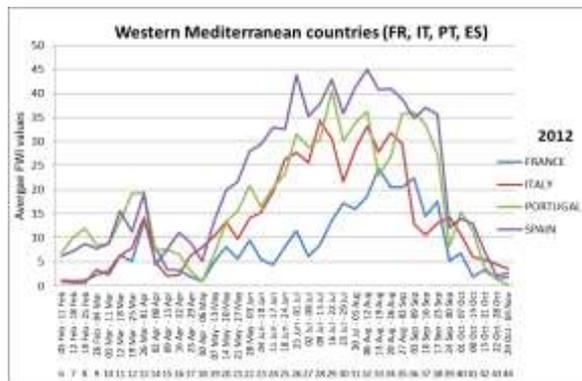
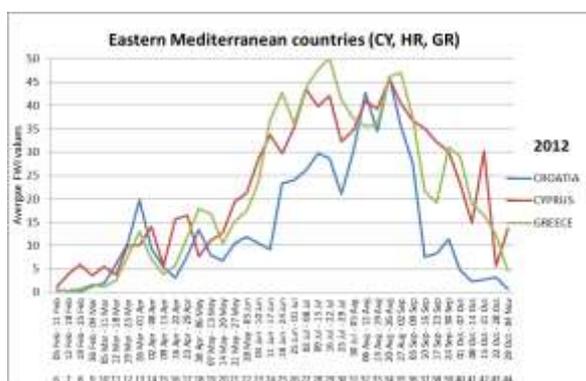
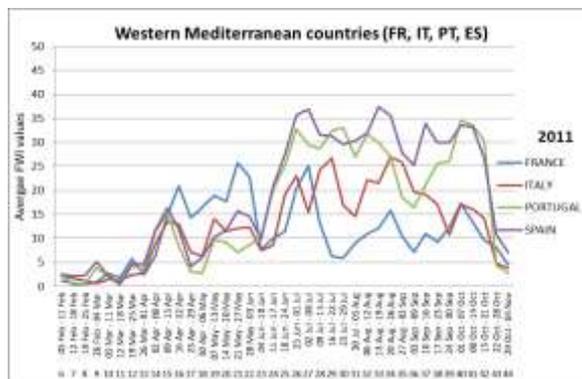
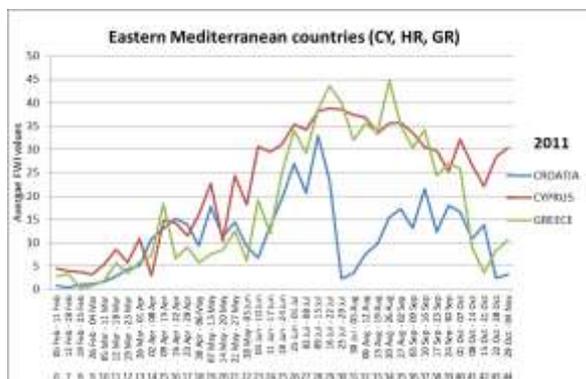


Figure 102. Fire danger trends 2011-2013 in eastern EU Mediterranean countries (CY, HR, GR).

Figure 103. Fire danger trends 2011-2013 in western EU Mediterranean countries (FR, IT, PT, ES).

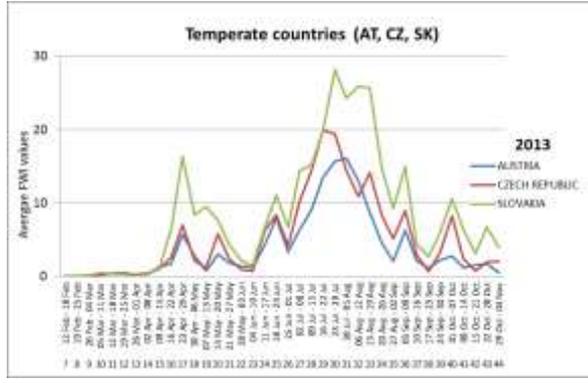
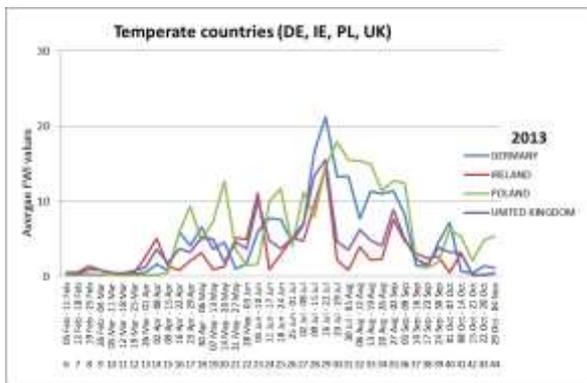
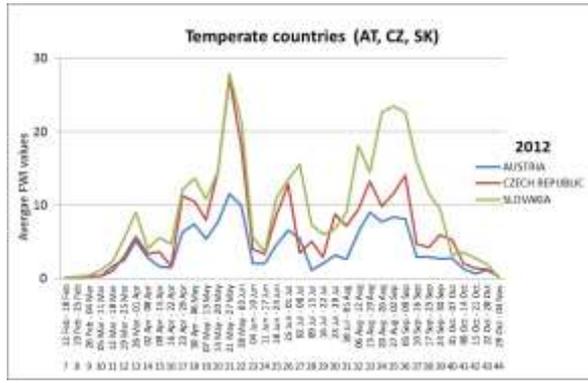
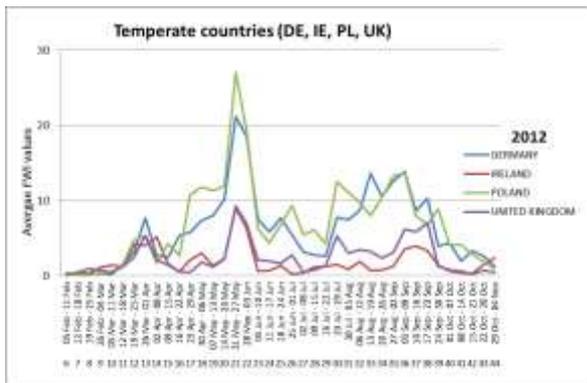
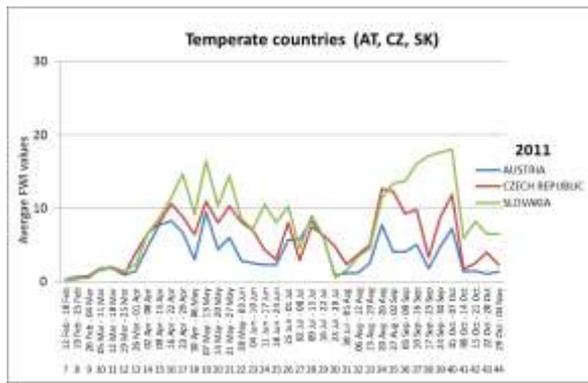
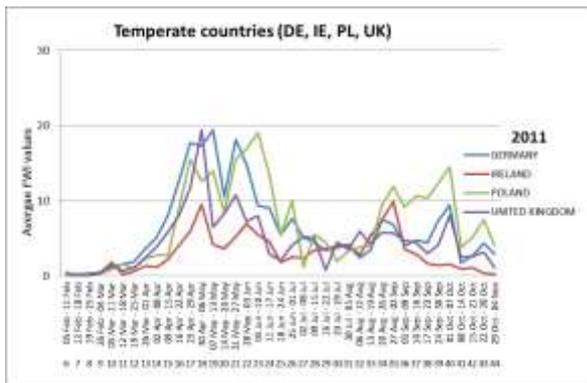


Figure 104. Fire danger trends 2011-2013 in some northern EU temperate countries (DE, IE, PL, UK).

Figure 105. Fire danger trends 2011-2013 in some central EU temperate countries (AT, CZ, SK).

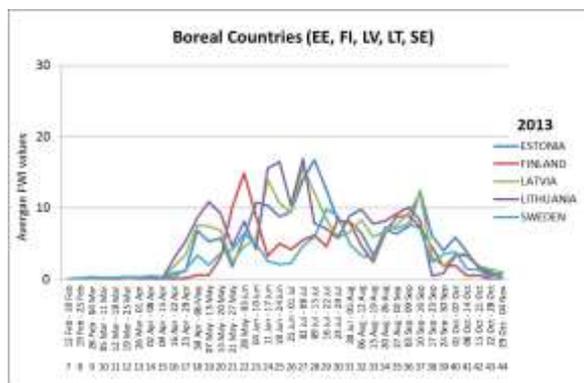
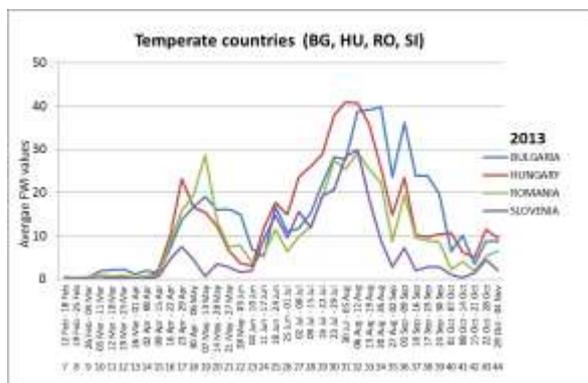
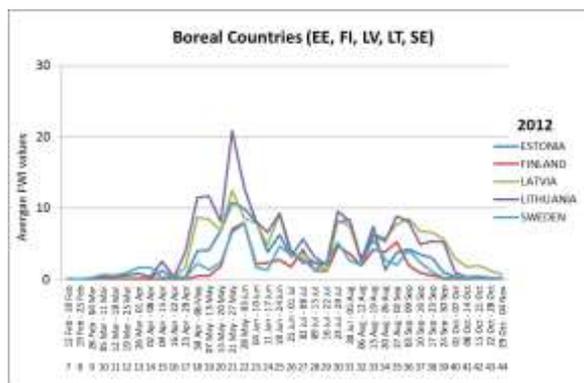
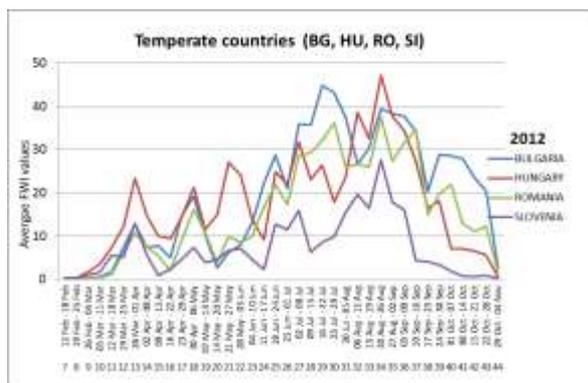
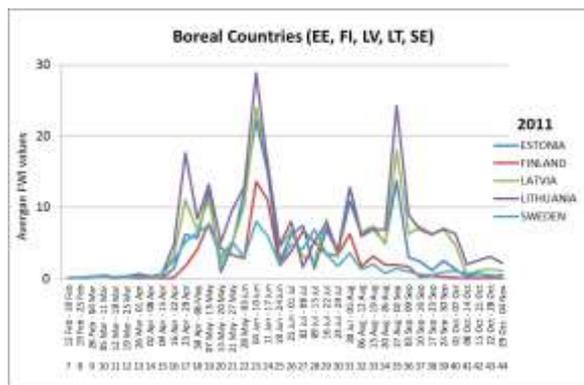
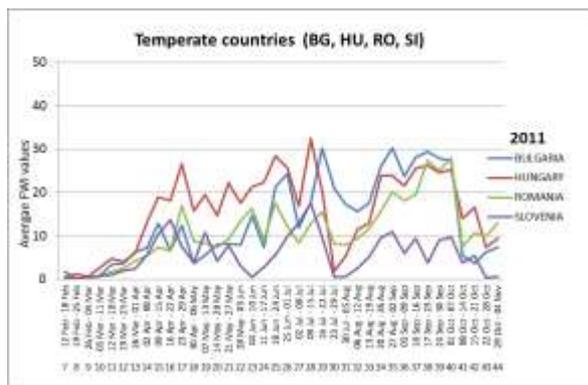


Figure 106. Fire danger trends 2011-2013 in some eastern EU temperate countries (BG, HU, RO, SI).

Figure 107. Fire danger trends 2011-2013 in some EU boreal countries (EE, FI, LV, LT, SE).

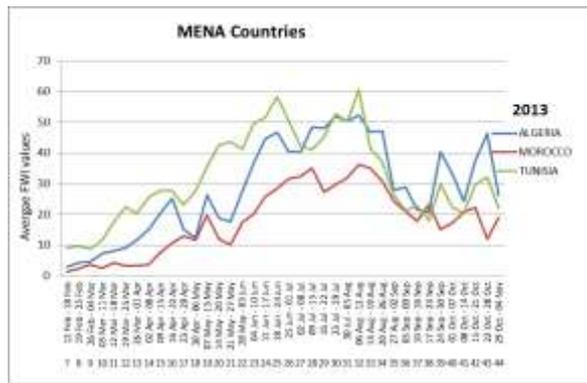
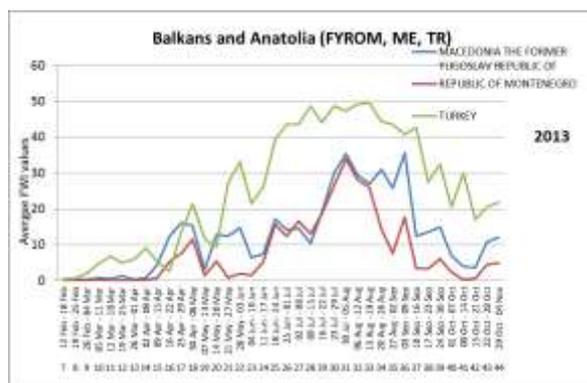
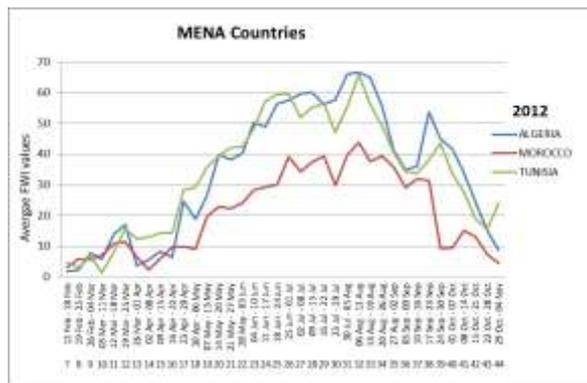
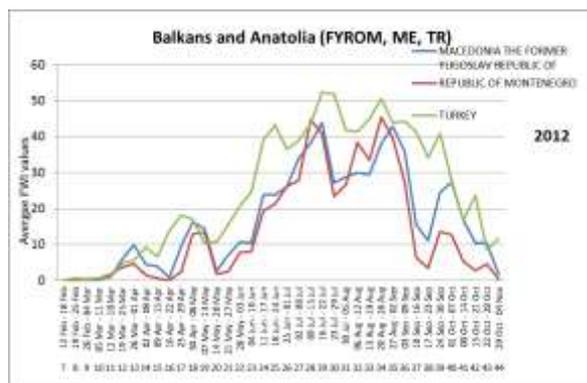
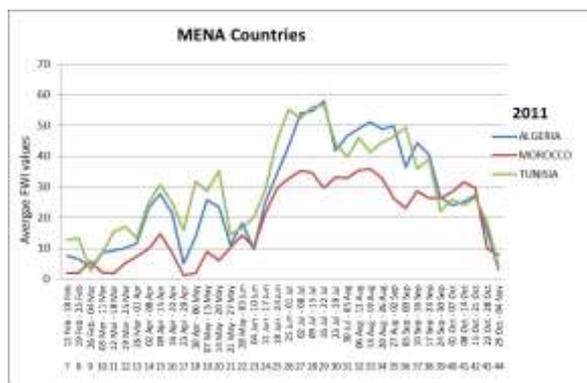
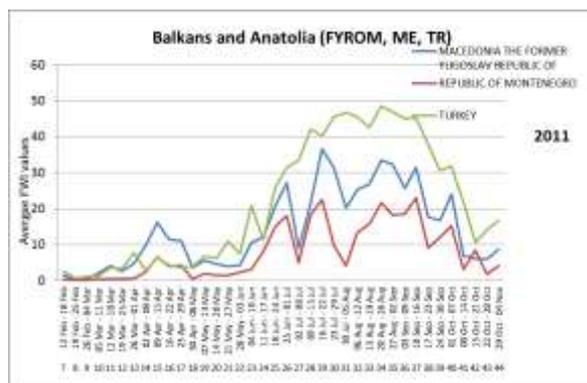


Figure 108. Fire danger trends 2011-2013) in the Balkans and Anatolia (FYROM, ME, TR).

Figure 109. Fire danger trends 2011-2013 in MENA countries (DZ, MA, TN).

As in previous years, the countries 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: 2013 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 40 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 meters (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 about 40 ha or larger. Although only a fraction of the total number of fires is mapped (fires smaller than 40 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 40 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 40 ha are given in the following paragraphs in alphabetical order, followed by a section on the MENA countries.

Overall, 2013 was a relatively light year for large fires. Fires of greater than 40 ha were observed in 29 countries and the mapped burnt area was just over a third that registered in 2012. By far the worst affected country in 2013 was Portugal, accounting for 45% of the entire burnt area recorded during the year.

More than one half of the burnt area of the season occurred in August.

The total area burned in 2013 by fires larger than 40 ha, as shown by the analysis of satellite imagery, was 340 559 ha (Table 34). These figures may also include agricultural and urban areas that were burned during the forest fires.

Table 34. Areas burned by fires of at least 40 ha in 2013 estimated from satellite imagery.

Country	Area (Ha)	Number of Fires
Albania	1233.46	9
Algeria	16854.5	51
Bosnia and Herzegovina	3457.99	9
Bulgaria	2991.45	12
Croatia	1017.76	6
Cyprus	2855.84	8
France	913.61	10
FYROM	7813.93	17
Germany	133.44	1
Greece	19915.16	35
Hungary	138.01	1
Ireland	8209.7	10
Israel	2851.9	4
Italy	15836.41	69
Kosovo under UNSCR 1244	347.22	4
Lebanon	181.58	1
Libya	5924.05	7
Montenegro	1623.26	8
Morocco	2805.6	7
Norway	218.42	1
Portugal	154174.41	359
Romania	3102.1	7
Serbia	1424.39	8
Spain	37262.59	125
Sweden	49.77	1
Syria	10540.37	27
Tunisia	13231.94	21
Turkey	20003.61	39
United Kingdom	5446.55	16
<b>TOTAL</b>	<b>340559.02</b>	<b>873</b>

Figure 111 shows the scars caused by forest fires during the 2013 season.

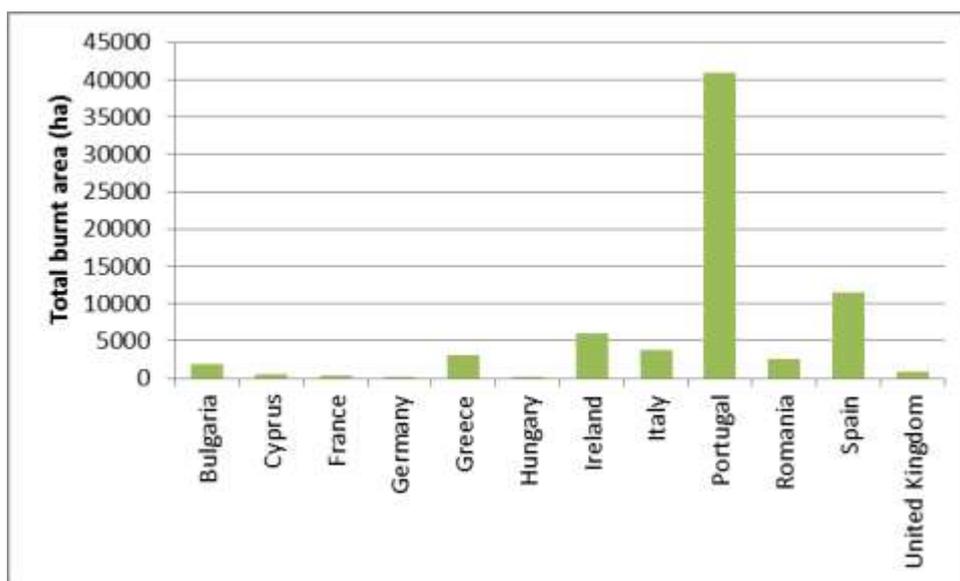
Of particular interest is the analysis of the damage caused by fires to the areas protected within the Natura2000 network, as they include habitats of especial interest which are home for endangered plant and animal species. However, the category of Natura2000 areas only exists in the countries of the European Union. Information on other protected areas outside the EU is not available and is thus not presented in this table. The area burnt within the Natura2000 sites is presented in Table 35 and Figure 110. The area affected in 2013 was less than half that recorded in the previous year, and 56% of it was recorded in Portugal.

<b>Summary</b>	<b>Total Area (Ha)</b>
<b>EU28</b>	<b>252046.8</b>
<b>Other European countries</b>	<b>36122.28</b>
<b>Middle East and North Africa</b>	<b>52389.94</b>
<b>Natura2000 sites</b>	<b>72008.27</b>

<b>Country</b>	<b>Area (Ha)</b>	<b>% of Natura2000 Area</b>	<b>Number of Fires</b>
Bulgaria	1973.02	0.053	5
Cyprus	488.12	0.3	2
France	379.01	0.006	5
Germany	133.44	0.002	1
Greece	3148.89	0.088	13
Hungary	138.01	0.007	1
Ireland	5998.3	0.659	6
Italy	3810.65	0.066	17
Portugal	40836.51	2.137	100
Romania	2675.52	0.063	4
Spain	11531.28	0.084	41
United Kingdom	895.52	0.051	4
<b>TOTAL</b>	<b>72008.27</b>		<b>100</b>

Table 35. Area burnt in 2013 within Natura 2000 sites.

Figure 110. Burnt area in Natura2000 sites in 2013



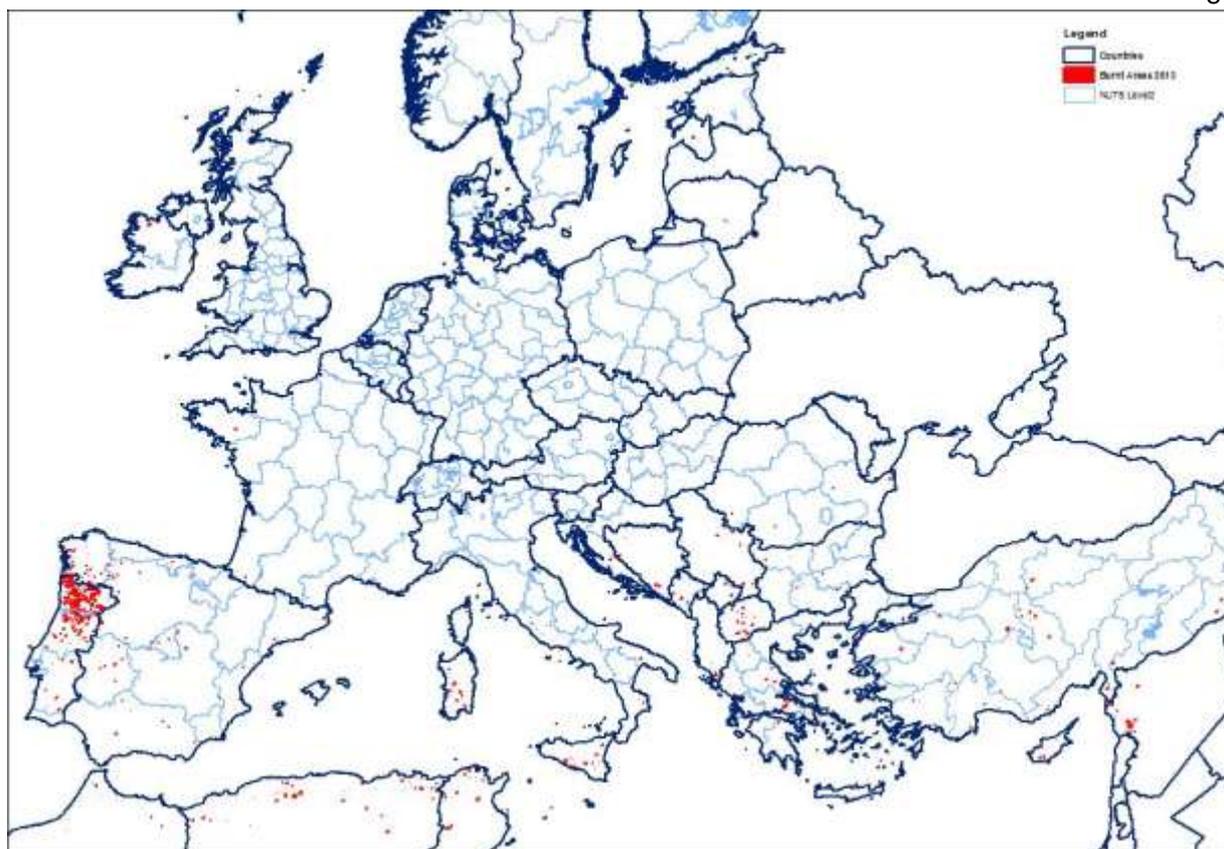


Figure 111. Burnt scars produced by forest fires during the 2013 fire season as mapped by EFFIS.

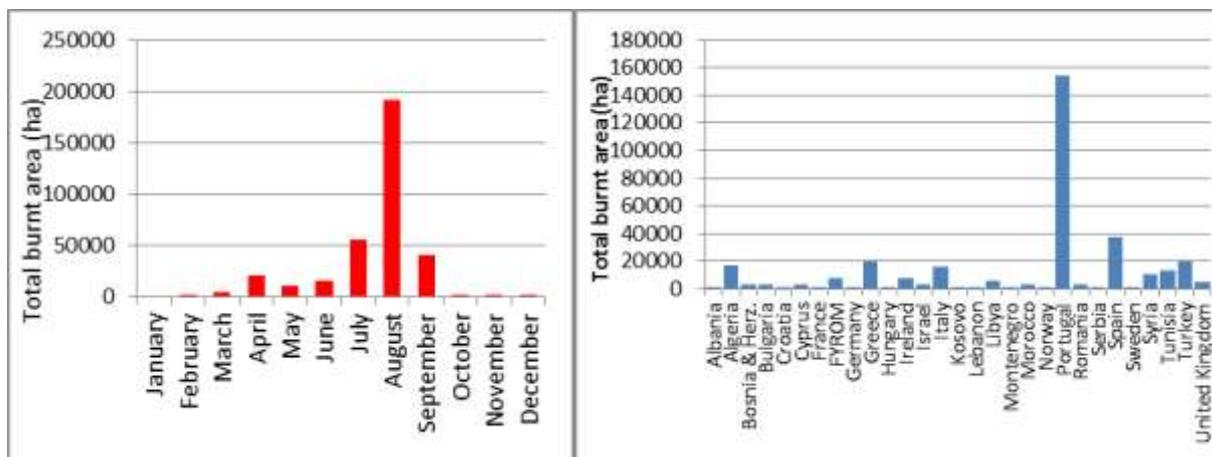


Figure 112. Total burnt area of fires >40 ha by month and by country in 2013 as mapped by EFFIS

In 2013, according to the EFFIS maps, 14 of the EU28 countries were affected by fires of over 40 ha: (Bulgaria, Croatia, Cyprus, France, Germany, Greece, Hungary, Ireland, Italy, Portugal, Romania, Spain, Sweden, United Kingdom), burning a total of 252 047 ha. Of this total, 72 008 ha (29%) were on Natura2000 sites.

## Europe

In most of Europe the worst part of the fire season occurred in August. In general, with a few notable exceptions, it was a quiet year for forest fires.

### 3.2.1 Albania

The 2013 fire season in Albania was the mildest for several years. 9 fires of over 50 ha burnt a total of 1 234 ha. These occurred relatively late in the season (August-October). Table 36 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. The burnt area was spread more or less evenly between forest/other wooded lands and other natural lands. Figure 113 below shows the damage caused by forest fires in Albania (AL) and neighbouring countries.

Table 36. Distribution of burnt area (ha) in Albania by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	583.91	47.34%
Other Natural Land	570.52	46.25%
Agriculture	76.29	6.18%
Artificial Surfaces	2.75	0.22%
<b>Total:</b>	<b>1233.46</b>	<b>100%</b>

### 3.2.2 Bosnia-Herzegovina

In common with most of the Balkans, Bosnia-Herzegovina had a very light year for forest fires. The annual total of 3 458 ha was a fraction of last year's total (87 697 ha), and a significant portion of this damage came from 3 fires over 500 ha. Fires of over 40 ha were only recorded in 2 months (April and August). Table 37 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. Visible fire scars caused by forest fires in Bosnia-Herzegovina (BA) can be seen in Figure 113.

Table 37. Distribution of burnt area (ha) in Bosnia-Herzegovina by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	2559.7	74.02%
Other Natural Land	608.27	17.59%
Agriculture	289.95	8.38%
Artificial Surfaces	0.07	0%
<b>Total:</b>	<b>3457.99</b>	<b>100%</b>

### 3.2.3 Bulgaria

The 2013 fire season in Bulgaria was the mildest for some years. 12 fires of over 40 ha were recorded, including one of over 1000 ha which occurred in August in a Natura2000 site. In total, 1 973 ha of the year's total of 2992 ha burnt Natura2000 land, representing 66% of the area burnt and 0.05% of the Natura2000 areas in the country. Table 38 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. Figure 113 shows the damage caused by forest fires in Bulgaria (BG).

Table 38. Distribution of burned area (ha) in Bulgaria by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	692.69	23.16
Other Natural Land	1182.55	39.53
Agriculture	1112.03	37.17
Artificial Surfaces	4.18	0.14
<b>Total:</b>	<b>2991.45</b>	<b>100</b>

### 3.2.4 Croatia

After two hard fire seasons in 2011-2012, Croatia had an extremely light year in 2013, and the damage recorded was only 3% of that observed in 2012. There were 6 fires of over 40 ha, burning a total of 1 018 ha. (As a comparison, in 2012, 7 fires of over 1000 ha were recorded, from a total of 33 240 ha). None of the burnt area was recorded in protected areas. Table 39 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. The visible scars left by fires in the south of Croatia (HR) can be seen in Figure 113 below.

Table 39. Distribution of burnt area (ha) in Croatia by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	249.22	24.49%
Other Natural Land	600.06	58.96%
Agriculture	160.37	15.76%
Artificial Surfaces	8.1	0.8%
<b>Total:</b>	<b>1017.76</b>	<b>100%</b>



Figure 113. Satellite image showing impact of forest fires across the Balkans in 2013.

### 3.2.5 Cyprus

After a fairly severe 2012 fire season, Cyprus experienced even more damage in 2013, making it the worst year since before 2006. There was a total burnt area of 2 855.8 ha caused by 8 fires, including two of 1032 and 723 ha that occurred in June and August. In 2013, 488.1 ha of Natura2000 areas were burnt, corresponding to 17% of the total area burned, and 0.3% of the total Natura2000 areas in the country. Table 40 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. Figure 114 shows the visible burnt scars caused by forest fires in Cyprus.



Figure 114. Satellite image showing impact of forest fires in Cyprus in 2013

Table 40. Distribution of burnt area (fires of at least 40 ha) by land cover class in Cyprus in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	1528.03	53.51%
Other Natural Land	281.57	9.86%
Agricultural Areas	923.19	32.33%
Artificial Surfaces	123.05	4.31%
<b>Total:</b>	<b>2855.84</b>	<b>100%</b>

### 3.2.6 Former Yugoslav Republic of Macedonia (FYROM)

The fire season in FYROM was relatively quiet, in common with most of the rest of the region. 17 fires of over 40 ha burnt 7813.9 ha. Most of the damage occurred in August and September, and included some very large fires, including one in Kumanovo that burnt 2166 ha in September. Table 41 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. Figure 113 above shows the visible scars left by fires in 2013 (MK).

Table 41. Distribution of burnt area (ha) by land cover types in FYROM in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/ Other Wooded Land	3776.55	48.33%
Other Natural Land	1049.11	13.43%
Agriculture	2988.27	38.24%
<b>Total:</b>	<b>7813.93</b>	<b>100%</b>

### 3.2.7 France

France continued the downward trend in the mapped burnt area that started in 2009. Only 10 fires of more than 40 ha were recorded in 2013, giving a total burnt area mapped of 914 ha (the lowest for more than a decade). From this area 379 ha were on Natura2000 sites, corresponding to 41.5% of the total area burned, and 0.006% of the total Natura2000 areas in the country.

Table 42 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. The burnt scars left by the few large fires occurring in the Mediterranean region of the country are shown in Figure 115.



Figure 115. Impact of forest fires in France in 2013.

Table 42. Distribution of burnt areas (fires of at least 40 ha) by land cover type in France in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	427.14	46.75%
Other Natural Land	443.91	48.59%
Agriculture	35.88	3.93%
Artificial Surfaces	6.68	0.73%
<b>Total:</b>	<b>913.61</b>	<b>100%</b>

### 3.2.8 Germany

Germany does not normally suffer from large fires. However, in May 2013 a single fire of 133.44 ha was recorded on a Natura2000 site. The entire area was classified as Other Natural Land according to the CLC classification, and represents 0.002% of the Natura2000 land in the country.

### 3.2.9 Greece

The 2013 fire season in Greece was one of the least damaging in recent years – only 2010 was a lighter year. In 2013 there were only 35 fires of more than 40 ha, which burned 19 115 ha. Nearly 90% of the damage occurred in July and August, and a significant proportion of the years' damage came from two fires of over 4000 ha, one in Voiotia province and one on Rhodos island. Of the total burnt area in 2013, 3 149 ha were on Natura2000 sites, corresponding to 15.8% of the total area burned and to 0.088% of the Natura2000 areas in the country. Table 43 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. Figure 116 shows the damage caused by forest fires in Greece.

Table 43. Distribution of burnt areas (fires of at least 40 ha) by land cover class in Greece in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	12790.14	64.22%
Other Natural Land	2860.81	14.37%
Agriculture	4116.04	20.67%
Artificial Surfaces	147.75	0.74%
<b>Total:</b>	<b>19914.74</b>	<b>100%</b>



Figure 116. Satellite image showing impact of forest fires in Greece in 2013.

### 3.2.10 Hungary

In Hungary, a single fire of 138.01 ha was recorded in August on a Natura2000 site. The area was classified as Other Natural Land and represents 0.007% of the Natura2000 area of the country.

### 3.2.11 Ireland

In Ireland the fire season started early with substantial damage being recorded in April, including a fire in Ballycroy North that burnt 3404 ha and was largest fire of the year among the northern European countries. Although the year was a relatively damaging one, the total burnt area was still only half that recorded in 2010. Figure 117 shows the visible scars left by forest fires in Ireland in 2013, including the two very large fires in County Mayo. Table 44 presents the distribution of the mapped burnt area by land cover type.

Table 44. Distribution of burnt area (ha) in Ireland by land cover types in 2013

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	464.8	5.66%
Other Natural Land	7559.95	92.09%
Agriculture	181.86	2.22%
Artificial Surfaces	3.08	0.04%
<b>Total:</b>	<b>8209.7</b>	<b>100%</b>

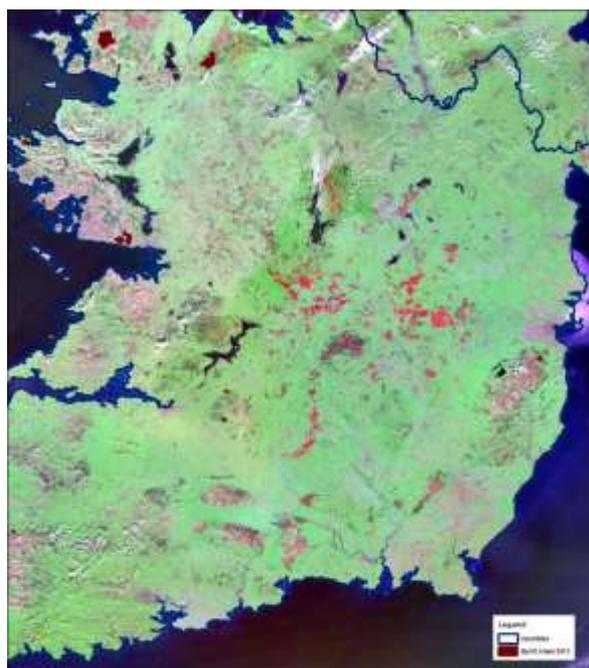


Figure 117. Impact of forest fires in Ireland in 2013

### 3.2.12 Italy

The 2013 fire season in Italy was quiet, with the lowest amount of damage recorded since 2006. 69 fires over 40 ha burnt a total of 15 836.4 ha, mostly between June and September. Of this total, 3810.7 ha of damage occurred on Natura2000 sites, corresponding to 24% of the total area burned, and 0.066% of the total Natura2000 area in the country. The region most affected was Sardinia, where there were two fires of over 2000 ha. Table 45 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. Figure 118 shows the distribution of major forest fires in southern Italy, Sardinia and Sicily.

Table 45. Distribution of burnt areas (fires of at least 40 ha) by land cover type in Italy in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	5207.62	32.88%
Other Natural Land	3490.1	22.04%
Agriculture	7079.89	44.71%
Artificial Surfaces	58.73	0.37%
Other Land Cover	0.07	0%
<b>Total:</b>	<b>15836.41</b>	<b>100%</b>

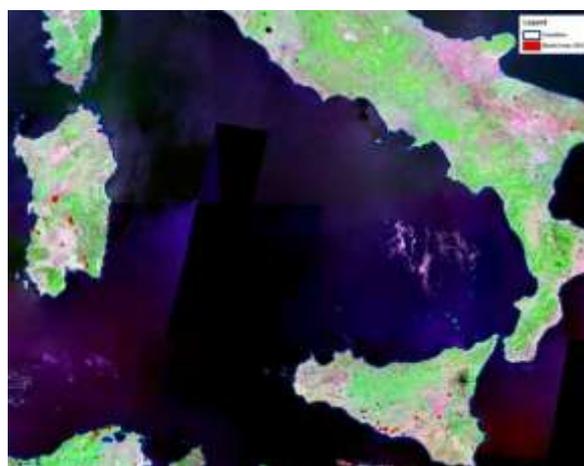


Figure 118. impact of forest fires in Italy in 2013.

### 3.2.13 Kosovo (under UNSCR 1244)

Kosovo had a very mild year for forest fires. A total of 347 ha were mapped from 4 forest fires, all in April – less than one twentieth of the damage recorded in 2012. Table 46 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. The mapped burnt scars left by the fires are visible in Kosovo (KS) in Figure 113 above.

Table 46. Distribution of burnt area (ha) in Kosovo by land cover types in 2013

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	333.12	95.94%
Agriculture	14.11	4.06%
<b>Total:</b>	<b>347.22</b>	<b>100%</b>

### 3.2.14 Montenegro

After a severe year for fires in 2012, 2013 was one of the lightest recorded in Montenegro for several years. A total of 1623 ha was mapped from 8 fires of over 40 ha. over three-quarters of the damage occurred in August, including one fire of over 500 ha which was mapped in Danilovgrad. Table 47 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. The visible fire scars caused by forest fires in Montenegro (ME) can be observed in Figure 113 above.

Table 47. Distribution of burnt area (ha) in Montenegro by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	1043.43	64.28%
Other Natural Land	169.07	10.42%
Agriculture	410.73	25.3%
Artificial Surfaces	0.02	0%
<b>Total:</b>	<b>1623.26</b>	<b>100%</b>

### 3.2.15 Norway

In Norway a single large fire of 218.4 ha was mapped in April. This affected mostly forest & other wooded land, as shown in Table 48.

Table 48. Distribution of burnt area (ha) in Norway by land cover types in 2013

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	167.44	76.66%
Other Natural Land	38	17.4%
Agriculture	12.99	5.95%
<b>Total:</b>	<b>218.42</b>	<b>100%</b>

### 3.2.16 Portugal

In 2013, Portugal was by far the country most severely affected by fires. 359 fires of at least 40 ha were mapped in 2013, with practically all the damage occurring between July and September. Nearly three-quarters of the total burnt area was registered in August: in this month a greater area was burnt than in the whole of 2012, amounting to one-third of the total annual damage recorded over all the countries covered by the satellites. The largest fire recorded in 2013 (15 015 ha) occurred in the Douro region in August, and nearly half of all the fires of over 500 ha recorded in 2013 were in Portugal. The total burnt area mapped in 2013 was 154 174 ha and is the highest amount of damage recorded since 2005. This area includes 40 836.5 ha on Natura2000 sites, corresponding to 26.5 % of the total area burnt, and 2.137 % of the total Natura2000 areas in Portugal. Table 49 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. The mapped burnt areas are shown in Figure 119.

Table 49. Distribution of burnt areas (fires of at least 40 ha) by land cover class in Portugal in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	72384.92	46.95%
Other Natural Land	53538.51	34.73%
Agriculture	27534.43	17.86%
Artificial Surfaces	672.59	0.44%
Other Land Cover	43.95	0.03%
<b>Total:</b>	<b>154174.41</b>	<b>100%</b>

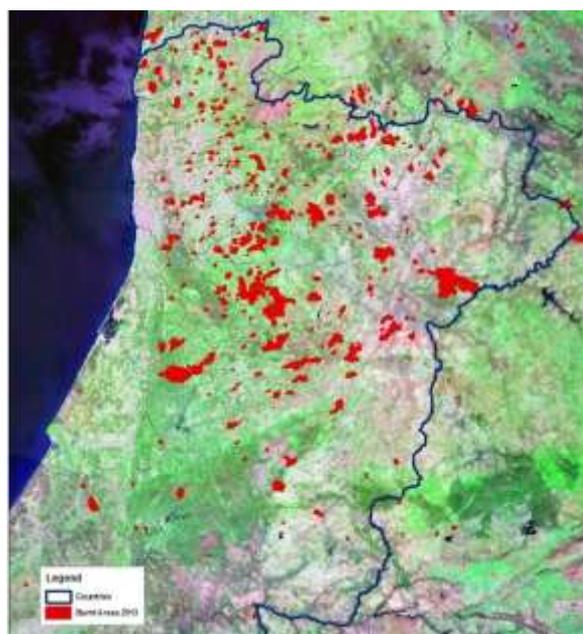


Figure 119. Impact of forest fires in Portugal in 2013

### 3.2.17 Romania

In Romania, 7 fires caused 3 102 ha of damage, a similar amount to that recorded in 2012. Most of the damage occurred early in the season, in March, and included one very large fire of over 2000 ha in Crisan, Tulcea. In 2013, 86% (2675 ha) of the total burnt area was on Natura2000 sites, representing 0.063% of the total Natura2000 area of Romania. Table 49 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database.

Table 50. Distribution of burnt area (ha) in Romania by land cover types in 2013

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	451.84	14.57%
Other Natural Land	2307.39	74.38%
Agriculture	340.54	10.98%
Other land cover	2.34	0.08%
<b>Total:</b>	<b>3102.1</b>	<b>100%</b>

### 3.2.18 Serbia

8 fires of over 40 ha were recorded in Serbia between April and September, causing 1424.4 ha of damage. The burnt area recorded was significantly lower than in 2012. Table 51 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database.

Table 51. Distribution of burnt area (ha) in Serbia by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	690.67	48.49%
Other Natural Land	146	10.25%
Agriculture	587.71	41.26%
<b>Total:</b>	<b>1424.39</b>	<b>100%</b>

### 3.2.19 Spain

Spain was the second country most affected by fire in 2013, although the total mapped burnt area was only one quarter of that recorded in Portugal. Most of the damage occurred over three months July-September and resulted in a total mapped burnt area of 37 263 ha from 125 fires, significantly less than in 2012 (189 744 ha) and one of the lowest amounts in recent years. 11 531 ha occurred on Natura2000 sites, corresponding to 31% of the total area burned, and 0.084% of the Natura2000 areas in Spain.

Table 52 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. The most noticeable fires in Spain during 2013 are presented in Figure 120.

Table 52. Distribution of burnt area (ha) in Spain by land cover type in 2013

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	20471.12	54.94%
Other Natural Land	8131.94	21.82%
Agriculture	8598.01	23.07%
Artificial Surfaces	33.97	0.09%
Other Land Cover	27.56	0.07%
<b>Total:</b>	<b>37262.59</b>	<b>100%</b>

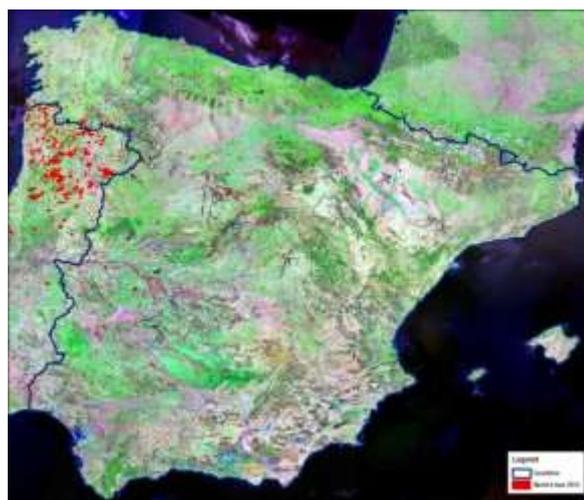


Figure 120. Impact of forest fires in Spain in 2013.

### 3.2.20 Sweden

In Sweden a single fire caused 50 ha of damage. This mostly affected forest and other wooded land (Table 53).

Table 53. Distribution of burnt area (ha) in Sweden by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	48.17	96.8%
Other Natural Land	1.59	3.2%
<b>Total:</b>	<b>49.77</b>	<b>100%</b>

### 3.2.21 Turkey

The 2013 fire season in Turkey was the worst since 2008. There were 33 fires of over 40 ha which burned a total area of 20 003 ha, double that recorded in 2012. Half the damage occurred in August, although large fires were recorded between May and September. The country suffered a number of exceptionally large fires, including one of 3 822 ha in Kepsut, as well as 4 other fires of over 1000 ha. Table 54 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. The visible scars from forest fires in the west of the country are shown in Figure 121.



Figure 121. Impact of forest fires in Turkey in 2013.

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

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	7863.9	39.31
Other Natural Land	5130.51	25.65
Agriculture	7006.06	35.02
Artificial Surfaces	3.13	0.02
<b>Total:</b>	<b>20003.6</b>	<b>100</b>

### 3.2.22 United Kingdom

The UK does not normally suffer from large fires. However, in 2013 there were 16 fires of over 40 ha recorded. Most of the damage occurred early in the season in March and April in Scotland and included one fire of 1 126 ha, as well as 3 other fires of more than 500 ha each. 895.5 ha of the damage occurred on Natura2000 sites, corresponding to 16.4 % of the total area burnt, and 0.05 % of the total Natura2000 areas in the UK. Table 55 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database.

Table 55. Distribution of burnt area (ha) in the UK by land cover types in 2013

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	446.02	8.19%
Other Natural Land	4966.13	91.18%
Agriculture	24.15	0.44%
Artificial Surfaces	9.14	0.17%
Other Land Cover	1.11	0.02%
<b>Total:</b>	<b>5446.55</b>	<b>100%</b>

## Middle East and North Africa

The fire season in North Africa ran from June to October in 2013 and was the mildest since before 2009 for Algeria and Morocco, although Tunisia had a relatively hard year. Most of the damage occurred in August, as is usual for these countries. In the Middle Eastern countries the worst fire damage occurred earlier in the year (typically between April and July) although Syria suffered a second wave of damage in August.

### 3.2.23 Algeria

After an extreme 2012 fire season in Algeria, 2013 was an exceptionally mild year. The total burnt area was only one twelfth of that recorded in 2012. 90% of the damage occurred in August, including one large fire of 3 537 ha that occurred in Oued-Djemmaa. One fire of 154 ha was recorded in a Protected Area, representing around 1% of the total burnt area. The burnt scars left by these fires can be seen in Figure 123. The Globcover land cover map from ESA was used to split the burnt area into different land type categories, and the distribution of burnt area by land cover types is given in Table 56.

Table 56. Distribution of burnt area (ha) in Algeria by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	5196.45	30.83%
Other Natural Land	2053.19	12.18%
Agriculture	9535.5	56.58%
Artificial Surfaces	69.36	0.41%
<b>Total:</b>	<b>16854.5</b>	<b>100%</b>



Figure 123: Impact of forest fires in Algeria and Tunisia in 2013

### 3.2.24 Israel

In 2013 there were 4 fires of over 40 ha in Israel. All occurred in April and May, and one was over 1000 ha. Table 57 presents the distribution of the mapped burnt area by land cover type and Figure 122 shows the locations of the mapped burnt scars in the north of the country.

Table 57. Distribution of burnt area (ha) in Israel by land cover types in 2013

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	346.98	12.17%
Other Natural Land	502.67	17.63%
Agriculture	2002.26	70.21%
<b>Total:</b>	<b>2851.9</b>	<b>100%</b>



Figure 122. Impact of forest fires in Israel in 2013.

### 3.2.25 Lebanon

In Lebanon a single large fire of 181.6 ha was mapped in July. This affected mostly agricultural land, as shown in Table 58.

Table 58. Distribution of burnt area (ha) in Lebanon by land cover types in 2013

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	26.67	14.69%
Other Natural Land	7.79	4.29%
Agriculture	147.12	81.02%
<b>Total:</b>	<b>181.58</b>	<b>100%</b>

### 3.2.26 Libya

In Libya, a total of 5 924 ha was mapped from 7 fires of at least 40 ha in 2013. Practically all the damage occurred in May and included a single very large fire of 3 308 ha in the province of Al Jabal al Akhdar. The CORINE Land Cover database has not yet been developed in Libya, so the Globcover land cover map from ESA was used to split the burnt area into different land type categories.

Table 59. Distribution of burnt area (ha) in Libya by land cover types in 2013

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest /Other Wooded Land	3672	61.98%
Other Natural Land	49.31	0.83%
Agriculture	2202.74	37.18%
<b>Total:</b>	<b>5924.05</b>	<b>100%</b>

### 3.2.27 Morocco

After a very hard year in 2012, the total burnt area in Morocco reverted to a relatively low level. 7 fires burnt a total of 2 806 ha, around one quarter of the amount recorded in 2012. Most of this damage occurred in a single fire in August, which burnt 2 004 ha in Idmine. 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 60.

Table 60. Distribution of burnt area (ha) in Morocco by land cover types in 2013.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest /Other Wooded Land	1939.62	69.13%
Other Natural Land	309.22	11.02%
Agriculture	556.77	19.85%
<b>Total:</b>	<b>2805.6</b>	<b>100%</b>

### 3.2.28 Syria

In Syria, 27 fires of over 40 ha burnt a total of 10 540 ha, slightly lower than the amount burnt in 2012. Three of the fires were more than 1000 ha. The CORINE Land Cover database has not yet been developed in Syria, so the Globcover land cover map from ESA was used to split the burnt area into different land type categories.

Table 61 shows the distribution of burnt area by land type. Forest and other wooded land was by far the worst affected land type. The visible scars from forest fires in the west of the country are shown in Figure 124.

Table 61. Distribution of burnt area (ha) in Syria by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	4911.48	46.6%
Other Natural Land	360.22	3.42%
Agriculture	5183.25	49.18%
Other Land Cover	85.41	0.81%
<b>Total:</b>	<b>10540.37</b>	<b>100%</b>

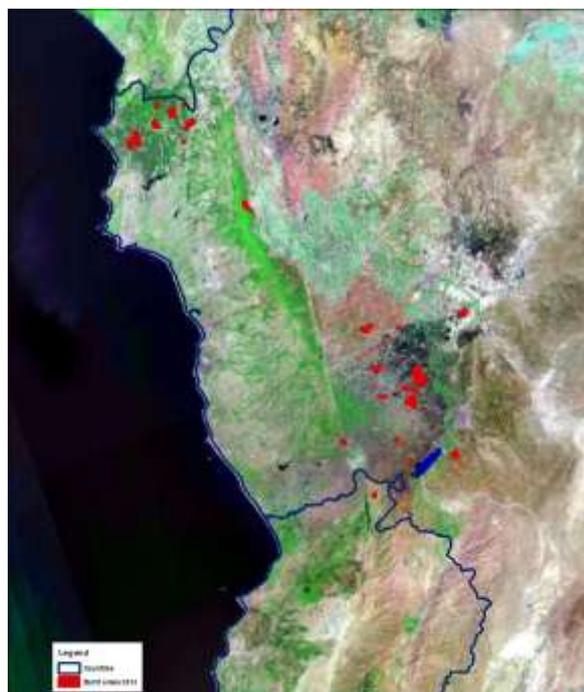


Figure 124. Forest fires in Syria in 2013

### 3.2.29 Tunisia

Unlike the other North African countries covered by EFFIS, Tunisia had a worse fire season than average. 13 232ha were mapped from 21 fires, more than the total of the previous 4 years. Most of the damage occurred in July and August and includes one fire of 4 422 ha that occurred in Kasserine in July, as well as 4 other fires of over 1000 ha. Figure 123 above 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 62.

Table 62. Distribution of burnt area (ha) in Tunisia by land cover types in 2013.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	11818.19	89.32
Other Natural Land	624.37	4.72
Agriculture	731.77	5.53
Artificial Surfaces	14.96	0.11
Other Land Cover	42.66	0.32
<b>Total:</b>	<b>13231.94</b>	<b>100</b>

### 3.3 European Fire Database

#### *Background*

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**.

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/>

#### *Structure and collected information*

The database contains four types of information: about the time, location, size and cause of the fire (Table 63).

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 over 2.4 million individual fire event records (1.86 million forest fires). See Table 63 for a summary.

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 125). 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 63. 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

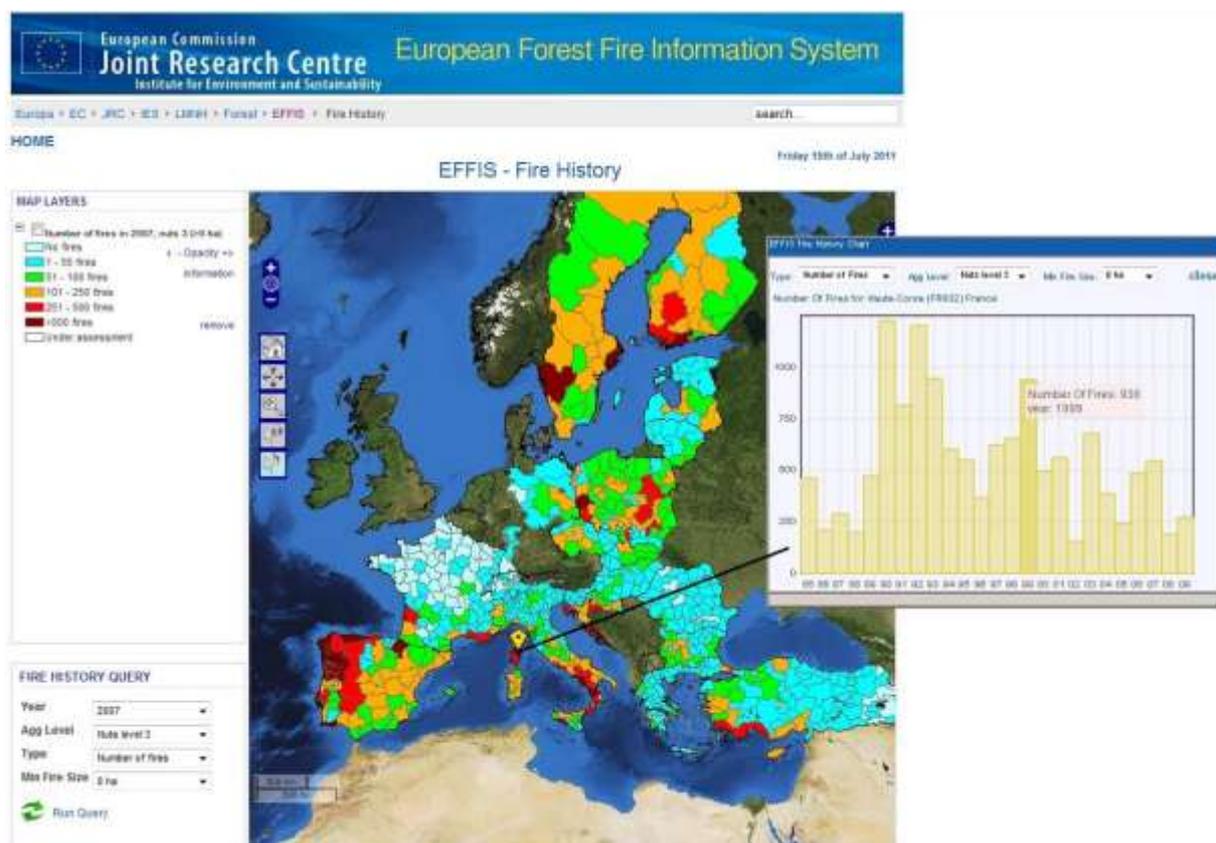


Figure 125. Access to the information stored in the European Fire Database from EFFIS web interface

Table 64. 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		79																2349										
1981		147																6730										
1982		71																3626										
1983		107								945								4542										
1984		166								1184								7356										
1985		96					12235		3732	1417				12931				8441									75	
1986		76					7514		2657	1088				6115				5036									89	
1987		109					8816		2116	1234				8506				7705									207	
1988		76					9440		2240	1798				9785				6131									158	
1989		168					20250		3321	1203				8328				21896									70	
1990		235					12914		3297	1283				11560				10745									118	
1991		148					13529		2372	1036				7580				14327									97	
1992		70					15956		2708	2008				10044				14954									182	
1993		76					14253		4766	2707				14317				16101									183	
1994		74			706		19249		4728	1955				7153			24361	19983									131	
1995		87			525		25557		6539	1494				5505			23816	34116			44						13	
1996		108			822		16586		6401	1527	3147			6064			23582	28626		4854	47						13	
1997		135			276		22320		8001	2271	3795			11608			25068	23497		7057	55						98	
1998		91			592		22003		6289	605	5485			9565			21342	34676		2503	143							
1999		45			794		17943		4881	513	3856			6956			32646	25477		4707	55							
2000		49	285		930		23574		4343	1469	7897			8609			31809	34109		4708	100							
2001		48	299		373		19099		4259	1313	4045			7227			24511	27982		4831	60							
2002		67	243		278		19929		4097	572	4713		429	4607			38154	28738		6490	64							
2003		155	427		1238		18616		7023	622	6937		373	9716			79013	26941		8282	227							
2004		49	221	957	300		21396	2285	3767	739	2859		104	6341	430	647	36315	26945	34	4955	50	153						
2005	251	63	185	653	299	65	25492	2631	4698	718	3372		150	7918	267	365	46542	40965	64	4573	74	287	1530					
2006	393	46	172	697	717	248	16334	6314	4608	764	3580		97	5651	1444	1929	35630	23647	105	4618	106	238	2227			347	216	
2007	1479	65	111	809	435	64	10932	2813	3382	1226	5177		603	10736	245	426	31303	23956	478	3787	129	463	2706			304	292	
2008	582	46	114	470	560	71	11656	3161	2781	1071	228		502	6648	272	716	35786	18619	91	5420	68	182	2135			267	259	
2009	314	52	91		575	47	15642	2746	4808	354	181		608	5423	471	890	30912	29218	190	4180	122	347				487	199	
2010	222	57	133		525	30	11722	3100	3828	540	131		109	4884	106	319	24443	25013	70	3120	33	123	1861			597	264	
2011	635	88	85		515	24	16417	2871	4283	953	279		2021	8181	137	373	39011	38118	340	3534	114	303				568	262	
2012	876	58	78		451	5	15978	1050*	3713		570		2657	10345	81	162	53907	30740	911	2213	168	517	2449	5036	99	484	493	

\* Provisional data - undergoing validation

**General notes on Table 64:**

- 2013 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

## Background documentation

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## ANNEX I – Summary Tables of Fire Statistics

**Table 65. Number of forest fires in five Southern Member States (1980-2013)**

**Table 66. Burnt area (hectares) in five Southern Member States (1980 – 2013)**

**Table 67. Number of forest fires in other European countries (1990-2013)**

**Table 68. Burnt area (hectares) in other European countries (1990 – 2013)**

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 65. Number of forest fires in five Southern Member States (1980-2013)**

<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
<i>% of total in 2013</i>	54%	30%	6%	8%	2%	100%
<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	4 406	7 259	1 695	56 677
<i>Average 2010-2013</i>	21 929	14 066	3 682	6 063	1 272	47 011
<i>Average 1980-2013</i>	18 633	15 195	4 802	9 536	1 534	49 699
<i>TOTAL (1980-2013)</i>	633 519	516 619	163 259	324 230	52 144	1 689 771

\* Incomplete data

**Table 66. Burnt area (hectares) in five Southern Member States (1980 – 2013)**

<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
<i>% of total in 2013</i>	52%	20%	1%	10%	16%	100%
<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	22 342	83 878	49 238	432 788
<i>Average 2010-2013</i>	117 473	110 510	7 977	69 608	36 178	341 745
<i>Average 1980-2013</i>	109 640	169 865	25 713	111 013	47 128	463 359
<i>TOTAL (1980-2013)</i>	3 727 776	5 7754 402	874 240	3 774 436	1 602 335	15 754 189

**Table 67. Number of forest fires in other European countries (1990-2013)**

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<i>Austria</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	954*	912*	750*	-	218	192	356	312	357
<i>Bulgaria</i>		73	602	1196	667	114	246	200	578	320	1710	825	402	452	294	241	393	1479	582	314	222	635	876	408
<i>Croatia</i> <sup>†</sup>	-	-	325	372	181	109	305	305	441	223	706	299	176	532	204	147	181	345	275	181	131	280	569	137
<i>Cyprus</i>	-	-	-	-	-	-	-	-	-	-	285	299	243	427	221	185	172	111	114	91	133	85	78	135
<i>Czech Rep.</i>	-	-	-	-	-	1331	1421	1398	2563	1402	1499	483	604	1754	873	619	697	-	-	-	-	-	-	-
<i>Estonia</i>	-	-	-	-	-	-	-	-	-	-	-	-	356	111	89	65	248	64	71	47	30	24	5	15
<i>Finland</i>	-	-	-	-	-	-	1475	1585	370	1528	826	822	2546	1734	816	1069	3046	1204	1456	1242	1412	1215	417	1452
<i>FYROM</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	652	573	80	99	523	483	186
<i>Germany</i>	-	1846	3012	1694	1696	1237	1748	1467	1032	1178	1210	587	513	2524	626	496	930	779	818	858	780	888	701	515
<i>Hungary</i>	-	-	-	-	-	-	-	-	-	229	811	419	382	375	104	150	97	603	502	608	109	2021 <sup>‡</sup>	2657	761
<i>Latvia</i>	604	225	1510	965	763	582	1095	768	357	1196	915	272	1720	900	647	365	1929	425	700	823	316	360	162	422
<i>Lithuania</i>	-	-	1180	634	715	472	894	565	258	1022	654	287	1596	885	468	301	1545	251	301	471	104	142	81	123
<i>Poland</i>	5756	3528	11858	8821	10705	7678	7923	6817	6165	9820	12426	4480	10101	17087	7006	12049	11541	8302	9090	9162	4680	8172	9265	4883
<i>Romania</i>	131	42	187	159	121	62	72	37	59	138	688	268	516	203	34	64	105	478	91	190	70	340	882	116
<i>Slovakia</i>	-	-	-	-	366	254	662	535	1056	426	824	311	570	872	153	287	237	463	182	347	127	303	517	233
<i>Slovenia</i>	-	-	-	-	-	-	-	-	-	-	-	-	60	224	51	73	112	140	74	120	32	114	168	75
<i>Sweden</i>	-	-	-	-	-	-	4854	7057	2503	4707	4708	4831	6490	8282	4955	4573	4618	3737	5420	4180	3120	3534	2213	4878
<i>Switzerland</i>	235	148	70	76	74	87	108	135	91	45	49	48	67	154	49	63	46	39	46	52	57	76	57	54
<i>Turkey</i>	1750	1481	2117	2545	3239	1770	1645	1339	1932	2075	2353	2631	1471	2177	1762	1530	2227	2829	2135	1793	1861	1954	2450	3755

\*Database undergoing validation – figures may change in future

<sup>†</sup> All figures changed since last year: different sources and methodology used to measure totals

<sup>‡</sup> Change in database compilation protocol

**Table 68. Burnt area (hectares) in other European countries (1990 – 2013)**

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<i>Austria</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	74*	75 <sup>§</sup>	48 <sup>§</sup>	-	22	37	78	69	165
<i>Bulgaria</i>	-	511	5243	18164	18100	550	906	595	6967	8291	57406	20152	6513	5000	1137	1456	3540	42999	5289	2271	6526	6883	12730	3314
<i>Croatia</i> <sup>†</sup>	-	-	11131	20157	7936	4651	11214	11122	32056	6053	68171	16169	4853	27091	3378	3135	4575	20209	7343	2900	1121	15555	24804	1999
<i>Cyprus</i>	-	-	-	-	-	-	-	-	-	-	8034	4830	2196	2349	1218	1838	1160	4483	2392	885	2000	1599	2531	2835
<i>Czech Rep.</i>	-	-	-	-	-	403	2043	359	1132	336	375	87	178	1236	335	227	53	-	-	-	-	-	-	-
<i>Estonia</i>	-	-	-	-	-	-	-	-	-	-	-	-	2082	207	379	87	2638	292	1280	59	25	19	3	79
<i>Finland</i>	-	-	-	-	-	-	433	1146	131	609	266	187	590	666	358	495	1617	576	830	576	520	580	86	461
<i>FYROM</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32665	5915	1307	737	17308	10021	1261
<i>Germany</i>	-	920	4908	1493	1114	592	1381	599	397	415	581	122	122	1315	274	183	482	256	538	757	522	214	269	199
<i>Hungary</i>	-	-	-	-	-	-	-	-	-	756	1595	-	1227	845	247	3531	625	4636	2404	6463	878	8055 <sup>‡</sup>	13978	1955
<i>Latvia</i>	258	69	8412	570	326	535	927	448	211	1544	1341	311	2222	559	486	120	3387	272	364	646	92	115	90	217
<i>Lithuania</i>	-	-	769	274	279	321	478	226	93	494	352	113	746	436	253	51	1199	38	112	287	22	293	20	25
<i>Poland</i>	7341	2567	4375 <sup>‡</sup>	8290	9325	5403	14537	6766	4222	8629	7089	3466	5210	28551	3782	5713	5657	2841	3027	4400	2126	2678	7235	1289
<i>Romania</i>	444	277	729	518	312	208	227	68	137	379	3607	1001	3536	762	124	162	946	2529	373	974	206	2195	6299	421
<i>Slovakia</i>	-	-	-	-	-	-	-	-	-	557	904	305	595	1567	157	524	280	679	118	510	192	403	1683	270
<i>Slovenia</i>	-	-	-	-	-	-	-	-	-	-	-	-	161	2100	138	280	1420	128	75	177	121	288	1006	66
<i>Sweden</i>	-	-	-	-	-	-	1588	5873	422	1771	1552	1254	2626	4002	1883	1562	5710	1090	6113	1537	540	945	483	1508
<i>Switzerland</i>	1705	96	27	34	404	444	286	1685	261	30	68	17	697	640	23	41	108	282	65	43	26	222	26	27
<i>Turkey</i>	13742	8081	12232	15393	38128	7676	14922	6316	6764	5804	26353	7394	8514 <sup>†</sup>	6644	4876	2821	7762	11664	29749 <sup>†</sup>	4679	3317	3612	10455	11456

\* Database undergoing validation – figures may change in future

<sup>†</sup> All figures changed since last year: different sources and methodology used to measure totals

<sup>‡</sup> Change in database compilation protocol



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#### Abstract

This is the 14<sup>th</sup> “Forest Fires in Europe” report published by the European Commission. The report contains a summary of the 2013 fire season in Europe, the Middle East and North Africa with official statistics on the number of fires and burnt areas compiled by the contributing countries. In addition to country reports with a summary of the 2013 fire season provided by the countries, the report Forest Fires in Europe, Middle East and North Africa informs about the latest developments in terms of forest fire prevention and initiatives of the European Commission to support forest fires fire protection activities in the European Union. Furthermore it provides the results of the European Forest Fire Information System (EFFIS) operating during the fire season, with special emphasis on the EFFIS Danger Forecast, providing daily maps of meteorological fire danger forecast of Europe, and the EFFIS Rapid Damage Assessment, performing the daily mapping and assessment of main land cover and Natura2000 areas affected by fires of at least 40 ha during the fire season.

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