



J R C T E C H N I C A L R E P O R T S

Forest Fires in Europe, Middle East and North Africa 2012

Joint report of JRC and
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Environment

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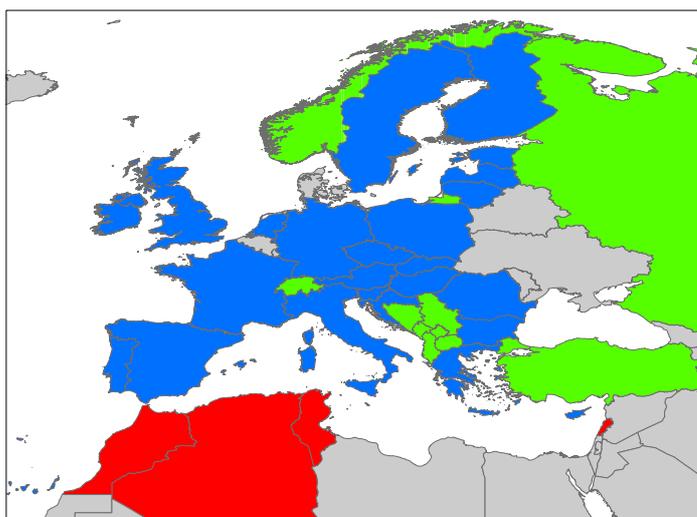
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1 PREFACE

The European Forest Fire Information System (EFFIS) was established with the aim of providing harmonised information on forest fires at the European level. For this purpose collaboration with EU Member States and neighbouring countries has been on-going since 1998. Since then, EFFIS has provided an ideal platform for countries to exchange good practices on fire prevention, fire fighting, restoration practices and other activities related to fire management.

EFFIS is further expanding to other countries with high or increasing fire risk. Since 2011, with the support of *Silva Mediterranea*¹ (FAO) and GIZ², the European Commission prepared the ground for involving Middle East and North African (MENA) countries in EFFIS activities and including them as members of its Expert Group on Forest Fires (EGFF).



Currently, 38 countries are signed up members of the EGFF, including 24 EU Member States (Austria, 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 13th issue of the EFFIS annual report on forest fires, which is now consolidated as highly appreciated documentation of the previous year's forest fires, the fire risk evolution, the fire danger forecast, fire damage assessments and fire statistics based on data provided by the national experts. 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.

¹ <http://www.fao.org/forestry/silvamed/en/>

² Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

2 FOREST FIRES 2012 IN THE EUROPEAN COUNTRIES

2.1 SOUTHERN MOST AFFECTED COUNTRIES (1980 – 2012)



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

During 2012 in these 5 countries forest fires burned a total area of 519 424 ha. This is well above the average of the last 20 years (which is about 400 000 ha) and among the highest since 2000. On the other hand, the number of fires that occurred (50 994) is below the average and among the lowest of the last 2 decades (see Table 1 and Annex 1 for details).

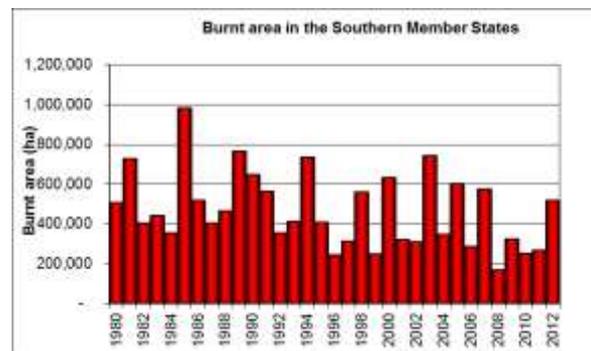
Figure 1a shows the total burnt area per year in the five Southern Member States since 1980. The statistics vary considerably from one year to the next, which clearly indicates how much the burnt area depends on seasonal meteorological conditions. Considering the 5 countries together, 2012 exhibits a local maximum for burned area, being overpassed for the last 12 years only by the dramatic 2003, 2005 and 2007 fire seasons, and following 4 consecutive relatively “mild” years.

Figure 1b 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. However, in the last 5 years the trend has been slightly upward. Overall, in terms of number of fires, the year 2012 was below the long term average.

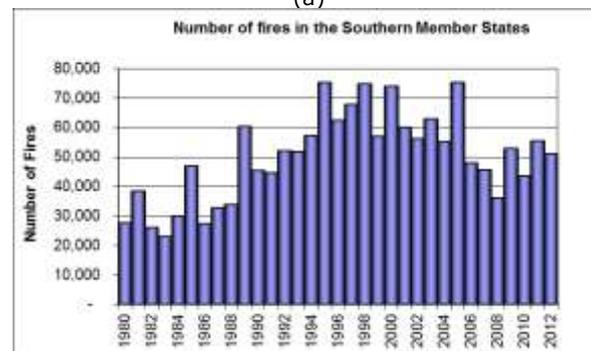
Figure 1c shows the yearly average fire size in the 5 countries since 1980. There is a clear difference in average fire size before and after 1990.

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

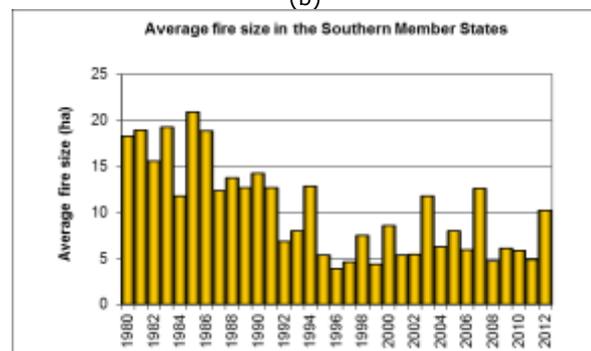
Similarly to the burned area trend, in 2012 the average fire size has a local maximum and it is only lower than 2003 and 2007.



(a)



(b)



(c)

Figure 1. Burnt area (a) number of fires (b) and average fire size (c) in the five Southern Member States for the last 33 years.

Figure 2 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 2012. It shows each of the 5 countries separately and also their total. It shows that 2012 has been a negative year in terms of burned area and average fire size, worse than the average of last two decades for southern Europe as a whole, but especially for Spain and, to a lesser extent, for Italy and Greece.

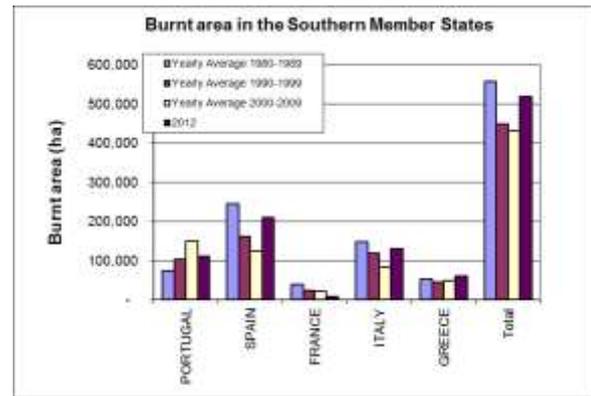
Table 1 gives a summary of the burnt areas and number of fires for the last 33 years, the average for the 1980s, the 1990s and the 2000s, and the average for the last 3 years, together with the figures for 2012 alone.

As previously mentioned, 519 424 ha were burnt in the five southern Member States, which almost reaches the sum of what was burned in 2010 (253 664) and 2011 (269 081) together, and it is about 21% more than the average of the last decade (2000-9) and 16% more than the previous decade (1990-9).

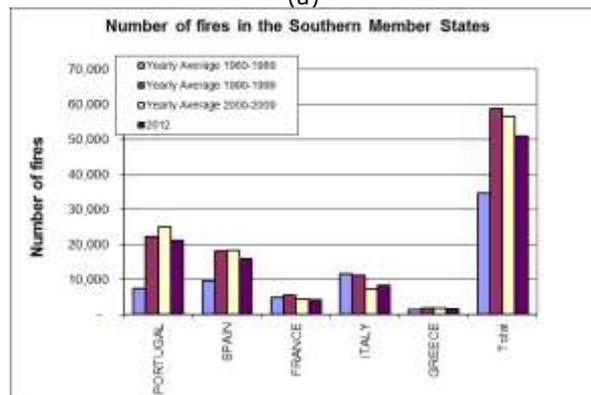
On the other hand the number of fires in 2012 was 50 994, which is about 10% below the average of the last decade and 13% below the average of the previous decade.

Figure 3 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 2012.

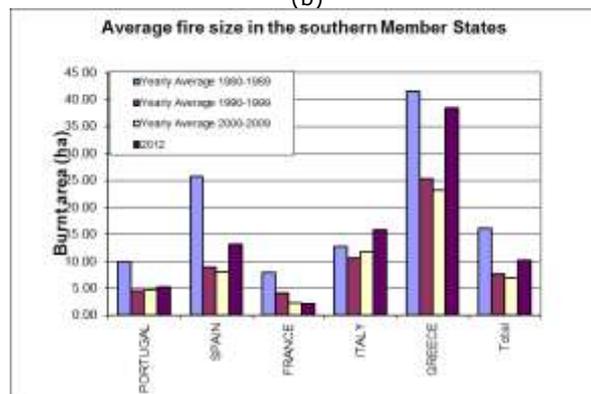
Since the area of each country is different, and the area at risk within each country is also different, the comparisons among countries cannot be absolute. It should also be borne in mind that since 2009 the figures for numbers of fires in Greece are incomplete and are therefore an under-representation of the true figure. During 2012 Spain was the most affected country in terms of burnt area, recording 40% of the burnt area for the whole of the five southern Member States, followed by Italy (25%) and Portugal (21%). The greatest number of fires was recorded in Portugal (42%), followed by Spain (31%).



(a)

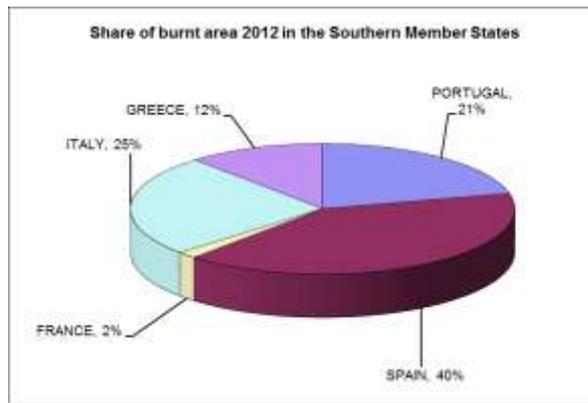


(b)

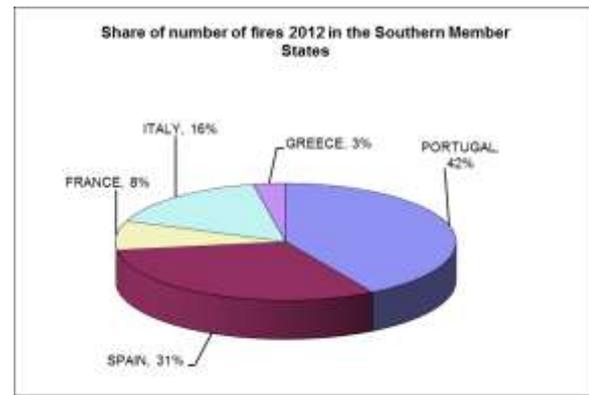


(c)

Figure 2. Burnt areas (a), number of fires (b) and average fire size (c) in the five Southern Member States in the year 2012 as compared with average values for previous decades.



(a)



(b)

Figure 3. Share of the total burnt area (a) and the total number of fires (b) in each of the Southern Member State for 2012

Table 1. 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 ^(*)	TOTAL
2012	21 176	15 902	4 105	8 252	1 559	50 994
% of total in 2012	42%	31%	8%	16%	3%	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	18 337	4 406	7 259	1 695	56 645
Average 2010-2012	22 808	14 551	4 168	9 736	1 408	50 040
Average 1980-2012	18 613	15 263	4 880	9 736	1 554	50 046
TOTAL (1980-2012)	614 228	503 690	161 036	321 294	51 282	1 651 530

<i>Burnt areas (ha)</i>	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
2012	110 231	209 855	8 600	130 814	59 924	519 424
% of total in 2012	21%	40%	2%	25%	12%	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	125 239	22 342	83 878	49 238	430 798
Average 2010-2012	105 711	116 372	9 433	83 118	32 678	347 313
Average 1980-2012	108 334	171 593	26 383	113 496	47 141	466 947
TOTAL (1980-2012)	3 575 020	5 662 572	870 632	3 744 360	1 555 659	15 409 243

^(*) Numbers of fires are incomplete since 2009

1.1.1. Portugal

Fire danger in the 2012 fire season

In 2012 the burnt area has increased to 110 231 ha which represents 76.5% of the average of the previous decennium, which was 144 021 ha. However regarding forest fire numbers, there was a decrease in 2012, to a total of 21 176 fires, representing a decrease of 12% when compared to the average of fire numbers of the last decennium and a decrease of 16% relating to 2011.

These outcomes had high impact mostly on shrubland (56.4%), rather than woodland (43.6%).

Because of the increased burned area Portugal was not able to meet the targets set on the National Fire Plan³, 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 2012 (Figure 4).

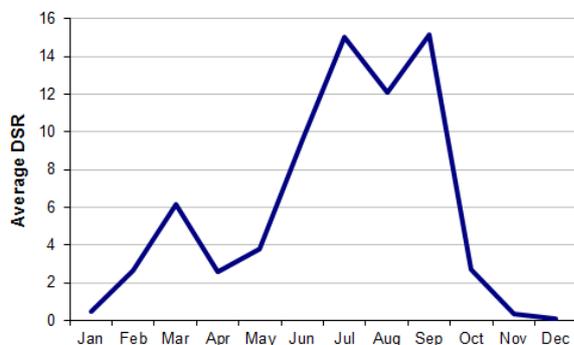


Figure 4. DSR variation in 2012

Fire occurrence and affected surfaces

In 2012 Portugal registered a total of 21 176 forest fires (79% <1ha), responsible for the burning of 110 231 ha (Figure 5). Forest fires affected mainly shrubland (56.4%). *Pinus pinaster*, *Eucalyptus globulus* plantations and *Quercus* sp. stands were the forest cover most affected by fires.

49.5% of the occurrences (10 481) were reported in January-June; they burned about 36 437 ha (33% of the total burned area); Table 2.

In the summer period (July-September) there were 10 003 forest fires (47% total forest fires), which consumed approximately 73 173ha (66.4% total burned area).

In 2012 the most critical month for forest fires was September with 4 651 forest fires (22% total forest fires) burning 34 509 ha (31.3% total burned area).

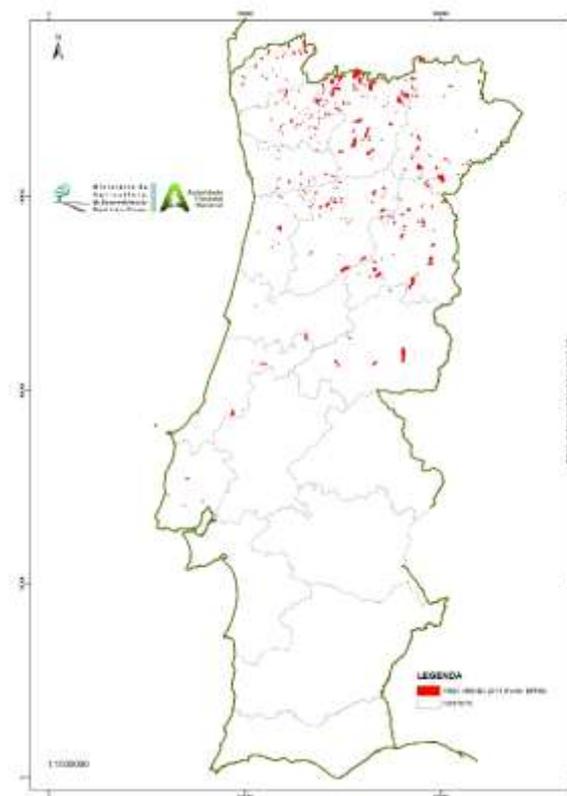


Figure 5. Burned areas in 2012, provisory data (Portugal).

Source: EFFIS/JRC, 2012)

³ 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.

Table 2. Forest fires in Portugal (monthly distribution)

Month	Number of Fires	Burnt Area (ha)		
		Wooded land	Shrub land	Total
January	330	41	225	266
February	3 749	2 999	9 523	12 522
March	4 174	10 538	10 723	21 261
April	871	384	430	814
May	523	488	292	780
June	834	350	444	794
July	2 661	10 747	20 821	31 568
August	2 691	1 997	5 099	7 096
September	4 651	20 382	14 127	34 509
October	625	136	471	607
November	52	4	9	13
December	15	0	1	1
TOTAL	21 176	48 066	62 165	110 231

Fire occurrence prevailed mostly in the urban districts, such as Porto, Braga, Vila Real (Northern region), Aveiro and Viseu (Centre Region), which registered 61% of the total number of fires (mainly very small fires). The Northern and Central regions of Portugal were the most affected by forest fires (84 265ha – 76.4% total), Table 3. 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 3. Number of fires and burned area in Portugal (NUTSII - 2010).

NUTS II Region	Number of fires			Burned Area (ha)		
	≥ 1ha	< 1ha	Total	Shrub land	Wooded land	Total
Norte	2979	10145	13124	29186	13466	42652
Centro	1110	4 496	5606	16211	25402	41613
Lisboa e Vale do Tejo	133	1.075	1208	627	88	715
Alentejo	153	553	706	319	2750	3069
Algarve	50	482	532	15822	6360	22182
TOTAL	4425	16751	21176	62165	48066	110231

The analysis of the yearly trends in the number of fires and burnt areas in Portugal is shown in Figure 7.

Portugal registered 143 large fires (≥ 100ha), which corresponded to 71% of the total burnt area. There were registered 26 fires larger than 500 ha, which burned 53 006ha. The largest fire of 2012 occurred in Faro district, with 21 437ha, on 18 July.

Fire causes

In 2012 the National Guard proceeded with the criminal investigation of 15 404 forest fires (72.7% of the total registered in 2012).

Intentional fires corresponded to 22% of the determined causes and Accidents or negligence were present in the ignition of 39% (Figure 6).

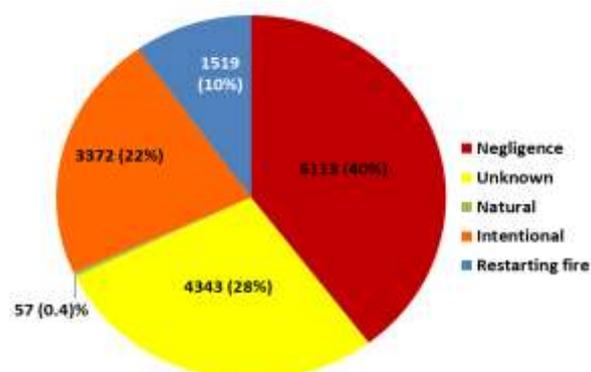
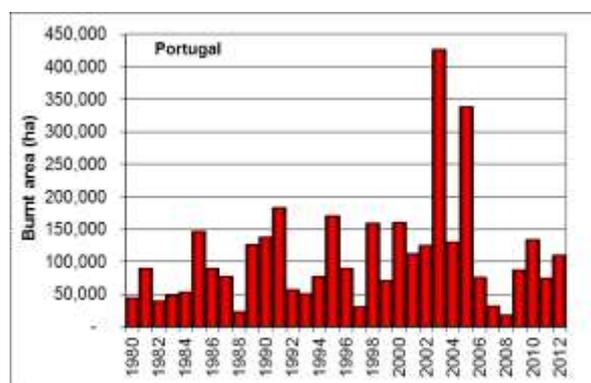
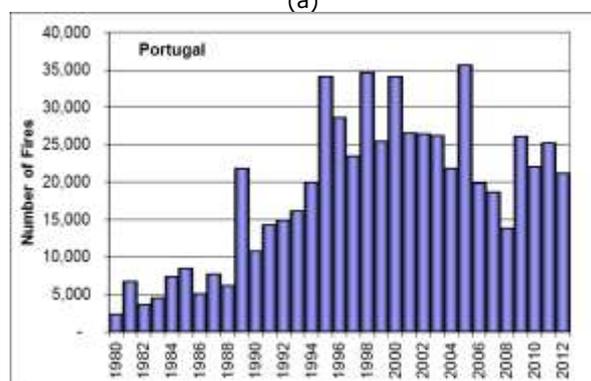


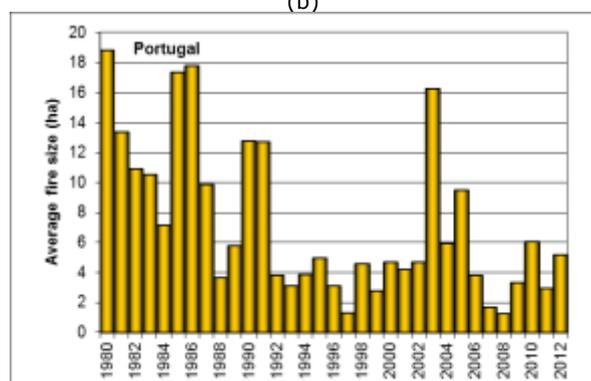
Figure 6. Main causes of forest fires in 2012



(a)



(b)



(c)

Figure 7. Burnt areas (a), number of fires (b) and average fire size (c) in Portugal 1980-2012.

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 2012, 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, in 2012, was made into engagement phases. 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 9 327 human resources, 1 987 vehicles and 44 aerial means available.

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

Table 4. . Fire-fighting means available per phase

Phases	Elements	Vehicles	Aerial Means
Alfa (< 15MAY)	Means available on demand		2 - 7
Bravo (15MAY-30JUN)	6 242	1 577	28
Charlie (1JUL-30SEP)	9 324	2 248	44
Delta (1OCT-15OCT)	5 363	1 335	23
Echo (> 15OCT)	Means available on demand		2 - 7

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

- 35 Helis for initial attack;
- 5 Heavy Helibombers for enlarged attack;
- 4 Amphibious aircrafts 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 2012 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 three 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 (AGRUF), covering several and different districts, became responsible for managing all forest fire fighting operations happening in their respective region.

Forest fires planning

The National Forest Authority 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 2012 there were 257 municipal forest offices established and 271 Municipal Plans for Forest Fire Prevention and 271 Municipal Operational Plans approved. 97% of the municipalities are covered by Forest Fire Prevention Municipal Plans.

The regional level planning is assured by 16 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 19 000 ha were managed of which 700 ha 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 2012 the publishing of Regulation no. 196/2012, 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 were no follow-up progresses in the Commission works.

Loss of human lives

During 2012, forest fires in Portugal caused the death of 6 fire fighters, 1 of them due to car accident and another one due to health problems. One civilian died as a result of forest fires.

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

Operations of mutual assistance

As a result of the situation of forest fires in Portugal, which required very high commitment operating air and ground resources, Portugal requested the activation of the European civil protection mechanism on September 03. Through this mechanism was requested the possibility of engagement of 2 modules of the type Canadair amphibious aircraft (4 aircraft), for a period of 48 hours. Based on this request, France sent 1 amphibian aircraft module of type Canadair (2 aircraft) and Spain released 1 amphibious aircraft. The French aircraft operated in Portugal from the Monte Real air base while the Spanish aircraft operated always from Spanish territory.

(Sources: National Authority for Civil Protection, Portugal)

2.1.1 Spain

Fire danger in the 2012 fire season

In January the risk of fire remained low virtually all month in most of the country, except the first ten days in which there were strong northerly winds in the Ebro Valley and west winds on the Mediterranean coast and up in the Guadalquivir valley, which drove up the risk to moderate in the areas concerned.

The wildfire risk rose over the month of February, from low up to moderate with some high risk areas at the end of the month. This was caused mainly by the lack of rainfall, coupled with significant offshore winds. In March the wildfire risk rose throughout the month, from low at the beginning, up to moderate and with zones of high risk at the end of the month. This increase was caused mainly by the lack of rainfall and high temperatures, combined with the influence of offshore winds.

Improving conditions in April, with rainfall above the monthly average values and slightly lower temperatures, made the fire danger generally low for most of the month. Only in some regions this risk became moderate or high. May was warmer and drier than usual, which influenced the fire risk, although it remained moderate for most of the month in the southern half of the peninsula. Only noteworthy are the last days of the month in the Guadalquivir river valley, where the risk was high due to the presence of westerly winds.

The month of June was extremely hot and dry, causing the fire risk to go from moderate to high throughout the month in the southern and eastern half of the peninsula. During the last week, in these areas, it reached an extreme level, coinciding with the heat wave that affected virtually all of Spain between 24 and 29 June. The month of July was also very hot and dry, with increasing risk of fire throughout the month in the southern half of the peninsula, reaching an extreme value in the first and last weeks.

During the month of August, considered by the meteorological services as "extremely warm" and "very dry", heatwave episodes were recorded at least twice, once around 9 to 11 and then another longer one from 17 to 23 August. On both occasions the risk rose to very high / extreme in large parts of the country.

The gradual drop in temperatures and rainfall recorded in September caused the forest fire risk to decrease during the month to moderate and low levels. Only the westerly winds later in the month increased the risk of fire to high and extreme values in the Eastern regions. The risk remained generally low throughout the month of October, helped by rainfall over almost the entire territory. Only during the first third of the month the risk was somewhat higher in the northwest peninsula, reaching high values in these areas.

The risk also remained low throughout the month of November due to rainfall and low temperatures. Occasionally the risk was somewhat higher in the southwest peninsula at the end of the first half of the month and later on in the east, reaching moderate values in these areas. In general, fire risk remained low throughout the month of December due to rainfall, high humidity and low temperatures. Occasionally the risk was somewhat higher in the Eastern regions during the first week of the month, and in the Cantabrian Mountains during the last week of the year.

Number of fires and affected surfaces

In 2012, the total number of fires was slightly below the average for the previous decade (2002-2011); 5.4% lower for the total number of fires and 9.9% less for the number of larger fires (≥ 1 ha). The percentage of small fires (< 1 ha) over the total number of fires is 66.2%, slightly above the average which stands at 64.5%.

Table 5. Number of fires in 2012 compared with 10 year average

	<i>Average 2002-2011</i>	<i>2012</i>
Number of fires < 1 ha	10 838	10 520
Number of fires ≥ 1 ha	5 976	5 382
Total	16 814	15 902

The distribution of the total number of fires by geographical area is shown in Figure 8.

Just over half (51.25%) of the fires occurred in the Northwest Peninsula (Galicia, Asturias, Cantabria, Basque Country, Zamora and León), followed by the Interior Communities which were affected by about a third of the losses (32.89%).

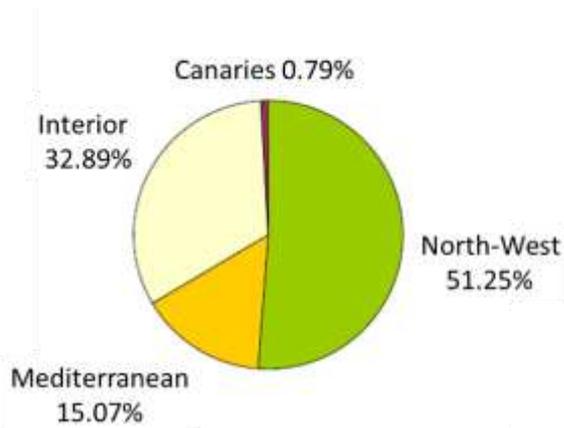


Figure 8. Number of fires in 2012 by geographic region

Both forest and total burnt area exceeded the average for the decade 2002-2012, by 117.3% and 82.9% respectively. The occurrence of several large fires (GIF: ≥ 500 ha) throughout the year and especially during the summer, contributed to this increase.

Table 6. Burnt area in 2012 compared with the 10 year average

	Average 2002-2011	2012
Burnt area forest (ha)	37 835.1	82 201.40
Total burnt area (ha)	114 734.1	209 855.21

The highest percentage of area affected is in the Mediterranean region with 40.94% of the total area affected (Figure 9).

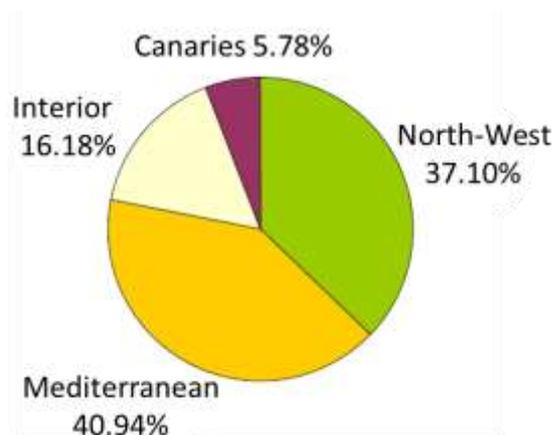


Figure 9 Burnt area in 2012 by geographic region

Large fires

There were 39 Large Fires (GIF: defined as burnt area ≥ 500 ha) in 2012. Although the majority are concentrated in the summer months, a good number also occurred early in the year. These fires (0.24% of the total number of fires) account for 64% of the total area burnt. Table 7 gives the location, date and burned area of these large fires.

Table 7. Large fires in 2012

Province	Municipality of origin	Start date	Burnt area (ha)
Zamora	Pías	08-01	1 115
Zamora	Hermisende	28-02	2 330
Orense	Veiga	28-02	527
Huesca	Montanuy	08-03	2 084
León	Truchas	09-03	905
León	Palacios del Sil	11-03	519
Asturias	Piloña	23-03	692
Asturias	Cangas del narcea	26-03	735
Coruña	A Capela (Fragas del Eume)	31-03	805
Tarragona	Rasquera	15-05	2 735
Valencia	Chelva	01-06	657
Barcelona	Castellet I la Gornal	12-06	580
Valencia	Llocnou de Sant Jeroni	12-06	1 331
Valencia	Cortes de Pallás	28-06	27 940
Valencia/ Castellón	Andilla	29-06	19 691
Albacete/ Murcia	Hellín-Moratalla	01-07	6 870
S.C.Tenerife	Vilaflor (Tenerife)	15-07	6 320
S.C.Tenerife	El paso (La Palma)	16-07	850
Girona	La Jonquera	22-07	10 291
Cáceres	Caminomorisco	23-07	621
Guadalajara	Chequilla	01-08	1 115
Cáceres	Gata	03-08	646
S.C.Tenerife	Villa de Mazo (La Palma)	04-08	2 197
S.C.Tenerife	Alajeró (Gomera)	04-08	2 924
Orense	Barco de Valdeorras	09-08	1 509
Guadalajara	Uceda	11-08	837
Salamanca	Valdehijaredos	11-08	1 035
Alicante	Torremanzanas	12-08	632
Ávila	Solana de Ávila	18-08	1 242
Zamora	Cubo de Benavente	18-08	650
León	Castrocontrigo	19-08	11 592
Navarra	Aras	21-08	624
Madrid	Valdemaqueda	27-08	1 560
Zaragoza	Calcena	27-08	4 602
Málaga	Coín	30-08	7 781
León	Riello	01-09	882
Toledo	El Real de S.Vicente	01-09	627
Zamora	Pedralba de la Pradería	22-09	2 571
Valencia	Chulilla	23-09	5 714
Total burnt area			136 340



Figure 10. Chulilla (Valencia) 24 September 2012.

The yearly trends in terms of numbers of fires and burnt areas during the last 32 years in Spain are shown in Figure 11.

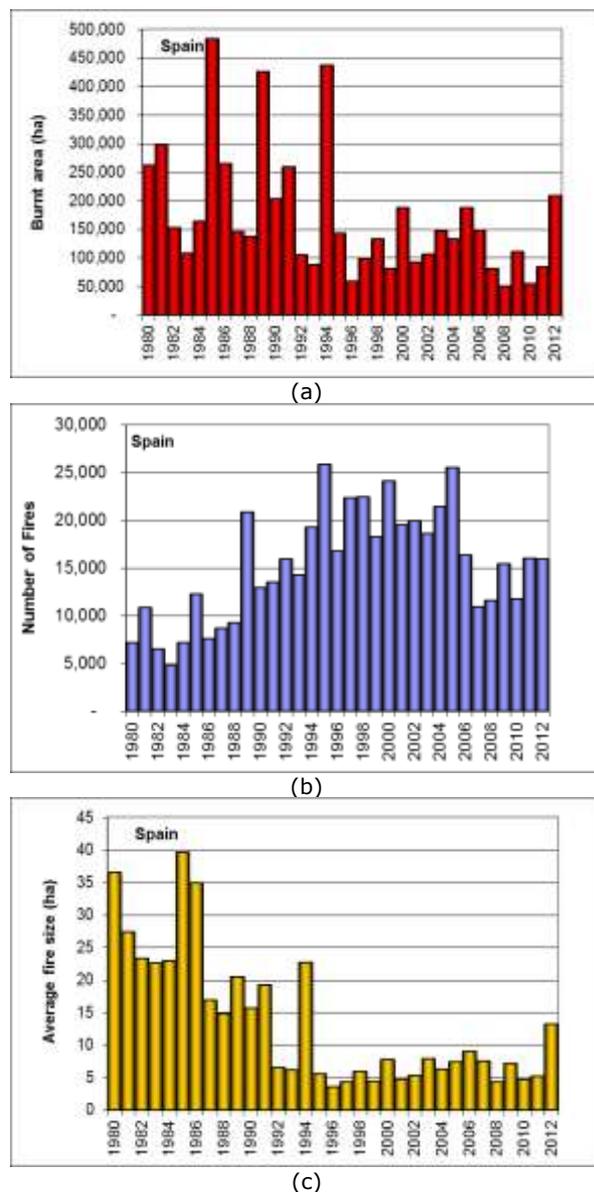


Figure 11. Burnt areas (a), number of fires (b) and average fire size (c) in Spain for the last 33 years.

Prevention measures

Training in fire management

During 2012, the ADCIF (*Área de Defensa contra Incendios Forestales*) organized the following training courses for personnel working on fire management:

- Course in Prevention: aimed at technical staff of the regions for qualification appropriate prevention techniques to the causes of the fire.
- Advanced Course in Management of Extinction: aimed at technical staff of the regions in order to qualify participants as

directors of extinction, assuming functions of planning, operations and logistics.

- Course on Fire Behaviour: covers current techniques for predicting fire behaviour in fire, using computer software and geographic information systems.
- Course in Safety and Accident Investigation: a new course designed to train participants as security officers in extinguishing forest fires.
- Course in Research Techniques on Causes: targeting environmental agents, addressing environmental crime, especially those related to forest fires, from the point of view of judicial police.
- Courses on Fighting Techniques: to train forestry foremen or equivalent staff for work in brigades.
- Fire Management Course: a practical course, aimed at those who regularly make use of fire (technicians, agents or foremen) and technical decision-makers in introducing the use of fire as a fuel management tool.
- Course of application of Incident Command System (IMS) to forest fires: introduces students to the organizational model of the ICS (incident Command System).
- Training Days Comprehensive Prevention Equipment: intended for EPRIF teams.
- Training for members of the Preventive Work Brigades: 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.
- Basic Courses Forest Fire: aimed at final year students.
- Fire Extinction Management Course: for staff of the Military Emergency Unit.

Preventive Work Brigades (*Brigadas de Labores Preventivas*)

MAGRAMA uses the services of *Brigadas de Labores Preventivas* against forest fires. They perform preventive silvicultural work, consisting of the reduction and control of forest fuels, making the forests more resistant to the start and spread of fire, and facilitating suppression actions in the event of a fire. The brigades are made available for public administrations and forest owners, running those tasks that are necessary to reduce the risk of fire in their forests.

Working on prevention in the months in which the risk of fire is lower, keeps the personnel continuously engaged, increasing their experience in public service.

In 2012, the brigades worked in collaboration with regional administrations, performing fire prevention work in more than 1 101 hectares of forest land.

In total more than 400 employees in ten brigades implemented preventive silvicultural work. The Brigades also work occasionally in support of the Integral Prevention Teams (*Equipos de Prevención Integral de Incendios Forestales: EPRIF*) to implement prescribed burns.

Exceptionally, the Preventive Work Brigades can act in support to the autonomous communities in severe forest fires. This happened in various fires, among which was the great fire that occurred on March 8 in Montanuy (Huesca) attended by Preventive Work Brigades of Daroca and Lubia.

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

MAGRAMA has collaborated with the regions in the forest fire prevention program for over 13 years, through EPRIF. The Integral Forest Fire prevention Teams (EPRIF) were created in 1998 to intervene directly in the territory affected by problems and causes that lead to fires. The work focuses primarily on supporting the rural population in conducting prescribed burns, and providing training and social awareness of the traditional uses of fire and its risks. The EPRIF operate between the months of December 2011 and April 2012.

During the campaign 2011/2012 there were 18 EPRIF teams nationwide distributed in regions and areas of high fire risk, attending to the special problems of the north-western mainland and various other specific locations.

Among other actions, during the last campaign the EPRIF conducted 254 controlled burns, 57 training / awareness activities, and contributed to the extinction of 55 forest fires. In particular they carried out preventive treatments by performing controlled burns on 1 693 hectares, all leading to the reduction of wildfire risk.

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 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.

In total, BRIF teams made 471 sorties during the year, with a total of 3 957 hours of work in fire and extinguished front length of 357 501 metres.

Aerial means

Throughout 2012, the MAGRAMA air assets made a total of 2 016 interventions in extinguishing forest fires. They flew for a total of 6 608 hours, making 32 975 discharges. The location of all actions taken between January 1 and December 31, 2012 is shown on the map below.



Figure 12. Location of intervention actions made by air in 2012

Budget

The summary budget for ADCIF (*Área De Defensa Contra Incendios Forestales de la DGD RYPF*) for 2012 is in the table below.

Type	Amount (Euro)
Aerial means	51 319 696.58
Human resources	22 320 716.99
Material and other resources	686 768.69
Total	74 327 182.26

Operations of mutual assistance

During the summer campaign, the MAGRAMA amphibious aircraft were sent to work in the extinction of several fires in Portugal in response to a request by the Portuguese government.

Amphibian aircraft conducted a total of 18 interventions in Portugal, totalling 78:35 fire flight hours and 146 discharges.

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

2.1.2 France

Fire danger in the 2012 fire season

The winter and early spring were marked by a severe drought, which particularly affected those areas most sensitive to forest fires. More frequent rain following the spring helped offset this situation and delayed the emergence of risks.

In the Mediterranean region, the months of July and especially in August were hot (summer 2012 ranks in 5th place as the hottest summer since 1950) and drier than normal, mainly in Roussillon, Provence and Corsica. The drought there was described as very strong by Météo France. In general, the soil water reserves were below normal over 2/3 of the land surface (Figure 13). However, rainfall occurred early in September to reduce the level of danger and put an end to the risk situation.

Overall, since the summer was relatively not very windy (3 episodes of strong wind), the total number of areas classified as at severe risk (310) is less than half the ten-year average, although the figures exceed those of 3 of the 4 last summers.

The areas classified at severe risk were located mainly in Provence and Corsica.

In the Southwest, from mid-June until the end of September, rainfall was limited, especially in the Landes massif. The drought became very strong in August, exacerbated by high temperatures. In the second part of summer, the danger level was marked, this situation aggravated at this stage of the season by the state of vegetation (drying of bracken) and the presence of windthrow hampering ground intervention means.

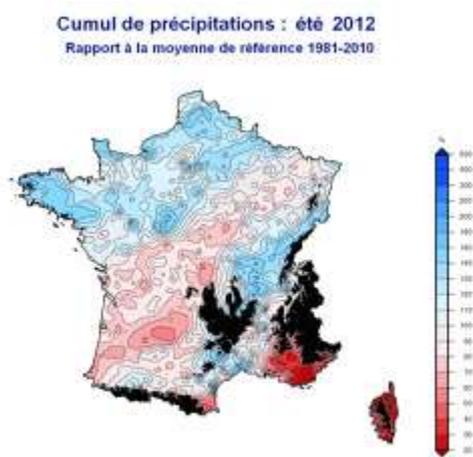


Figure 13. Cumulative precipitation in France summer 2012 compared with average 1981-2010

Fire occurrence and affected surfaces

8 600 ha were affected by 4105 fires in France in 2012 (compared with 9 400 ha in 2011, and a 10-year average of 19 900 ha). This is part of a positive trend over several years. The Mediterranean region is the most affected by fire, with 4 415 ha burnt. However, its proportion of the total (53% in 2012) has tended to decrease over the last years (it previously stood at over 70%).

Mediterranean departments

In total, 4 415 ha were affected by 1 800 fires in the Mediterranean region during 2012. The burnt area is less than the ten-year average (13 300 ha). In 2011, 4 500 hectares had been affected.

Almost half the 2012 figures were caused by operational activities in February and March, often linked to the practice of stubble burning, while the rainfall deficit was also very important. In addition to the fires that developed in the Ardèche in Sablières and in Burzet during which two firefighters died, two fires were of significant magnitude:

- February 29, 2012, 105 ha were burnt in Tartonne (Alpes-de-Haute-Provence)
- March 5, 105 ha were affected in Pourcharesses (Lozère)

During the actual summer forest fires campaign, 2 400 ha were affected by 770 fires in the Mediterranean region, which is well below the ten-year average (10 600 ha, 1 000 fires).

The most affected departments in 2012 were: Bouches-du-Rhône (850 ha), Ardèche (550 ha), Hérault (530 ha), Pyrénées-Orientales (460 ha), Haute-Corse (440 ha).

Apart from the fire in Perthus, which developed in Spain in close proximity to the border, and on which substantial resources were committed by France (water bombers, fire retardant detachments, helicopter support and intervention detachment from FORMISC: *formations militaires de la sécurité civile*, and reinforcement brigades) to prevent it from spreading in the Pyrénées-Orientales, three fires burnt more than 100 ha during the summer. They occurred in:

- Pyrénées-Orientales (Boulterrenere, 170 ha on 21 July). The fire retardant detachments and DIH of FORMISC were engaged.
- Hérault (*Nissan*, 185 ha on 22 July)

- Bouches-du-Rhône (Orgon, 740 ha burnt - fire started on the night of August 25-26). This is the biggest fire to have developed in France in 2012. In order to extinguish the fire it was necessary to deploy significant reinforcements (up to 14 water bombers, one retardant detachment and a military section of civil defence system, 4 columns of reinforcement from South-East and East zones and 4 other columns from the Mediterranean departments, totalling 550 firefighters).

On average, 12 fires burn more than 100 ha in the summer.

According to surveys conducted to establish the type of vegetation concerned, 50% of affected surfaces consisted of forests, 25% were maquis and garrigue, and 25% were stubble or wasteland. Damage to property was limited.

Southwest regions

3 400 ha were affected by fire in the South-West, including 1 000 ha in the Landes massif. These areas are smaller than those burnt in 2011 (3 900 ha, of which 1 100 ha in the Landes massif) or, on average, during the last 10 years (5 400 ha including 1 150 in the Landes massif).

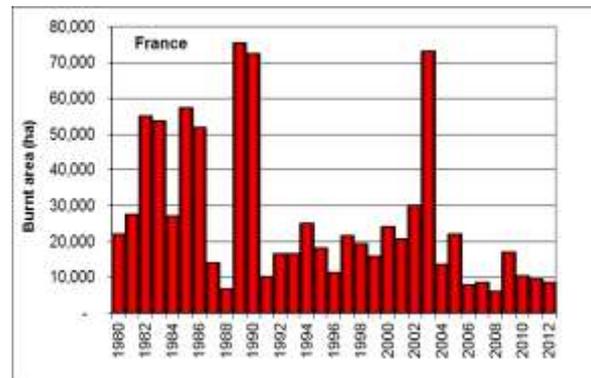
However, it should be noted that in 2012, unlike previous years, the larger fires developed during summer, and not at the end of winter (in the Pyrenees) or spring (for the Landes).

The affected area totalled 2 000 ha during the summer of 2012 in the South-West (including 920 ha in the Landes massif) and is thus higher in this period than the decade average (1 300 ha, including 400 ha in the Landes massif). Most of the destruction was concentrated in the second half of August.

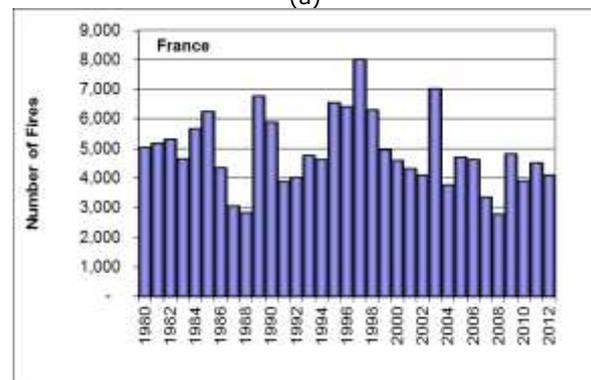
2 fires were particularly large:

- The first occurred in Lacanau (Gironde, August 16 - 634 ha): up to 7 water bombers were involved and 110 firefighters stepped in from neighbouring departments.
- The second was in L'Hospitalet (Ariege, Aug. 19 - 520 ha). This fire developed in very difficult terrain and spread in the humus making normal intervention control means ineffective (including air assets). A detachment of FORMISC intervention helicopters was engaged for a week and fifty firefighters from neighbouring departments and from Gard intervened. Due to the difficulties in dealing with this fire, it was not extinguished until 10 September.

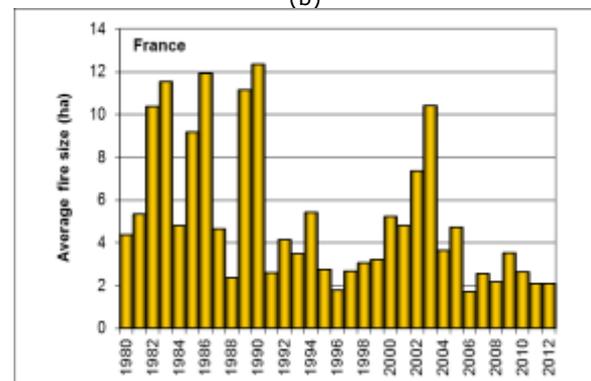
The yearly trends in terms of numbers of fires and burnt areas in France since 1980 are shown in Figure 14.



(a)



(b)



(c)

Figure 14. Burnt areas (a), number of fires (b) and average fire size (c) in France from 1980 to 2012.

Actions carried out in Réunion (Indian Ocean)

In 2011, a large fire burning in the Maïdo massif made it necessary to send significant reinforcement means from the mainland. In 2012, a Dash water bomber was positioned on the island at the beginning of the sensitive period (October) until the end of the year.

In total, 150 ha of natural areas were affected by fire in 2012, against more than 2 700 in 2011 and 1 700 in 2010.

Fire prevention activities

Several areas of efforts were followed to make to forest fire prevention policy in France more effective during 2012:

- The implementation of the new legal provisions on the prevention of forest fires due to the revision of the Forest Code.
- Updating the multi-year planning policies

The first generation of departmental or regional plans of protection of forests against fire (PPFCI), which are required in the departments and regions particularly vulnerable to fire, are gradually coming end of their 10 year period of validity.

Field Actions

The terrestrial expenses against the prevention of forest fires in France were globally assured by the collectives, the State (Ministry in charge of Forests) and, in the particular case of the Landes forest, by an amount close to 150 million Euro in 2012.

In 2012, the Ministry of Forests, with the cooperation of the National Forest Office (ONF) and co-financing from FEADER (*Fonds Européen Agricole pour le Développement Rural* - European Agricultural Fund for Rural Development), funded a DFCI action plan of around 28 million Euro. The collectives realize an annual average financial outlay of five times that of the state.

Through these cooperative efforts, more than a thousand people were mobilized for the terrestrial prevention of forest fires (not including firefighters of departmental Services for fire and rescue – SDSI - who are also mobilized as a preventive measure for ground surveillance in times of high risk): 175 specialised DFCI forest workers of the ONF, about 800 general forest fire staff, and dozens of forestry staff, commissioned officers and sworn members of the NFB.

The NFB, in association with the communities and SDIS concerned, implemented a program of general interest missions in the Mediterranean area, in which the following were carried out in 2012:

- Land management: 544 water points, 13 lookout stations, 398 km of DFCI maintained trails, 1 275 ha mechanical brushing, 510 ha of prescribed burns;
- 6 166 surveillance patrols, including 189 interventions against starting fires. Some projects have received financing from FEADER.

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.

Under a protocol signed with the Ministry of Defence, the Ministry has dedicated 200 men, 80 vehicles and three helicopters to the mission of protecting forests, funded by the Ministry of the Interior.

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 could be deployed, despite the need to provide additional specific coverage northwest of the country, indirectly affected by the Olympic Games in London because of the influx of people related to this event.

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 national means were mainly engaged in the Southern zone during summer 2012.

The water bombers

They performed 3 020 hours of "operational" flight during the year (2 120 hours on fire-fighting, 900 under the GAAR). This is significantly lower than the average of the last 10 years (3 900 hours).

- In the Mediterranean region, the water bombers intervened in 175 fires (in 75 cases during armed aerial reconnaissance missions).

- In the Southwest, the water bombers of civil security were positioned 26 times in Bordeaux Merignac during the summer. They were used for fifteen engagements against fire during this period.

The instruction and intervention of civil security units (UIISC)

They were engaged for 90 fires, in two thirds of cases in Corsica (where they also performed 370 ground surveillance operations, contributing to the occupation of forest areas and making it possible to limit the number of outbreaks of fire).

On the mainland, the detachments for fire retardant intervention were activated 12 times, the "support" groups seven times, and the helicopter intervention detachment 8 times (this was more activity than during previous years).

Reserve firefighters

Engagements of reserve firefighters in 2012 represent a total of 4 400 man-days. They were committed for 85% of their time in the Mediterranean region.

These reinforcements were mobilized mainly:

- during the fires that developed as of July 21 in the Eastern Pyrenees and the Spanish border; they came from the departments of South and South-West zones and numbered up to 300 firefighters (cumulative total: 1 300 men -days)

- At the Orgon fire for which 500 men from the South and East zones were mobilized (cumulative total: 1 800 man-days).

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.

However, it should be noted that two firefighters died during combat operations in the Ardeche, and fifty were also more or less seriously injured.

Operations of mutual assistance

Given problems of availability of aircraft in 2012, France was not able to respond to all requests for assistance.

Two operations were conducted, however:

- The first in favour of Spain from July 22 to 25, on the occasion of a fire developing on the French-Spanish border (Spanish side)

- The second in favour of Portugal from 4 to 8 September (2 CL 415 and a coordination aircraft were made available).

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

2.1.3 Italy

Fire danger in the 2012 fire season

The Region of Sicily experienced a particularly critical summer season; seeing an increase in the number of events by 25% compared to 2011. There were large areas affected by the fires, which accounted for over 40% of the overall total forested and non-forest area at national level.

Fire occurrence and affected surfaces

In 2012, throughout the country there were 8 252 forest fires which burnt 130 814 ha in total, of which 74 543 were wooded. Compared to the previous year 2011, the total number of forest fires has increased by just 1%, while the total areas burnt by fire increased by over 80% (in particular the wooded areas, which increased by 94% compared with an increase in non-wooded areas of 67%).

The total number of fires is just below (-8%) the long-term average of the 40-year time series of about 9 000 events per year. The data recorded in the month of March was significantly higher than the average for the period (Figure 15).

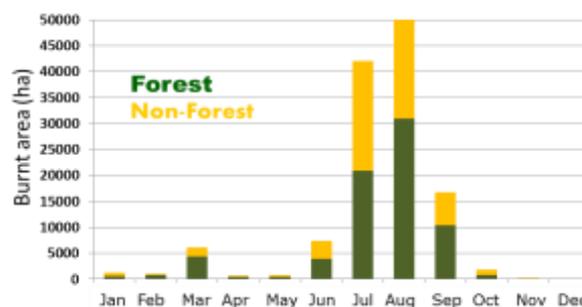
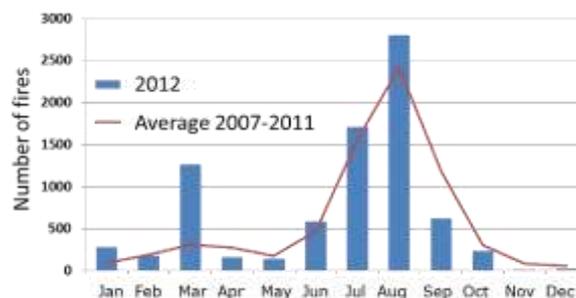


Figure 15. Number of fires and burnt area in 2012 by month

The total area affected by fire was high, well above the long-term average (+22%).

The average size for a fire was about 16 ha, 33% higher than long-term average of 12 ha. The proportion of wooded land burnt was 56%.

Table 8. Number of fires and burnt area in Italy by region in 2012

YEAR 2012	Number of fires	Burnt area (ha)			Average fire size
		Forest	Non-forest	Total	
PIEMONTE	166	560	821	1381	8.3
VALLE D'AOSTA	12	4	48	52	4.3
LOMBARDIA	262	461	875	1336	5.1
TRENTINO ALTO ADIGE	49	45	4	49	1.0
VENETO	164	88	62	150	0.9
FRIULI VENEZIA GIULIA	181	686	115	801	4.4
LIGURIA	354	1188	122	1310	3.7
EMILIA ROMAGNA	167	258	248	506	3.0
TOSCANA	756	1681	1149	2830	3.7
UMBRIA	186	1687	767	2454	13.2
MARCHE	70	172	100	272	3.9
LAZIO	715	5597	2459	8056	11.3
ABRUZZO	154	647	883	1530	9.9
MOLISE	142	412	520	932	6.6
CAMPANIA	1186	6531	1568	8099	6.8
PUGLIA	557	4472	3789	8261	14.8
BASILICATA	343	2921	3202	6123	17.9
CALABRIA	1069	16750	5828	22578	21.1
SICILIA	1271	27326	28257	55583	43.7
SARDEGNA	448	3057	5454	8511	19.0
ITALY TOTAL	8252	74543	56271	130814	15.9

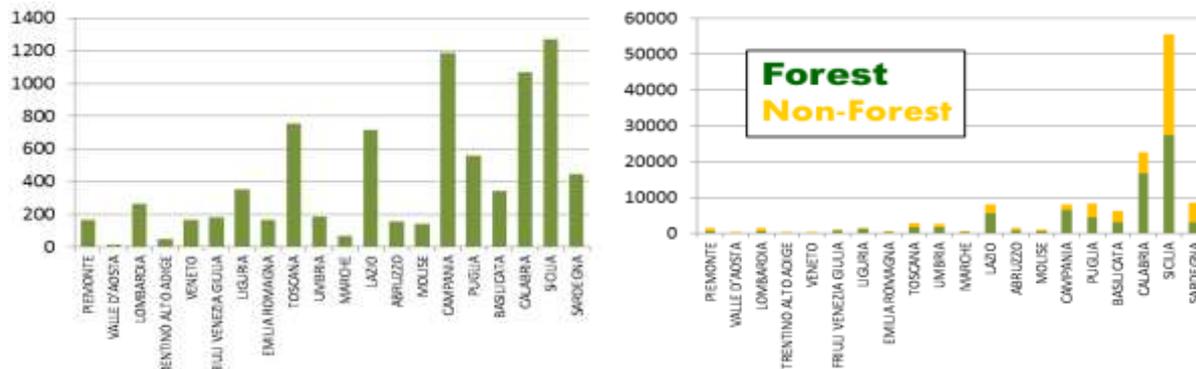


Figure 16. Number of fires and burnt area in 2012 by region

The complete archive of the data relating to forest fires collected by the *Corpo Forestale dello Stato* (Italian Forest Corps) is available from 1970 to present.

The number of fires increased during the 1970s, then remained less than 10 000 per year until 1978, when there were more than 11 000 fires, to remain consistently high in the 1980s and 1990s. From 2000 to 2007 the average number of fires has dropped by one-third compared to the previous two decades.

The burnt wooded area has been consistent from 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 area of non-wooded areas affected by fire was relatively low in the first decade, with an average of 36 000 hectares per year,

peaking in the period 1980-89 with over 93 000 hectares per year and then reducing in the third decade, with an average value of more than 63 000 hectares, further down 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 in the period 1990-1999, with a slight rise in the years 2000-2007 to 10.8 hectares. The year 2012 shows a considerable increase due to the large areas that affected Sicily, while the average of the 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).

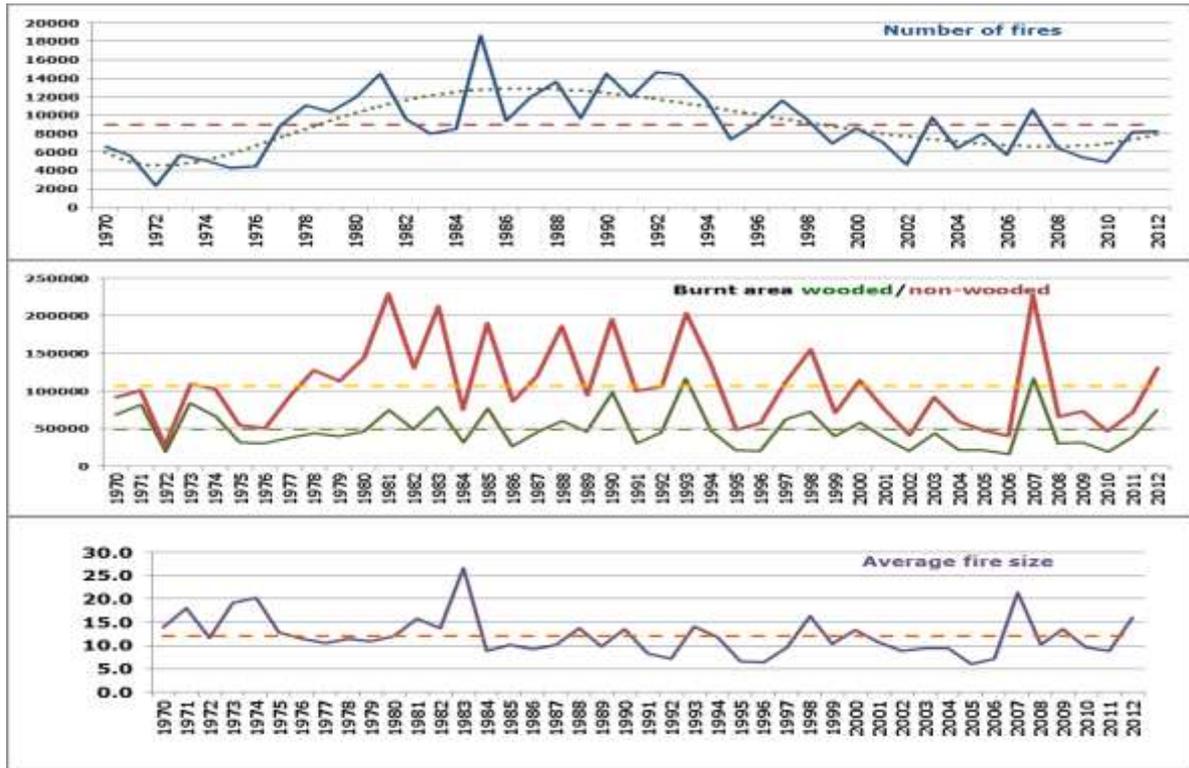


Figure 17. Historic progression of fires in Italy 1970-2012

Investigation activities

The Italian Forest Corps, in fighting against 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 the regions with special statute and the autonomous provinces.

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

Actions against forest fire offences made by the territorial Italian Forest Corps in 2012, made it possible to report 594 people to the Judicial Authority, of which 543 were for negligent fires and 51 for arson. Of these, 15 people were arrested, pursuant to custodial measures for arson, while 579 were released on caution.

In total, over the period 2000-2012, over 5 000 people have been reported to the Judicial Authority for forest fire offences, of which 164 were arrested in the act or were subjected to pre-fire detention orders.

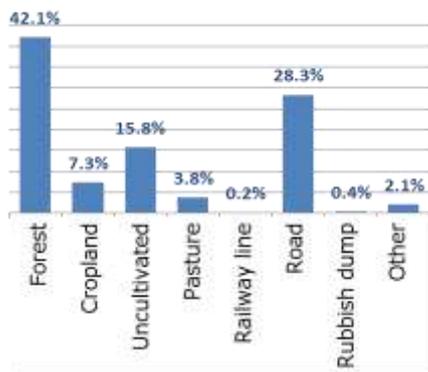


Figure 18. Location of fire start

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

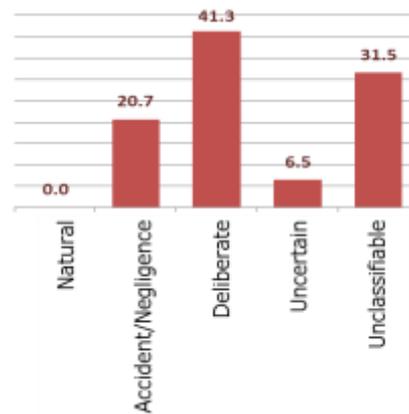
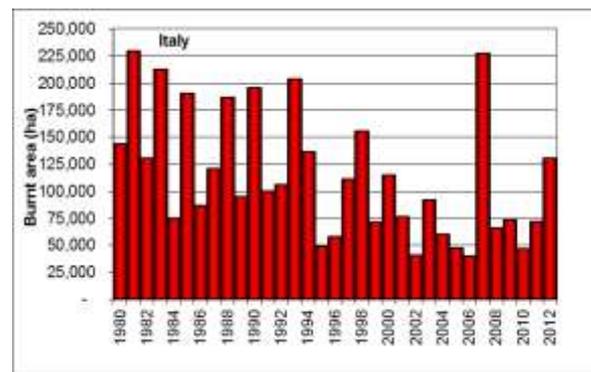
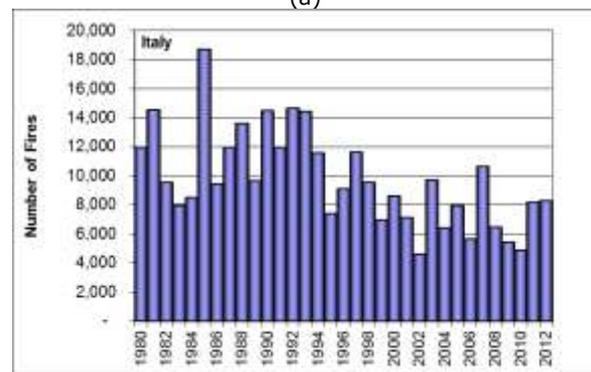


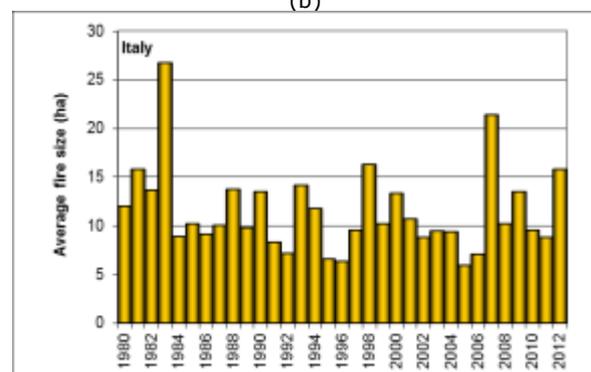
Figure 19. Fire causes in 2012



(a)



(b)



(c)

Figure 20. Burnt areas (a), number of fires (b) and average fire size (c) in Italy from 1980 to 2012

2.1.4 Greece

Fire danger in the 2012 fire season

Fire danger during the 2012 fire season did not show specific peaks, although the season was recorded as among historical hottest in many regions in Greece, as temperature was higher than 40°C during two short periods.

During the first heat wave, which affected mainly the eastern part of the Mainland, on 15-16 July there were no fire incidents worth mentioning.

During the second heat wave, which affected the entire Country, and mostly the Mainland and the Ionian Islands, on 7-8 August, one of the most important annual fire incidents took place on Mount Athos. A fire lasting 27 days burned 4 683.7 ha of wooded land triggered the activation of the international Civil Protection mechanism.

On August 18th, the largest fire of the year occurred in Chios Island, lasting for 12 days, and burning 11 005.0 ha of wooded land.

Fire occurrence and affected surfaces

The number of forest fires and burnt area in Greece during 2012 are indicated in Table 9. The reported statistics for 2012 are provisional and derive from combined sources: ground data collected by local units of the Forest Service and Landsat TM satellite images with spatial resolution of 30m to map burnt areas. Although the information currently available on the number of forest fires is not complete, the information on burnt areas complemented with the additional remote sensing source is considered to be reliable enough.

During 2012, about 1559 forest fires were recorded. As mentioned, this number is still provisional and it is likely to rise when the compilation of fire data will be completed. However no large deviation from this figure is expected.

From the current provisional results, the number of fires is around the average of last years while the burnt area is considerably higher.

Table 9. Number of fires and burned area in 2012 by regional forest administration

<i>FOREST ADMINISTRATION AUTHORITIES</i>	<i>Total number of fires</i>	<i>fires <1 ha</i>	<i>fires 1-5 ha</i>	<i>Fires 5-100 ha</i>	<i>Fires 100-500 ha</i>	<i>fires >500 ha</i>	<i>Total Burned area (ha)</i>	<i>Wooded Burned area (ha)</i>	<i>Non wooded Burned area (ha)</i>
REG. EAST MAC. THR.	93	50	26	17	0	0	354.4	281.3	73.1
REG. W. MACEDONIA & REG. CENT. MACEDONIA	259	138	68	43	7	3	7 905.6	7 368.7	536.9
REG. IPEIROU	136	83	39	13	1	0	1 589.8	337.8	1 252.0
REG. THESSALIAS & REG. ST. GREECE	137	78	27	29	3	0	1 616.4	1 510.7	105.6
REG. ATTIKIS, REG. N. AIGAIU & REG. S. AIGAIU	301	174	53	47	19	8	31 780.4	30 434.1	1 346.3
REG. PELOPONISOU & REG. W. GREECE & REG. IONIAN ISLANDS	434	281	89	53	8	3	10 742.1	9 838.5	903.6
REG. KRITIS	199	118	56	21	3	1	5 935.7	2 656.9	3 278.8
TOTAL	1 559*	922	358	223	41	15	59 924.3	52 428.1	7 496.2

* Provisional

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

Fire fighting means and information campaigns

The personnel involved in fire suppression during 2012 was in total of 15 777 persons, of which 8 587 permanent personnel of the Fire Brigade (which deals also with the

structural fires), 4 000 temporary personnel employed with five years contracts, 1 740 personnel hired seasonally to support forest fire suppression and 1 450 volunteers fire fighters.

The Fire Brigade of Greece owns about 1 686 engines which are used in both structural fire and forest fire suppression. Few additional 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 2012 campaign are indicated in Table 10.

Table 10. Aerial means participating in the 2012 campaign

STATE OWNED MEANS			
AIRCRAFT	LARGE	CL-215	11
		CL-415	7
	SMALL	PEZETEL	18
HELICOPTERS		HP CHINOOK	3
TOTAL			39
HIRED MEANS			
HELICOPTERS	H/P SIKORSKY 64		3
	H/P KA-32		7
TOTAL			10

Operations of mutual assistance

During the fire campaign, the European Civil Protection Mechanism was activated 4 times for forest fires in Greece as indicated in Table 11.

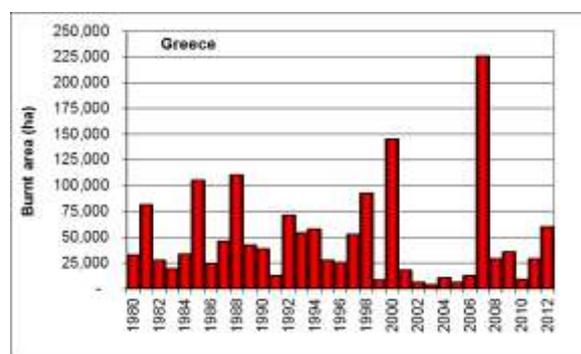
Table 11. Activations of the European Civil Protection Mechanism and related aerial & terrestrial means.

Date of fire:	8/8/2012
Location of fire:	Mount Athos-Chalkidiki
Country	Serbia
<i>Serbia supported Greece with 57 Fire Fighters and 12 Vehicles (only the 11 were used eventually). They arrived on 10-08-2012 and left on 14-08-2012</i>	
Date of fire:	17/6/2012
Location of fire:	Stefani-Korinthias
Country	Italy
<i>Italy supported Greece with 2 CL-415. Total flight work: 5h:58min (2h:59min each)</i>	
Date of fire:	18/6/2012
Location of fire:	Rito Korinthias-Megara
Country	Croatia
<i>Croatia supported Greece with 1 CL-415. Total flight work: 3h:11 min*</i>	
Date of fire:	19/6/2012
Location of fire:	Orxomenos
Country	Croatia
<i>Croatia supported Greece with 1 CL-415. Total flight work: 1h:28 min*</i>	

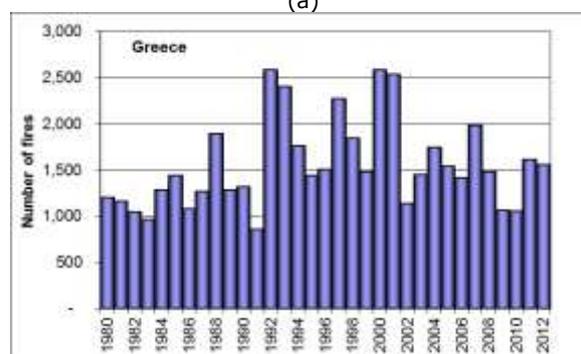
*The same CL-415/total flight work concerning both fires sum up to: 4h:39min

Injuries and loss of human lives

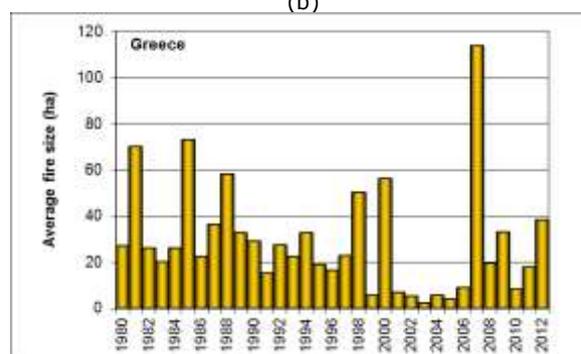
During the fire campaign four persons died. One of them was a fire fighter from the permanent personnel of the Fire Brigade and three of them were citizens. Five citizens suffered from burns and eight citizens were injured.



(a)



(b)



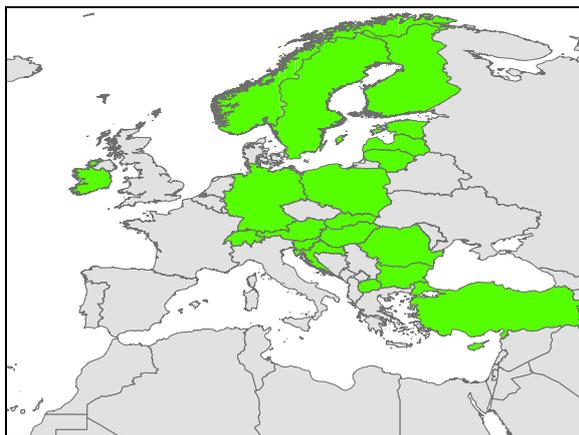
(c)

Figure 21. Burnt areas (a), number of fires (b) and average fire size (c) in Greece from 1980 to 2012

(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 OTHER EUROPEAN COUNTRIES

This section presents data from the other countries (excluding the 5 Southern States as presented in the previous chapter).



2.2.1 Austria

In Austria there were several days with a high level of forest fire danger in 2012, but the period was only one or two weeks.

Fire occurrence and affected surfaces

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

Table 12 shows the number of fires and burnt area in Austria in 2012, calculated by the Austrian federal fire brigade association based on the reports of the different fire brigades. Nine of the fires burned more than 5 ha.

Table 12. Number of fires and burned area in Austria in 2012

<i>Fire type</i>	<i>No. of Fires</i>	<i>Burned area(ha)</i>
<i>Wildland fires</i>	698	29
<i>Forest fires</i>	312	69
<i>Total</i>	1010	98

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. In 2012 there were no special information campaigns for forest fire danger.

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 communities write more **regulations** on forest fire danger.
- 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 is planning an **EU module** for forest fire fighting with helicopter support. We have special equipment for forest fires in the mountains.

Injuries and loss of human lives

In 2012 there were no deaths (either fire fighters or civilians) during forest fires.

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

2.2.2 Bulgaria

In the year 2012 there were once again two clearly delineated peaks for the number of forest fires, typical for our country. The first peak was in March, but the second starts in July and finished in October. During the year forest fires again tested all the institutions involved in the preservation of our green heritage. In July, August and September we had many difficult fires, starting with the fire in a nature reserve in Vitosha mountain - "Bistrishko Branishte". This fire was followed by a number of large fires in the districts Haskovo, Nessebar, Sredets, Elhovo, Pazardzhik, Nevestino, Eleshnitsa, Vidin, Mesdra and many others. With the decisive participation of employees from the forest and fire services the situation was taken under control, without leading to crisis situations like those of 2000 and 2007.

On the basis of the statistics of the Executive Forest Agency for forest fires in the country in 2012 we note an increase in their number, compared with the previous years 2009, 2010 and 2011. During the year, 876 forest fires were registered, which affected 12 729.8 ha of forests. The biggest fire affected 1 604.4 ha. The average size of forest fire in the country for 2012 is 14.5 ha. Compared to the average for the period 2001-2012 (burnt area 9541 ha and average number of fires 560), 2012 has close to average or slightly above average statistical indicators for forest fires in the country. The trends regarding the number of fires and burnt area are presented in Table 13 and Figure 22.

Most of the burned areas are state owned - 60%; 17% are municipal property, 21% are privately owned and about 2% belongs to the church and to other legal entities.

The main causes for the forest fires during 2012 are as follows:

- Carelessness – 596 in number
- Arson - 73 in number
- Natural - 42 in number
- Unknown - 165 in number

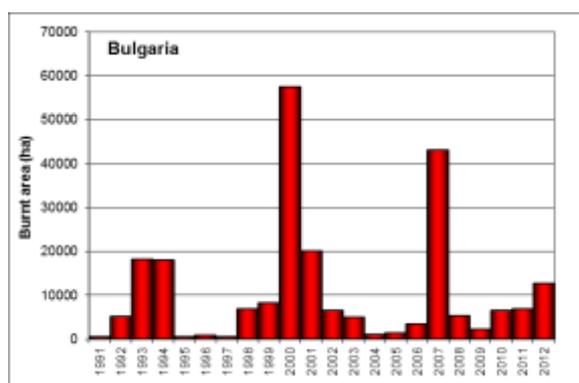
The direct losses by forest fires in 2012 are estimated to be 1 200 000 Euro, although the average damage for the last 12 years is 3 000 000 Euro.

Almost all the activities for forest fire prevention, monitoring, forecasting, suppression, etc. are financed by the state and municipality budget.

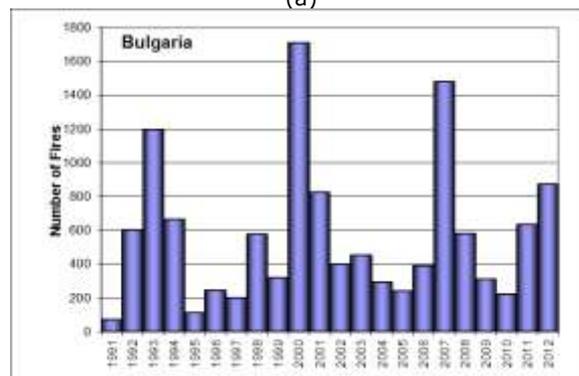
During 2012 there were no reported losses of human lives by forest fires.

Table 13. Forest fire statistics for Bulgaria for the period 2000-2010

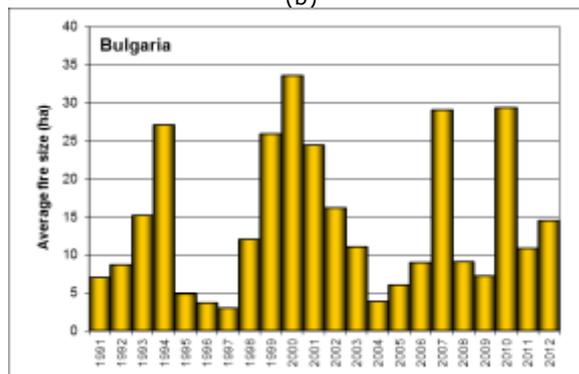
Year	Burnt area (ha)		Fire causes (number)			Total number of fires
	Total	Forest lands	Human activities	Natural	Unknown	
2001	20152	18463	187	19	619	825
2002	6513	5910	150	7	245	402
2003	5000	4284	281	9	162	452
2004	1139	1139	116	2	173	291
2005	1446	1446	114	7	130	251
2006	3537	3537	191	9	192	392
2007	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
Mean	9541	9290	350	11	199	560



(a)



(b)



(c)

Figure 22. 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

Review of the 2012 fire season

Fire prevention measures and firefighting operations are governed by the Fire Protection Act, Firefighting Act and subordinate legislation. Every year the Government of the Republic of Croatia brings forth an additional Fire Protection Program which is implemented by state authorities, public institutions and firefighting organizations. Also, additional financial means are approved through this Program for firefighting operations. The National Protection and Rescue Directorate is tasked with coordination and supervision of the fire protection implementation. The year 2012 was specific in many ways: significant hectares of burned vegetation in the coastal (Mediterranean) and continental parts of the country, an extremely hot and dry summer and increased frequencies of sun and wind radiation regimes.

Tasks accomplished before the fire season

The National Protection and Rescue Directorate has made a National Plan for Engagement of Firefighting Forces. The Plan establishes firefighting commands and standard operating procedures used in firefighting. Standard operating procedures also govern the engagement of aircraft in fighting forest fires.

Estimates and Fire Protection Plans were made before the beginning of the fire season for especially endangered areas: the islands of Korčula, Lastovo, Mljet, Brač, Hvar, Vis, Šolta and Dugi otok, and the Pelješac peninsula. This is where firefighters and firefighting equipment were relocated from the continental part of the country during the summer. The coastal area saw 43 firefighting vehicles deployed with a total of 681 firefighters. In addition to local firefighting forces, an additional 1 054 seasonal firefighters were engaged and deployed in both professional and voluntary firefighting units. During major firefighting emergencies a further 405 firefighters were engaged from neighbouring counties and the continental part of the Republic of Croatia.

During the fire season, the Firefighting Operational Centre performed the coordination of land and aerial firefighting forces along the coast, as well as the communication with the Air Forces Aerial Firefighting Command operating within the Ministry of Defence. The Firefighting Operational Centre reported on fire events to

the centre in Brussels (Monitoring Information Centre – MIC) once a week with an overview of the week's events in the Republic of Croatia through video conferences. The Meteorological and Hydrological Service calculated the Fire Weather Index on a daily basis. Prior to the fire season additional training for forest fire fighters was carried out, including rope descending from helicopters and joint operations with aircraft.

The Aerial Firefighting Forces consist of six CL-415 Canadair airplanes, five AirTractors AT-802 A/F and two Mi-8 MTV1 helicopters. The airplanes had 2 435 flight hours in fire response operations.

The Ministry of the Interior performed additional supervision of fire threatened areas, forests, tourist resorts, hotels, camps and national parks. In addition, promotional activities were carried out to familiarize the population and tourists of the fire hazard.

Climate conditions

Climate analysis made by the Meteorological and Hydrological Service showed that temperatures in the summer of 2012 (June, July, August) on the coast and in the Adriatic were extremely hot in comparison with recent years. Precipitations in the summer were mainly in categories of very dry and extremely dry. Compared with the ten-year mean weather regime frequency, the 2012 summer reveals a significant increase in radiation regime frequency in the Northern and Middle Adriatic. Wind regime frequency was also increased.

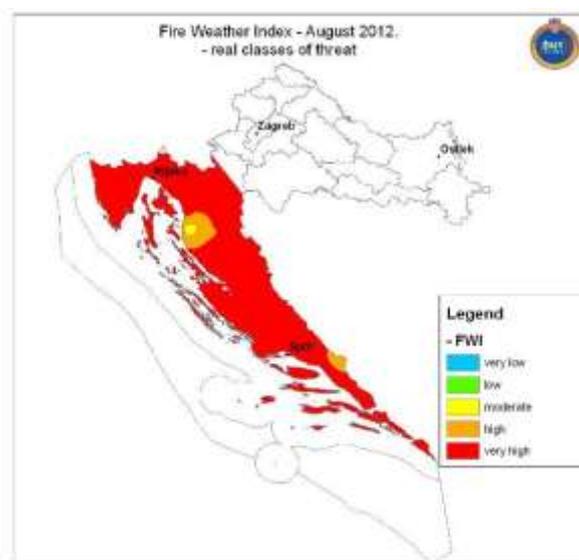


Figure 23. Mean monthly Fire Weather Index in August 2012

Figure 23 shows the mean monthly Fire Weather Index for August 2012. The mean monthly Fire Weather Index was very high along the Adriatic coast, on the islands and 65 km inland. Most of the days in August showed a very high Fire Weather Index. Even the situation in August 2003 was not as dramatic, so that we may say that August 2012 was the most extreme month ever recorded.

Fire Data Overview

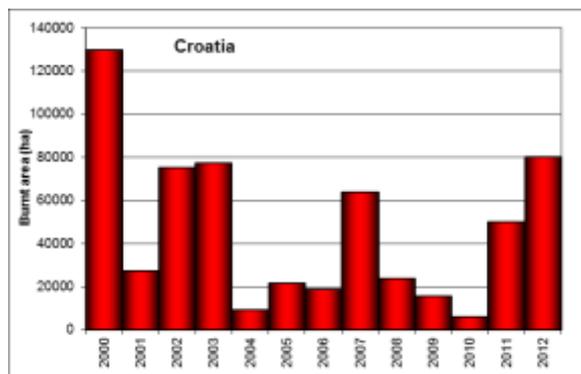
According to data kept by the National Protection and Rescue Directorate, 2012 saw 7 870 vegetation fires burning an area of 80 252 ha in the Republic of Croatia, 51 815.53 ha of which were forests (making up 26.1% of the total burnt area) while the remaining 59 283 ha (73.9%) was lower forms of vegetation including macchia, grass and shrubs. Burned Area Index (average burned area per fire) was 10.2 ha per fire. Figure 27 shows burned area, number of fires and average fire size for the period from 2000 to 2012 in Croatia. The figures clearly show an increase in the number of fires, burned area and burned area index in the last three years.

Distribution of fires by the size of burned area

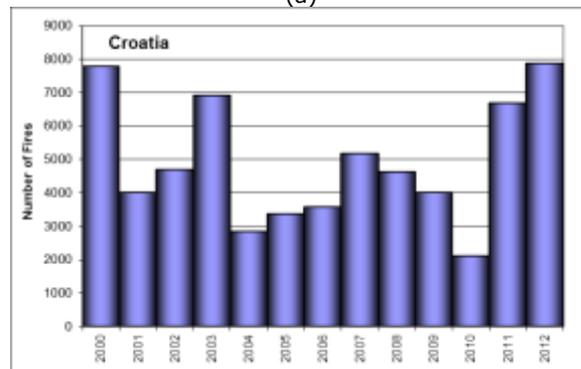
Table 14 and Figure 2 show that 83.39% of vegetation fires in 2012 burned an area less than 5 ha. In the period when most of the fires were recorded (March and August) there were also more fires burning areas exceeding 5, 10, even 100 ha. In the period of the most frequent fires, land and aerial firefighting forces were deployed in a number of fire locations. Thus it is easy to comprehend why a certain number of fires burned areas larger than 10 or 100 hectares.

Table 14. Distribution of vegetation fires in relation to the size of burned area in 2012

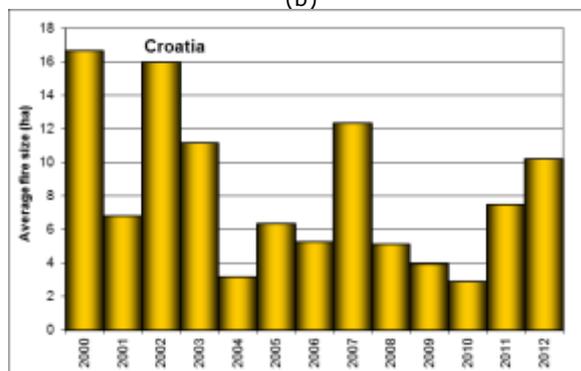
<=5 ha		>5 <=10 ha		>10 <=100 ha		> 100 ha		Total
No.	%	No.	%	No.	%	No.	%	
6563	83.39	505	6.42	680	8.64	122	1.55	7870



(a)



(b)



(c)

Figure 24. Burnt areas (a), number of fires (b) and average fire size (c) in Croatia from 1992 to 2012.

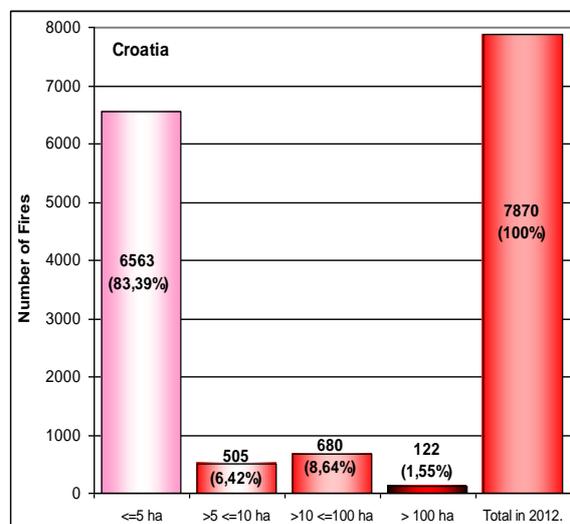


Figure 25. A total number of vegetation fires compared with the number of fires and the size of burned area.

Distribution of fires by time spent in active fire suppression activities

On average, 77.19% fires were extinguished within the first four hours from the moment of receiving the first notification (Table 2). Only in 8.94% of fires did the suppression last for more than 12 hours.

Table 15. Distribution of vegetation fires by time spent in active fire suppression activities

<=4 hrs		>4 <=12 hrs		>12 hrs		Total
No.	%	No.	%	No.	%	
6944	77.19	673	13.87	253	8.94	1745

Indicators in Table 1 and Table 2 show the following:

- relatively quick fire detection and notification of firefighting units;
- speed of fire response;
- good selection of appropriate fire response forces;
- good operational tactics at the fire location;
- well-functioning firefighting system significantly reduces forest fire damage.

Vegetation fires in mined or suspected mined areas

The suspected mined area in the Republic of Croatia comprises 695 square kilometers while 12 counties and 96 cities and municipalities are polluted by mines and unexploded ordnance. 90 000 mines are estimated to pollute the area. A look at Table 3 with fire incidents in mined and suspected mined areas reveals that a relatively small number of fires (71) burned a large area of 8 280 ha. The share of such fires in the total burned area in 2012 was 10.3%. Burned areas in mined areas are large due to reduced access and safety in suppressing these fires.

Table 16. Fires vegetation on mined or suspected mined areas in 2012

Number of fires	Burnt area (ha)	Average fire size (ha/fire)
71	8280	116.62

The probability of explosions and consequent casualties among firefighters make it impossible for land forces to access mined areas where aircraft have difficulties in responding to fires. In order to keep firefighters and equipment safe such fires are monitored or suppressed at a safe distance (roads, safe forest trails etc) which results in larger average burned areas (116.62) ha per fire – Figure 26.

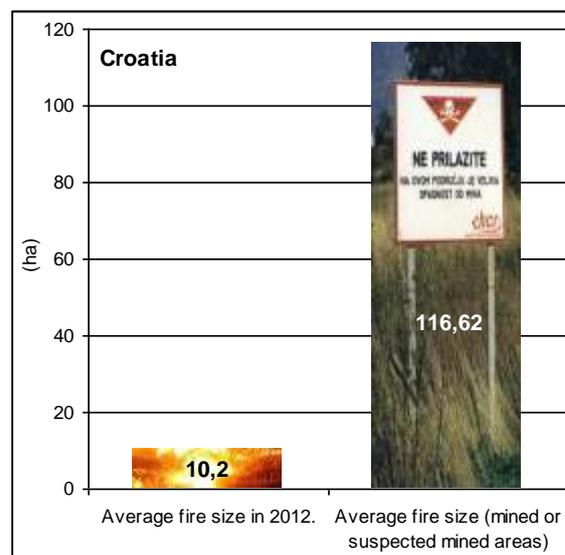


Figure 26. Comparison between average burned area in mined and suspected mined areas and average burned area in 2012

Operations of mutual assistance

Although the 2012 fire season called for maximum efforts, Croatia also assisted other countries in fighting fires. Canadair airplanes were deployed in Greece in June and three times (in July, August and September) in Bosnia and Herzegovina. Twice in July two helicopters were deployed in Montenegro to assist their firefighters.

Loss of human lives

During 2012 all fires in the Republic of Croatia (vegetation fires, structure fires, fires in means of transportation) killed 36 people, injuring an additional 126.

(Source: National Protection and Rescue Directorate, Republic of Croatia).

2.2.4 Cyprus

Fire danger in the 2012 fire season

In January and February 2012 the weather was wet with periods of unstable weather conditions giving rain, local thunderstorms, hail and snow over the mountains.

During March and April the weather was relatively dry with certain periods giving local rain and isolated thunderstorms. In May the weather was wet with periods of unstable weather conditions giving local rain and isolated thundery showers. The mean daily maximum temperature was around 28°C inland and 19°C on the mountains.

In June, the mean daily maximum temperature was 36°C inland and 26°C on the mountains. During certain periods, extremely high temperatures were recorded ranging from 2 to 9°C above normal, the highest reaching 41°C.

During July the mean daily maximum temperature was 38°C inland and 29°C on the mountains, whilst the highest maximum temperature recorded was 43.6°C. In August the weather was warm. The mean daily maximum temperature was around 38°C inland and 28°C on the mountains and the highest maximum temperature recorded was 40°C.

September was dry and warm with mean daily maximum temperature reaching 35°C inland and 25°C on the mountains and with highest maximum temperature reaching 39.6°C.

October was wet and warm, with unstable weather conditions during certain periods of the month, giving local showers and isolated thunderstorms. The mean daily maximum temperature was around 30°C for inland and 20°C on the mountains whilst the highest maximum temperature recorded was 35.2°C.

The weather during November was wet and relatively warm, with periods of unstable weather conditions giving local rain, isolated thunderstorms and hail. The mean daily maximum temperature was around 24°C for inland and 14°C on the mountains. During December 2012, periods of unstable weather conditions giving local rain, isolated thunder showers, hail and snow were recorded.

Fire occurrence and affected surfaces

During the year 2012, the number of forest fires in Cyprus was slightly decreased compared to the previous year. The total number of 78 fires that was recorded during 2012 is considered as the lowest ever recorded since the year 2000. However, regarding the total burnt area, there was a 58% increase compared to the year 2011, with a total of 2 531 ha, of which 2 330 ha was wooded land. 57% of the total number of the fires had a burnt area smaller than 1 ha. In 2012 there were 7 forest fires with a burnt area greater than 50 ha.

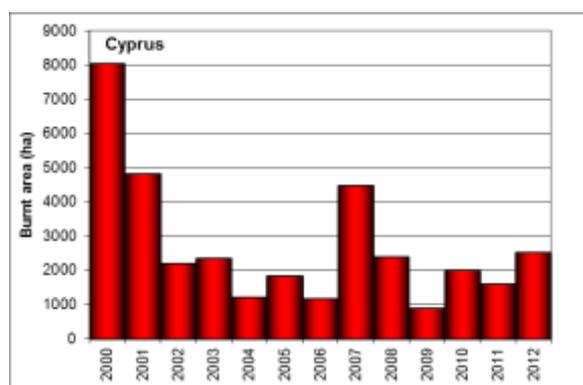
Major fires in 2012

- Kato Drys, Larnaca District. On the afternoon of August 12, a large-scale fire broke out at Kato Drys village. The blaze spread quickly because of strong winds, scorching 1 630 hectares of trees and wild brush. Residents were moved from their homes as high winds fanned the fire in many directions towards nearby communities.
- Neo Chorio, Pafos District. On the morning of July 3rd, a deliberately set fire broke out in Neo Chorio village across the Akamas peninsula, an area of great biodiversity and ecological importance. Reported at 9:10am by a forest patrol, the fire was brought under control at 15:40 and was completely extinguished at 12:00 on July 4th. The fire burnt a total area of 198 hectares, of which 181 hectares were wooded land.

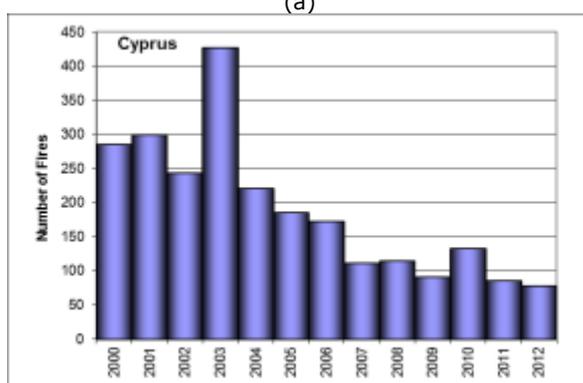
The trends regarding both the number of fires and burnt areas over the last 12 years (2000-2012) are shown in Table 17 and Figure 27.

Table 17. Number of forest fires and burnt areas in Cyprus from 2008 to 2012

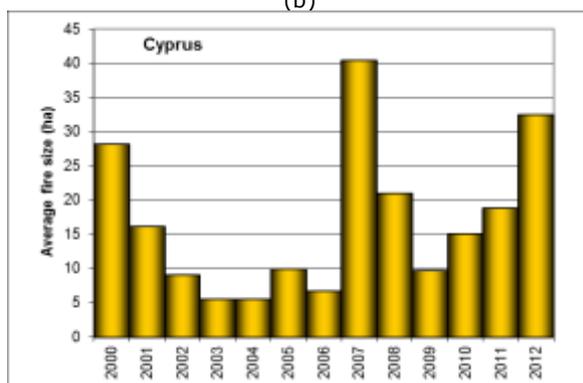
Year	Number of fires	Burned area (ha)		
		Total	Forest and other wooded land	Agriculture and other artificial land
2000	285	8 034	2 552	5 482
2001	299	4 830	778	4 052
2002	243	2 196	166	2 030
2003	427	2 349	921	1 428
2004	221	1 218	667	551
2005	185	1 838	962	876
2006	172	1 160	888	272
2007	111	4 483	3 704	779
2008	114	2 392	1 997	395
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



(a)



(b)



(c)

Figure 27. Burnt areas (a), number of fires (b) and average fire size (c) in Cyprus from 2000 to 2012.

Fire causes

Regarding the causes of forest fires, 53% were caused accidentally or by negligence. Intentional fires (arson) corresponded to 27% and natural caused to 15%. Unknown causes correspond to 5% of the total number of forest fires.

Injuries and loss of human lives

In 2012, four forest fire fighters were injured during the suppression of forest fires.

Fire fighting means and information campaigns

During the year 2012, there were hundreds of presentations at schools, aiming to raise awareness and increase environmental education and knowledge, among youngsters of different ages. Moreover, throughout the year and especially during the summer period, a campaign targeting the rural population was undertaken through the media and the press. Training programmes on fire prevention and suppression methods and techniques were organized for both professional and volunteer forest fire fighters.

For forest fire detection purposes, 27 lookout stations and an automatic detection system were used. A number of 420 forest fire fighters were recruited and deployed during 2012, to form the Forest Fire Fighting Task Force. During the 2012 fire fighting operations, two fire fighting aircrafts, a number of fire fighting helicopters, fire engines and crawler tractors, were used.

Operations of mutual assistance

There were no operations of mutual assistance during 2012.

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

2.2.5 Estonia

Fire occurrence and affected surfaces

In 2012 a total number of 777 forest fires and wildfires were recorded; 5 of these were classified as forest fires. Forest fires and wildfires destroyed 2 buildings. In 2011 there were recorded 1 396 forest fires and wildfires, 24 of these were classified as forest fires. Forest fires and wildfires destroyed 2 buildings.

Table 18. Forest fires in Estonia 2000-2012

Year	Number	Area (ha)	Average area (ha)
2000	158	683.9	4.3
2001	91	61.8	0.7
2002	356	2081.7	5.9
2003	111	206.6	1.9
2004	89	378.9	4.3
2005	65	86.5	1.3
2006	250	3095.6	12.4
2007	64	292.4	4.6
2008	71	1279.8	18.0
2009	47	59.3	1.3
2010	30	24.7	0.8
2011	24	19.3	0.6
2012	5	2.5	0.5

Forest fires in 2012 were recorded in 5 counties. The first fire in 2012 was recorded in May, the last one in June. The largest fire of 2012 occurred in June in Võru county Rõuge, burning an area of 1.0 ha.

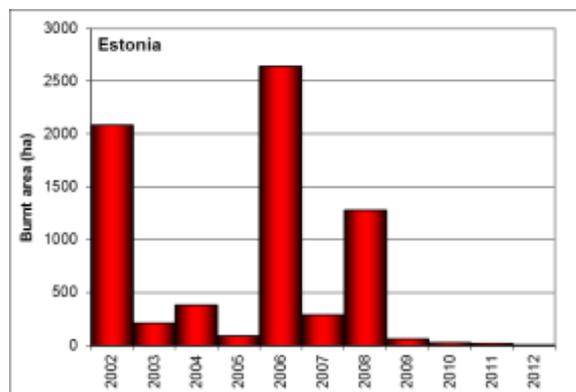
The burnt area, number of fires and average fire size for the years 2002 – 2012 are shown in Figure 28.

Fire fighting means and intervention campaigns

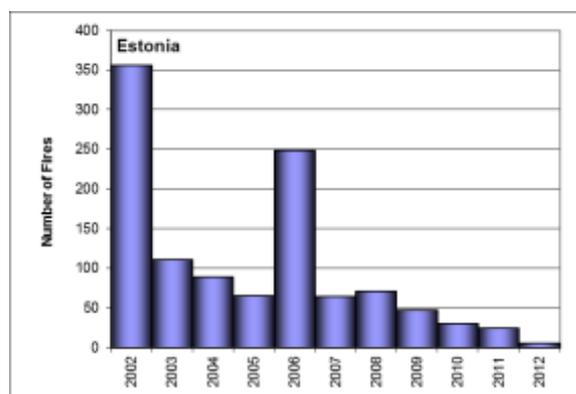
The Estonian Rescue Board is responsible for fighting forest and wildfires. The Estonian Rescue Board cooperates in its operations with the Police and Border Guard Board, Estonian Defence Forces, Environmental Board, State Forest Management Centre, Private Forest Centre, Environmental Inspectorate and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

Fire causes

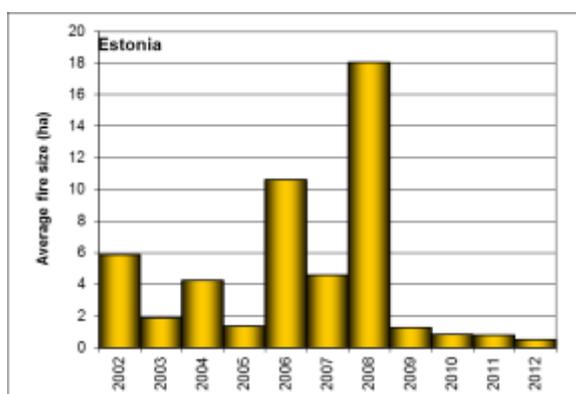
In 2012, 100% of forest fires were of human direct or indirect origin, and all of them were caused by accident/negligence.



(a)



(b)



(c)

Figure 28. Burnt areas (a), number of fires (b) and average fire size (c) in Estonia from 2002 to 2012

(Source: The Estonian Environment Agency, Estonia).

2.2.6 Finland

Fire danger in the 2012 fire season

Based on information from the Finnish meteorological institute, summer 2012 was very wet. Average fire danger days between year 1998 and 2012 is presented below.

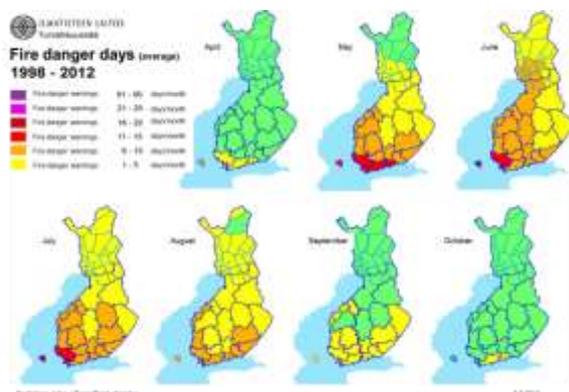


Figure 29. Average fire danger days 1998-2012

Fire occurrence and affected surfaces

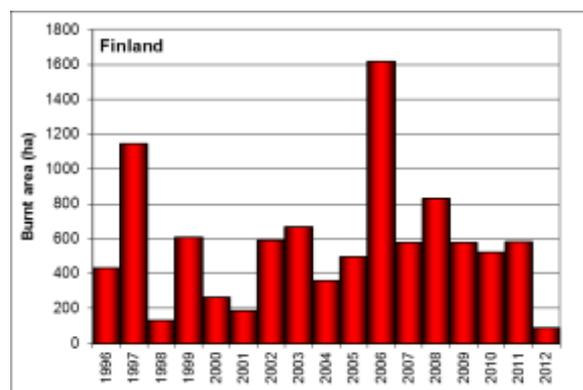
The number of forest fires in 2012 in Finland was lower than the normal average level. There were 1 011 wildfires in Finland last year and 417 of them were reported as forest fires. The total burned area was around 216 ha, of which 86 ha was forest land. The average burned forest area per fire was 0.21 ha. The yearly trends in terms of number of fires and burnt area from 1996-2012 in Finland are shown in Figure 27.

Fire prevention activities

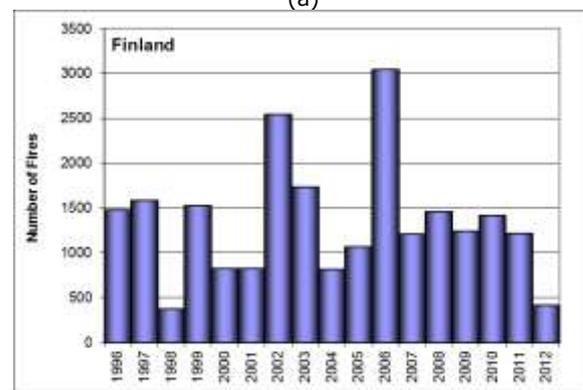
There was more cooperation with many institutes such as the Finnish meteorological institute, for example projects for improving situation awareness. There has also been more co-operation with Russia in achieving containment of forest fires since 2005.

Fire fighting means and information campaigns

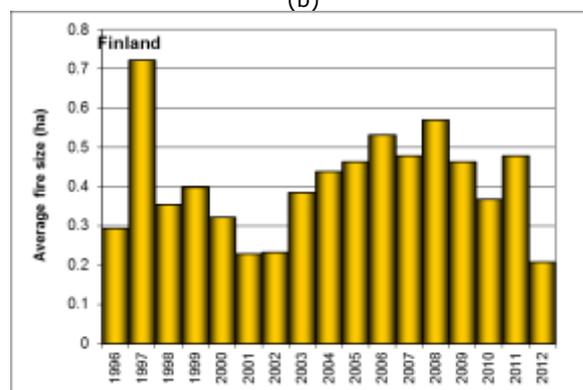
- Finnish military forces acquired some new NH 90 helicopters to extinguish forest fires.
- We initiated more co-operation between other authorities such as border guard.
- Continuation of forest fire aerial officer education for some fire officers.
- Instructions for extinguishing fires by helicopter were published.
- Development and integration between operative forest fire management system and prediction system for smoke spread.



(a)



(b)



(c)

Figure 30. Burnt areas (a), number of fires (b) and average fire size (c) in Finland from 1996 to 2012.

Loss of human lives

No one died in in forest fires in 2012. Six 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.

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 Interior, Finland)

2.2.7 FYROM

The Republic of Macedonia covers a total area of 25 713 km², 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/m² and average sunshine period of 2450 hours per year.

Fire danger in the 2012 fire season

The fire danger in the 2012 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 2012 there were 2 300 fires, of which 483 were forest fires, affecting a total area of 21 417.57 ha. The forest land affected was 10 020.97 ha and 47 % 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 2007-2012 are shown in Figure 31.

The number of fires and burnt area according to types of fires for the year 2012 are shown in Figure 32.

Fire fighting means and information campaigns

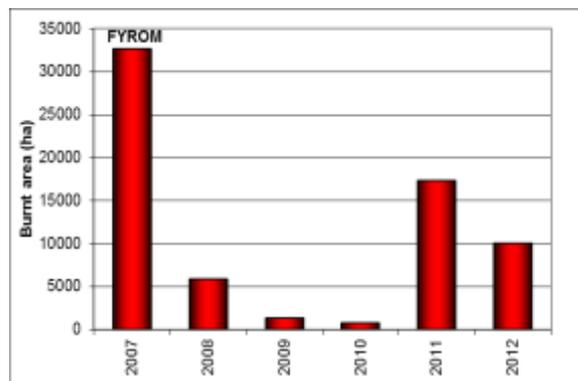
Fire prevention and fire fighting activities were undertaken along with public information campaigns. For the purpose of awareness raising, media events such as press conferences, short reports and announcements on the TV and radio were organized.

Three planes of the Protection and rescue directorate were also engaged for fire extinguishing during the 2012 forest fires.

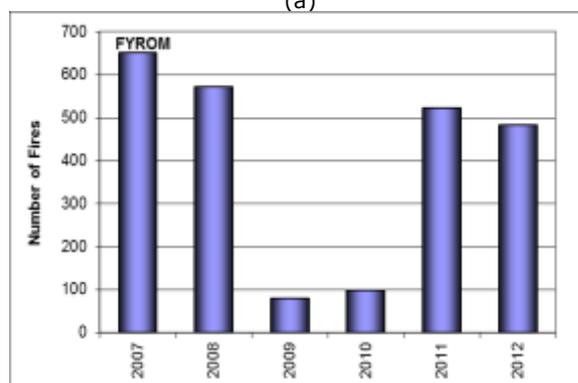
979 flights were made, lasting 337 hours and 42 minutes, during the period of time from July until September 2012.

Injuries and loss of human lives

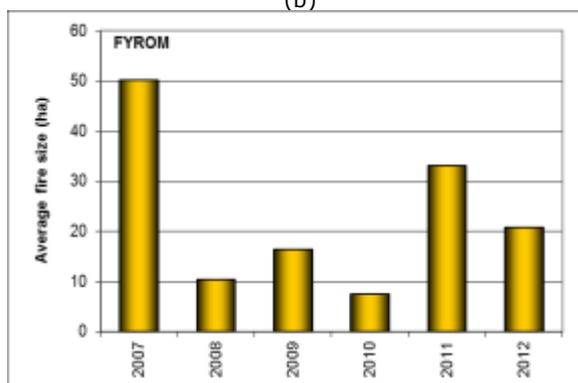
During the 2012 fire season there were 12 injured and 5 lost their lives during rescuing and protecting from fires in the region of Strumica.



(a)



(b)



(c)

Figure 31. Burnt areas (a), number of fires (b) and average fire size (c) in FYROM from 2007 to 2012

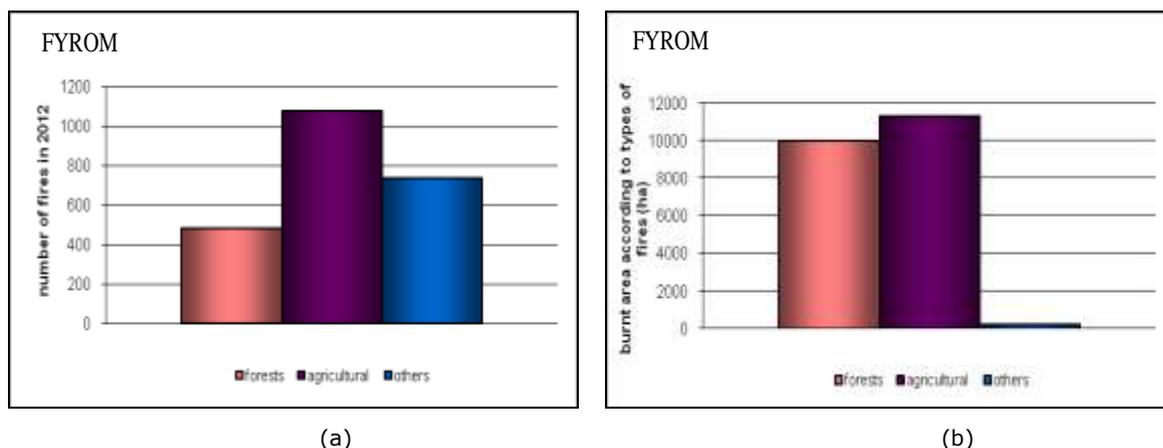


Figure 32. Number of fires (a) and burnt area (b) according to the type of fires in FYROM in 2012

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

2.2.8 Germany

Fire occurrence and affected surfaces

A total of 888 forest fires were reported in Germany in 2012, corresponding to a burnt area of 214 ha (47.6 ha in deciduous forests and 166.4 ha in coniferous forests).

As in previous years, the most affected province (Land) in terms of burnt area was Brandenburg. Almost as badly affected in terms of burnt area was Niedersachsen, although the number of fires was much lower. This reflects the figures for the whole country: in general a slightly lower number of fires led to a higher burnt area in 2012, as compared with 2011. (Table 19).

Table 19. Burnt area in total and by forest type, and total number of fires, Federal Republic of Germany, 2012

	Burnt area (ha)			Number of fires
	Coniferous forest	Broadleaves forest	Total	
Baden-Württemberg	6.6	13.3	19.9	57
Bayern	34.7	8.4	43.1	61
Berlin	1.5	0.0	1.5	2
Brandenburg	62.8	15.0	77.9	241
Bremen	0.0	0.0	0.0	0
Hamburg	0.0	0.0	0.0	0
Hessen	2.8	7.8	10.5	42
Mecklenburg-Vorpommern	3.3	0.4	3.7	20
Niedersachsen	60.3	9.3	69.6	57
Nordrhein-Westfalen	1.2	0.5	1.7	21
Rheinland-Pfalz	4.2	1.9	6.1	25
Saarland	0.0	1.0	1.0	3
Sachsen	4.1	10.1	14.2	82
Sachsen-Anhalt	9.4	3.3	12.7	67
Schleswig-Holstein	0.0	0.0	0.0	0
Thüringen	5.1	1.6	6.7	23
Germany	196.1	72.5	268.6	701

In 2012 the majority of fires occurred in May (229 ignitions, 99.4 ha burnt; Figure 33).

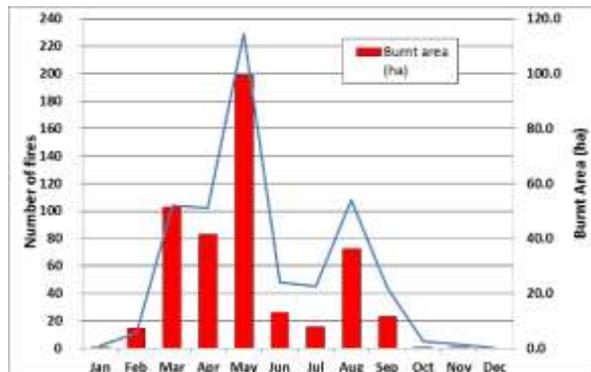


Figure 33. Number of fires and burnt area by month in Germany in 2012

The trend of the burnt areas, number of fires and average fire size in Germany for the years 1991-2012 are shown in Figure 35.

Fire causes and impacts

The main causes of forest fires during 2012 are shown in Figure 34. Within the category of negligence fires, the majority (103) were caused by the general public (campers, visitors, children etc.).

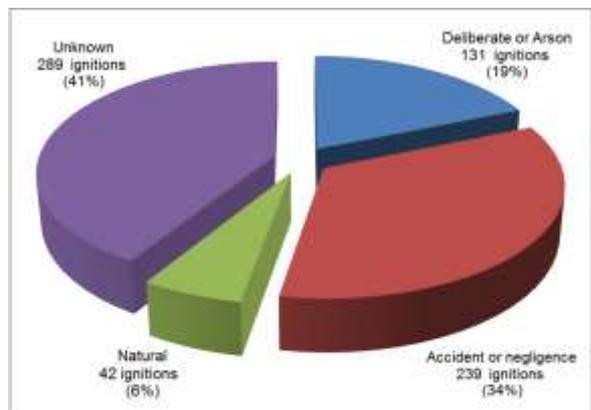
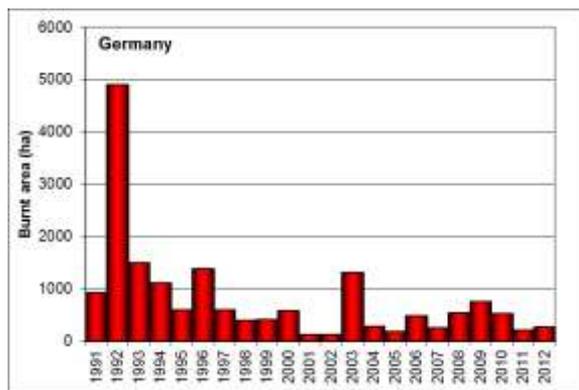
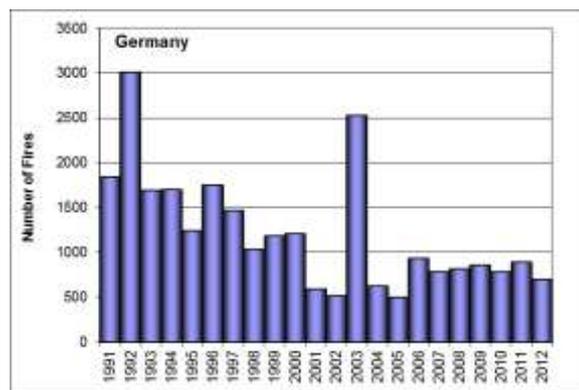


Figure 34. Causes of forest fires in 2012

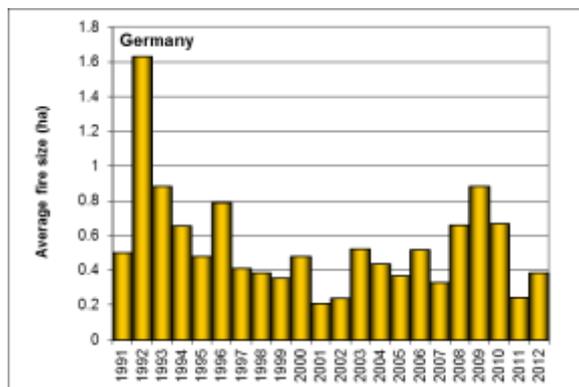
The economic damage caused by forest fires in 2012 is estimated to be 0.5 million Euro, around half the amounts reported in the last 2 years. The yearly average from 1991 to 2012 is 2.0 million Euro. In 2012, approximately 2.4 million Euro were spent on prevention measures and surveillance activities.



(a)



(b)



(c)

Figure 35. Burnt areas (a), number of fires (b) and average fire size (c) in Germany from 1991 to 2012.

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

2.2.9 Hungary

Fire danger in the 2012 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. 2012 was the year of the highest extreme weather situations in the past 100 years. We may characterize the first nine months of 2012 with serious drought. The drought period lasted throughout the summer and influenced the whole fire season.

Fire danger started to rise in April and it reached the "very high" level more times during the year. There were some short periods (days) when the FWI values reached the "extreme" level in summer. So a total fire ban was ordered twice and local or regional fire bans were ordered more than thirty times by the Forestry Directorates.

Although the fire dangerous periods were forecast from April, there were lots of wildfires in the vulnerable parts of Hungary from the beginning of March. The 2012 fire season lasted until the autumn (mid-October).

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.

Forest fires have multiplied in the last few decades in Hungary. The reasons can be found in climate extremes, less precipitation, the increase of mean annual temperature and a series of winters without snowfall. Due to the warming, the dangerous period of wildfires has extended, which may be an issue in the increase of such fires, especially if the socio-economic circumstances remain the same. (Data from 2007 are shown in Table 20).

Table 20. Number of fires and burnt areas

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

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

95% of forest fires are surface fires, as shown in Table 21. Surface fires, when surface litter and other dead vegetal parts and smaller shrubs burn, have been common in Hungarian forests. They can develop throughout the fire season. Canopy fires mostly develop in coniferous forests, mainly in the Great Hungarian Plain during summer. Ground fire is not significant in Hungary, though – due to partial, relatively thick peat – it is not unknown either

Table 21. Fires in Hungary 2012 by fire type

Type of forest fire	Number of fires	Total burnt area (ha)
Ground fires	19	267
Surface fires	2621	12401
Crown fires	17	1309
Total	2657	13977

The number of forest fires has significantly increased in recent years. They spread to almost 50 hectares from time to time again. The average proportion of fires smaller than 1 ha is almost 50%. The most problematic and the most prevalent type is the so called "average size" forest fire (between 1 ha and 10 ha), which adds up to the other 40% of the total number of fires. The average total burnt area was 5.3 hectares in 2012, which is significantly higher than in previous years. In 2012 there were 49 fires events when more than 50 hectares were burnt. In most cases about 30% of the total burnt area is forest.

Small fires under 1 hectare extent give 62 % of the total of forest fires. This fact well depicts that the capacity of fire fighters and disaster prevention services are overloaded by spot fires. Small fires are usually low intensity surface fires where dry grass and small twigs are burning. There are forest fires beyond 100 hectares rarely in Hungary, in which mainly conifers, native poplars and locusts are burnt.

In 2012 there were 27 fire events 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 27 below.

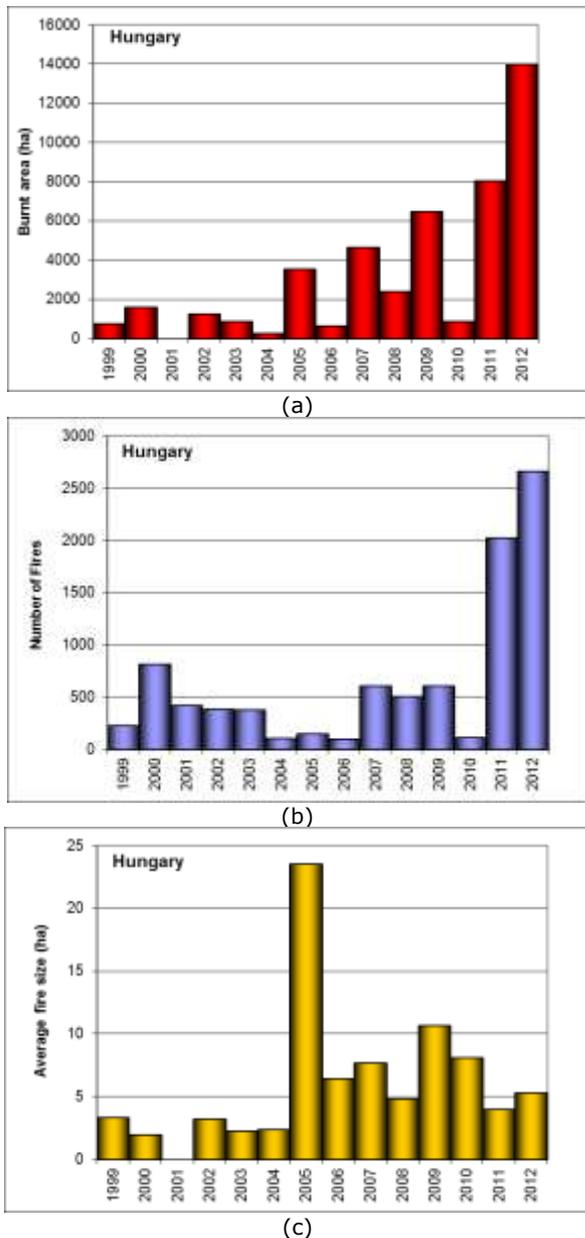


Figure 36. Burnt areas (a), number of fires (b) and average fire size (c) in Lithuania from 1992 to 2012.

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 Causes

Due to climate and vegetation circumstances, naturally induced forests fires are of no account (about 1%) in Hungary. 99% of forest fires are human induced (negligence or arson). Most fires are induced by (adult or infant) negligence 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. Most of the total burnt area was due to incorrectly extinguished fires.

There are a lot of fires with unknown causes. The cause of the fire is not verifiable directly in many cases. If the circumstances of the forest fires are undetermined, the cause is registered as "unknown".

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

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

Spring vegetation fires usually burn with low or medium intensity in broadleaf forests, juvenile growth, shrubs and grasslands. The fire totally or partially consumes forests and causes serious harm. 40-45 % of spring fires burn in the northern areas (Borsod-Abaúj-Zemplén County, Heves County, Nógrád County) which indicates these areas as high danger zones for forest fires. In these areas not only traditional grassland management methods, but other social-economic factors add to the forest fire danger.

Figure 37 represents the tendency experienced in recent years that there are two periods of high danger for forest fires during the year.

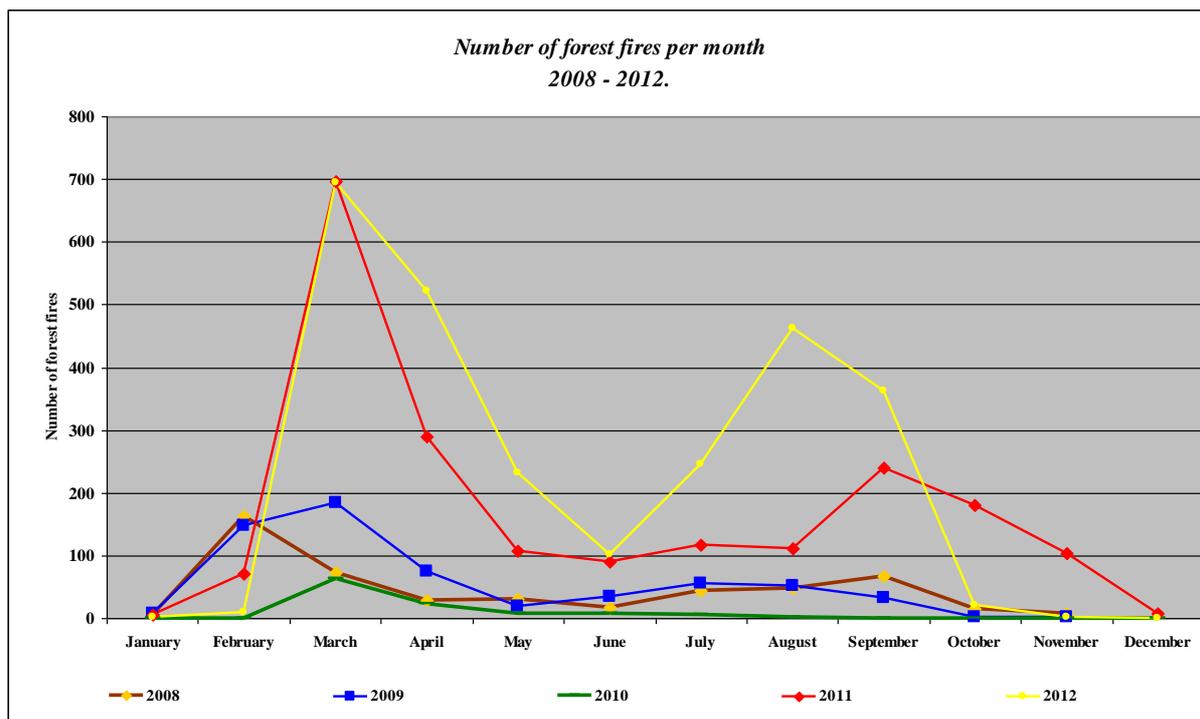


Figure 37. Fire frequency per month in 2008-2012

Forest litter, needles, dead twigs and branches get totally dry in arid summer periods without rainfall (June-August) and start easily burning as a consequence of negligently lighted fires. Coniferous forests are highly vulnerable, as a small litter layer fire can even result in canopy fire in this period.

Unlike spring fires, summer fires usually burn in the Great Hungarian Plain. Almost every year these fires burn in the poor sites of Bács-Kiskun county and Csongrád county. Usually they do not have as dramatic effects as in May 2012 when 1 000 hectares burnt near Bugac village.

Studying the statistics we can see that a total of more than 4 366 hectares of forest were burned or affected by fire during 2012. In addition, more than 6 778 hectares of grass vegetation and more than 2 800 hectares of bush vegetation were destroyed in forest fires (Table 22).

Table 22. Fires by forest type

Forest type	Total burnt area (ha)
Forested land	4366
Other wooded land	2833
Other land	6778
Total	13977

Fire prevention activities and fire information campaigns

There is a cooperation agreement between the Fire Service and forest authority. In 2012 the National Fire Prevention Committee was established by the government where representatives of forest authority also became members. It is required for the committee to monitor recent fire prevention activities and fire awareness raising campaign materials.

In 2011, special types of forest fire hazard maps were developed for fire fighters by FD. The maps can be printed and stored in their IT system. In order to improve the map system, a Web Map Service (WMS) developed by forest authority based on the special forest maps, was launched in 2012. The WMS contains some special types of forest thematic layers. The Fire Service has been using them in their GIS system.

Fire prevention and fire fighting activities were presented very well by spokesmen and members of the National Fire Prevention Committee in the media in the frame of awareness-raising campaigns in the last fire season. Media events such as press conferences, short reports and announcements in newspapers and on the radio and TV were organised accordingly. Supplying data from the fire database to forest owners, managers and media is a daily task.

Use of data derived from FWI developed by JRC was integrated in the fire ban system in 2012. Its values were taken into consideration and they were analysed throughout the whole fire season supported by the JRC.

A number of expert presentations and demonstrations about forest fire prevention and suppression were organised by FD for fire fighters. The webpage of Forestry Directorate is continuously updated with fire prevention information.

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

A study was ordered by the Forest Authority about causes of forest fires in North Hungary. It was prepared by University of Miskolc Institute of Sociology. Negligent or intended fires in spring mainly occur in Borsod-Abaúj-Zemplén county and Heves

county. Sociological research demonstrates that people living there can be reached through social workers, regarding the special socio-economic conditions in the area. Researchers are open to personal consultation and they can reach the most disadvantaged people to prepare a report about their customs and practices of using fire and to survey their knowledge about forest fires. The results of the study will be built in the fire prevention actions from 2013.

With the help of a new module, some statistical analyses can be made in the Forest Fire Information System of forest authority. Gathered fire data are processed and evaluated by size, date, cause, duration of fires, and they are compared with traditions in forest management processes and behaviour of visitors and hikers in the forest land area.

Figure 38 shows places of forest fires in Hungary in different seasons of the year.

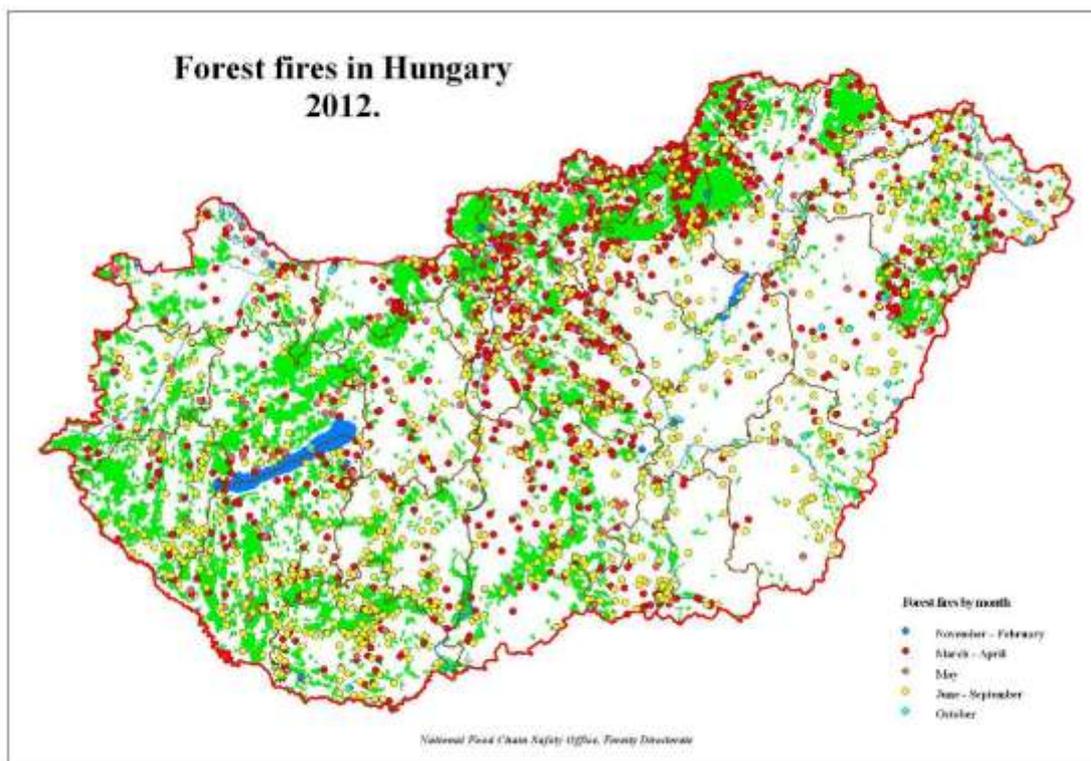


Figure 38. Locations of forest fires in Hungary during 2012

Operations of mutual assistance and loss of human lives

There were no casualties among fire fighters or civilian people during fire fighting in 2012. Fire service equipment was not heavily damaged. No death or personal injury

occurred during fire fighting in 2012. Neither Fire Service nor Forest Authority served mutual assistance last year.

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

2.2.10 Ireland

Introduction

2012 Fire season in Ireland (February-June) was characterised by generally poor weather conditions, which kept fire activity and fire related forest losses at a very low level, relative to losses in previous years.

Weather patterns during 2012

Ireland's fire season occurs much earlier than in Southern European conditions. Most fire incidence occurs between March and June, corresponding with suitable weather and vegetation conditions, and traditional agricultural burning practice in upland areas.

Despite higher than average annual rainfall levels during 2012 generally, spring rainfall patterns were actually significantly lower than would normally be expected for the time of year. A minor heat wave was experienced during the last week of March where temperatures reached up to 25 degrees in some key fire-prone western regions, creating ideal conditions for fire spread. However, fire incidence during this key period was still far lower than expected, given the prevailing conditions. This low level is thought to be partially in response to fire prevention/awareness raising measures implemented by DAFM and other partner agencies prior to and during this period.

Summer rainfall levels (May-August) were some of the highest on records since records began, and summer 2012 was characterised by very low average seasonal temperatures (<14 degrees Centigrade), and high rainfall levels, in some areas up to 200% of average seasonal levels. As a consequence, fire incidence after April was sparse with low rates of spread where fires did occur.

Fire incidence levels

Statistics are not currently available in relation to total fire incidence during 2012; however anecdotal evidence suggests that total incidence levels may have been as low as 30% of normal expected activity, predominantly as a result of prolonged wet weather conditions and reduced levels of agricultural burning activity. Overall incident levels are estimated at approx 1200 individual incidents nationally, including urban based outdoor/land fires.

2012 Forest Losses attributable to fire

Just 75 hectares of forest are thought to have been destroyed in Ireland during 2012, including 25 ha of state owned forest. This low level of loss is in sharp contrast with other years, and may reflect both prevailing weather conditions and improved fire prevention and response measures developed by the forestry sector following the catastrophic fire events during 2011. Data regarding individual incidents etc. is not currently available from Fire Service Authorities.

The total area of non-forest land burned over has not been fully established, but is estimated at between 5 000 to 7 000 ha nationally, based on anecdotal reports from local forestry and fire service staff.

EFFIS derived datasets and imagery were again used to attempt to estimate burned areas, and forest losses within this area. In contrast with Southern European fires most Irish fires are too small, or most likely too short in duration for MODIS detection, and are not detected. However, a small number of hotspots are detected annually and this permits historic EFFIS data to be used to determine spatial and temporal patterns of fire activity, in order to focus fire prevention measures into critical high risk areas for the remainder of the fire season. These techniques were applied directly to good effect in South Western Ireland during spring 2012.

Injuries and loss of human lives

No direct casualties arising from wildfire occurred during 2012.

Other developments during 2012

- A greatly enhanced and coordinated public awareness campaign was implemented in 2012, and this campaign was focussed at local level using EFFIS derived spatial data along with local knowledge from Fire Services and forestry operators.
- A conference event in Dublin in early February 2012 highlighted the risks of fire to the private forestry sector, and highlighted measures that can be taken to reduce risks to forest holdings. This event was launched by the late Shane McEntee TD, the then Minister of State with responsibility for forestry. The event was also attended by personnel from land management, recreational, farming and

conservation organisations. Wildfire management experts from the UK attended and highlighted UK measures in relation to wildfire mitigation in SE England prior to the 2012 Olympic games.

- Intensive meetings took place between the Forest Service, Department of Agriculture and Food (DAFM), and upland farming interests, in relation to the responsible use of fire, and the adoption of the DAFM Code of Practice for Prescribed burning by farmers using fire as a land management tool.
- Farmers in receipt of commonage (extensive grazing) supports received direct communication from the Department of Agriculture Food and the Marine in relation to the responsible use of fire. A synopsis of the Prescribed Burning – Code of Practice Ireland was issued and Single Farm Payment Conditions and Penalties for farmers for infractions associated with burning were highlighted.
- Both EFFIS and Met Eireann (Irish Weather Service) Fire Weather Index (FWI) data were used to define fire danger and to guide the issuing of general fire warnings by the Forest Service. Locally derived Met Eireann FWI data remains the primary source of data for fire condition monitoring and risk analysis by the Forest Service.
- Fire warning advertisements, editorials and features were carried in national and Farming media throughout the fire season, based on known high risk risk periods such as bank Holiday weekends and where high risk conditions were defined by FWI outputs. Ministerial press releases and media commentary were utilised during highest risk conditions.
- Two county-level Wildfire Interagency Groups have been established in counties Cork and Kerry on a pilot basis. These groups permit highly orchestrated cooperation and coordination of fire prevention and response activities between state agencies and landowners in fire prone areas.
- A comprehensive EU LIFE application relating to fire prevention and mitigation was prepared by a consortium of forestry interests during summer 2012, with direct support and inputs from private and state commercial forest management companies, DAFM Forest Service, and the National Association of Regional Game

Councils. Following several months of development, this application for LIFE funding did not proceed due to organisational issues within the stakeholder group. It is agreed by stakeholders that significantly improved stakeholder organisation and development will be required before a LIFE project of this type will be viable in Ireland, and it is hoped that the issue of LIFE funding for fire measures can be revisited at some point in the future when these issues have been resolved. Stakeholders concerned are now working on improving these organisational issues, and implementing those portions of the plan that can be achieved using locally available resources.

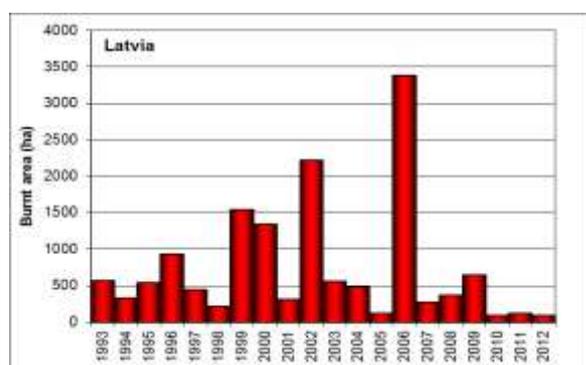
- Fire prevention measures were also supported by concurrent law enforcement measures by the National Parks and Wildlife Service and An Garda Síochána, the National Police Force. There were up to seven known criminal court proceedings taken or pending against landowners for illegal burning activity during 2012, and four people are known to have been convicted and fined for illegal burning outside of the prescribed burning season or within NATURA 2000 designated areas.
- The measures outlined above have been further refined and implemented again during Fire Season 2013.

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

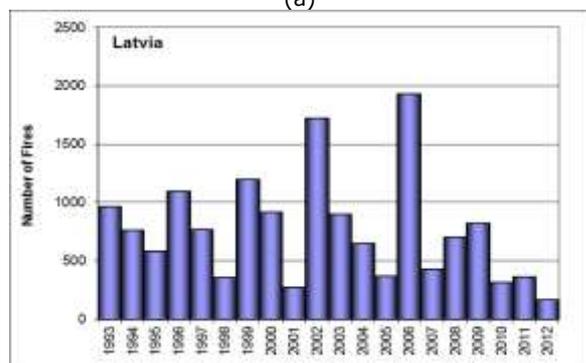
2.2.11 Latvia

Fire occurrence and affected surfaces

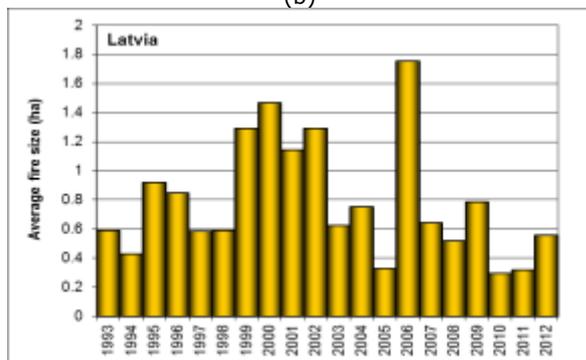
In 2012 the forest flammable period was set from first of May and continued until September 15. In total, 162 forest fires were discovered and extinguished in 2012 during which 90 hectares were burnt. Of these, 22 hectares of forest, 47 hectares of young stands and 21 hectares of other wooded land were affected. Table 23 shows the distribution of numbers of fires and burnt areas by month during the fire season, and Figure 40 shows the locations of the fires in 2012. The yearly trends in terms of number of fires and burnt area during the last 20 years in Latvia are shown in Figure 39. In 88 % of cases the fires were detected and put out before the burned area had reached 1 hectare.



(a)



(b)



(c)

Figure 39. Burnt areas (a), number of fires (b) and average fire size (c) in Latvia from 1993 to 2012.

Traditionally, the highest number of forest fires was in the vicinity of the two Latvia's biggest cities – Riga and Daugavpils (33 fires, 21.4 hectares affected area, and 63 fires, 16.4 hectares, respectively). The State fire and rescue service also extinguished wildfires 1764 times. Total burnt area unknown.

Table 23. Number of fires and burnt areas by month

Month	Number of forest fires	Burnt area (ha)
March	1	21.4
April	31	37.1
May	62	21.1
June	24	4.8
July	33	1.4
August	7	2.7
September	4	1.5
Total	162	90

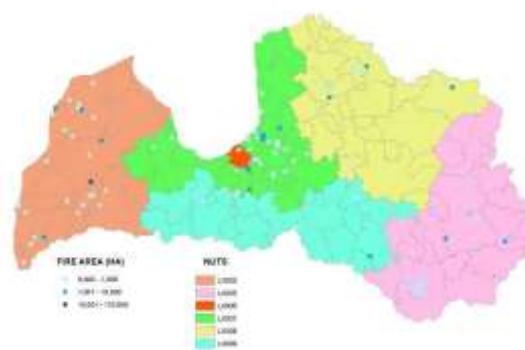


Figure 40. Map of forest fire locations in 2012

Preventive measures

Under the acts of law, fire prevention measures are imposed on forest owners (managers). In 2012 joint stock Company "Latvian state forests" which manages state-owned forests (1.59 million hectares) spent 53628 LVL on fire preventive measures, and Ltd. company "Riga city forest" which manages forests belonging to Riga municipality (66.5 thousand hectares) spent 1500 LVL. (Table 24).

Table 24: Expenditure on fire prevention measures in Latvia in 2012

Title	Costs, LVL
<i>Latvian State forest</i>	
Creating new fire breaks, 18km	2280
Existing fire break cultivation, 3450km	48848
Water point, warning sign renovation	2500
Total	53628
<i>Riga City Forest</i>	
Creating new fire breaks, 6km	1500
Existing fire break cultivation, 504km	
Total	55128

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

2.2.12 Lithuania

Fire danger in the 2012 fire season

Forest fires during the year 2012 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

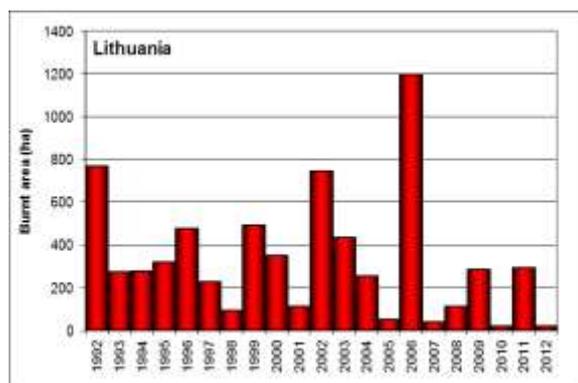
In 2012, according to the data of the Directorate General of State Forests, 81 forest fires occurred and damaged 20 ha of forest.

The average fire area in 2012 was 0.25 ha. All fires were less than 3.5 ha. Most of the fires (63%) were in April and May. The total damage was estimated to be 12 000 euro. The yearly trends in terms of number of fires and burnt area during the last 21 years in Lithuania are shown in Figure 27 below.

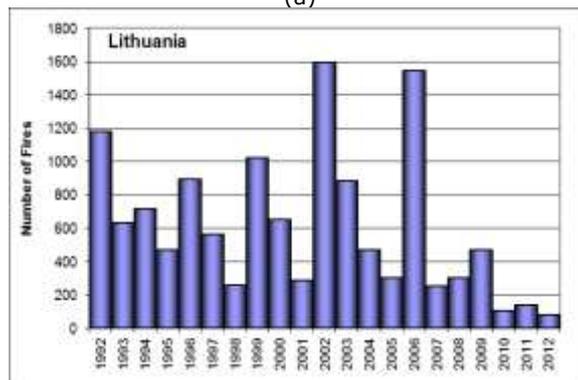
Fire prevention activities

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.

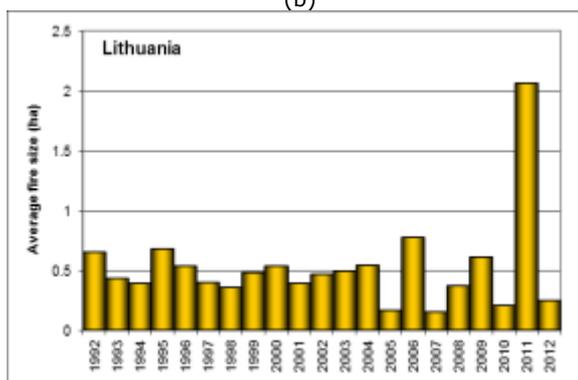
Every year, state forest enterprises together with Fire and Rescue Services and the Armed Forces organize educational trainings in the forest in order to check how organizations are able to organize forest fire extinction, manage difficult situations, control the actions, collaborate with each other and keep the connection. In order to sustain the system of general state fire protection measures, state forest enterprises budgeted 1 500 thousand EUR from their own funds in 2012, and 12.5 thousand km of firebreaks were maintained.



(a)



(b)



(c)

Figure 41. Burnt areas (a), number of fires (b) and average fire size (c) in Lithuania from 1992 to 2012.

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 2012.

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

2.2.13 Norway

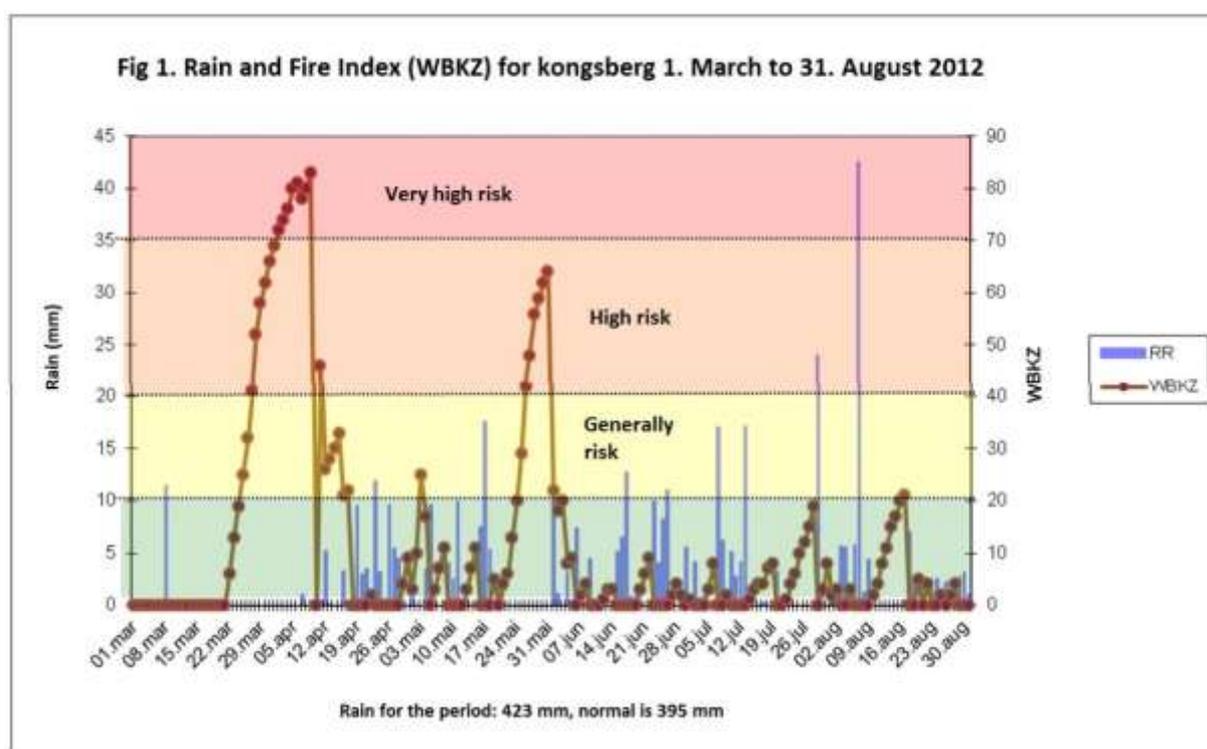
Fire danger in the 2012 fire season

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 south-west 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.

This year March had the highest average temperature ever recorded and in the southern and eastern part of Norway we had a spring with less rain than normal. The fire index was high in the southern part of Norway in two periods; March and May (the year had totally 105% more rain than an average year). The northern part of Norway had a low Fire Index all season.



Fire prevention activities

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

The Fire Services are responsible for the following activities:

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

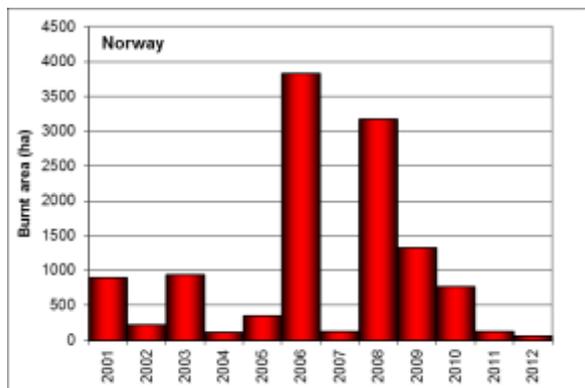
The Governmental Authorities are responsible for the following activities:

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

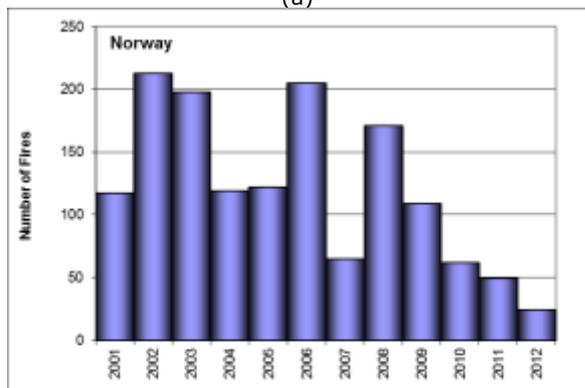
Fire occurrence and affected surfaces

In 2012 there were only 45 recorded fires in Norwegian, 25 ha of productive forest and 35 ha of other wooded land (wildland).

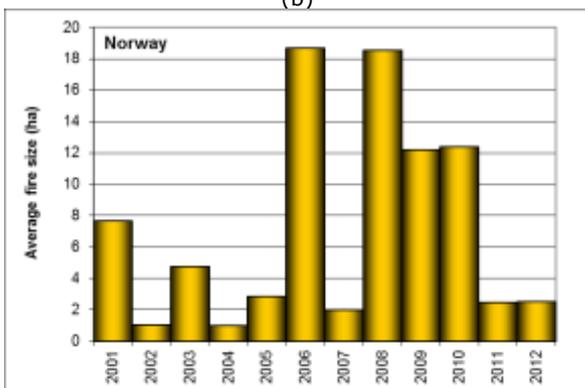
This is probably underreported because of a new reporting system in the Directorate for Civil Protection and Emergency Planning.



(a)



(b)



(c)

Figure 42. Burnt areas (a), number of fires (b) and average fire size (c) in Norway from 2001 to 2012 (NB. Probably underreported).

Operations of mutual assistance and loss of human lives

No operations of mutual assistance were taken and no loss of life was reported in Norway during the fire season of 2012.

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 increase by involving more helicopters.

In 2012, the helicopter(s) were used in four fires with around 40 hours of flying time during which they dropped approximately 1000 tons of water.



Photo: Paal Bentsdal.

The Directorate for Civil Protection and Emergency Planning 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.



Photo: Paal Bentsdal.

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

2.2.14 Poland

Fire danger in the 2012 fire season

The seasonal nature of the occurrence of fires is strictly related to the weather conditions. The diagrams (Figure 43-Figure 47) show the variations of air temperatures, precipitation, pine (*Pinus sylvestris* L.) litter moisture, relative air humidity and the national degree of forest fire danger risk (NDFFDR) in the 2012 fire season. They also present the number of fire outbreaks.

The mean monthly air temperatures were higher (by about 0.6°C) than the long-term mean values in the entire country. In April air temperatures were also a little higher than the long-term mean values for this month, which at 9 a.m. systematically increased for the whole month from 3 to 24°C. At 1 p.m. the air temperature rose from 6°C, and in the last days of the month exceeded 30°C.

In May the air temperature significantly increased and at 9 a.m. it was on average 17.5°C, and at 1 p.m. it was 21.9°C. In June the air temperature slightly increased at 9 a.m. (about 0.8°C), whereas at 1 p.m. it decreased about 0.1°C.

In July the air temperature increased about 4°C and reached 21.9°C at 9 a.m. and 26.1°C at 1 p.m., and was the highest in the fire season. Then it decreased at 9 a.m. in August about 2.6°C, and in September to the level 14°C, however at 1 p.m. about 1.2°C in August and in September to the level 20.1°C.

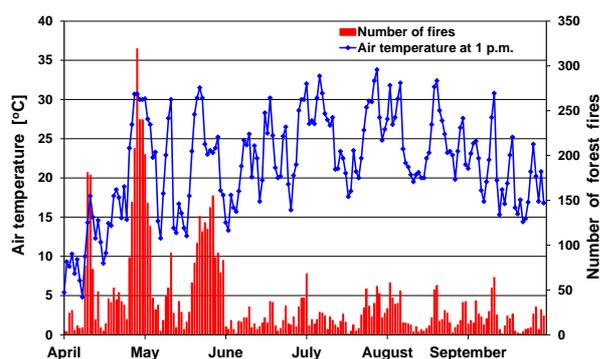


Figure 43. Air temperatures and numbers of forest fires in fire season 2012

The average precipitation level in the fire season was about 22% lower than the long-term mean value.

In April and May it rained almost every day, but the amounts of rainfall were not large. In April there were 20 days with less than 2 mm rainfall; in May it rained up to 24 days.

Daily and usually abundant rainfall appeared throughout June and July. The average daily precipitation in April was 1.5 mm; in May a little lower (1.2 mm) and in June was the highest (3.2 mm). In July the rainfall slightly decreased (about 0.2 mm), but still was high.

In August rainfall decreased to 2.1 mm daily, and in September the average daily precipitation was the lowest and reached 1.3 mm daily.

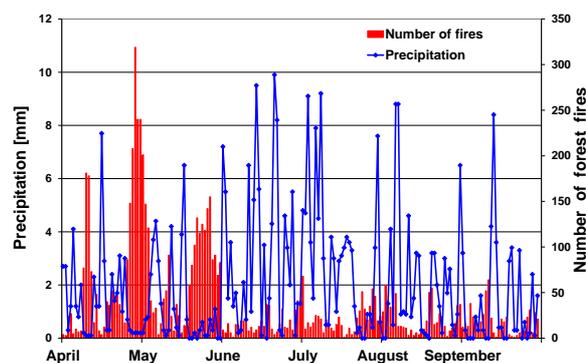


Figure 44. Precipitation and numbers of forest fires in fire season 2012

The mean litter moisture values at the national scale varied between 10 and 51%. Through the last days of April and all of May the litter moisture in both observation times was found to be below thresholds of fire-safety. The litter moisture at 9 a.m. averaged 35% in April and 24% in May; however at 1 p.m. it was 29% in April and 20% in May.

In May the litter moisture was the lowest in the fire season. In June the litter moisture was the highest in the fire season: 37% at 9 a.m. and 31% at 1 p.m. In July, August and September followed a slight decrease in these values (about 3%).

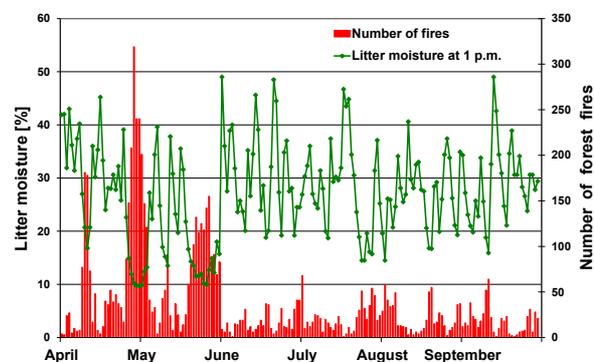


Figure 45. Litter moisture and numbers of forest fires in fire season 2012

Relative air humidity was also found below thresholds of the fire-safety in the last days of April and May, for both of the daily observation times. In comparison with April, relative air humidity values in May decreased from 71% to 63% at 9 a.m. and from 51% to 46% at 1 p.m. and were the lowest in the fire season. The highest relative air humidity in the fire season at 9 a.m. was in September (87%), also high was in August (89%), however in June and July were 74%. Values of relative air humidity at 1 p.m. were 60% in June, 59% in September and 56% in July and August.

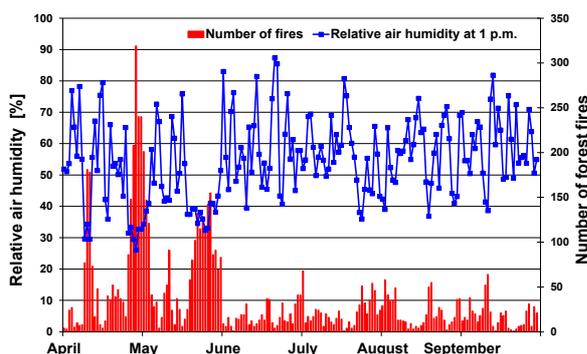


Figure 46. Relative air humidity and numbers of forest fires in fire season 2012

Most of the 2012 fire season was characterized by undistinguished forest fire danger risk (NDFDR < 1.5). Only in May the forest fire danger risk was higher than 2.0. The lowest forest fire danger was in September (value of NDFDR was 1.0 at 9 a.m. and 1.3 at 1 p.m.).

The share of occurrence in the third level of forest fire danger for the fire season was 22% on average, which was 4% lower compared with the period 2001-2010. In May it reached its maximum value of 52%, in April 22%, in July 20% and in August 17%. But in September it was only 7%.

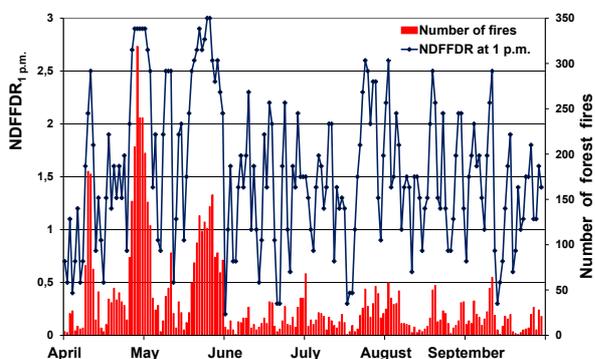


Figure 47. The National Degree of Forest Fire Danger Risk and numbers of forest fires in fire season 2012

Fire occurrence and affected surfaces

In 2012 in Poland, a total of 9 265 fires broke out (5 752 forest and 3 513 other non-wooded natural land), about one thousand more than in 2011, with a surface area of 7 235 ha (4 782 forest and 2 453 ha other non-wooded natural land), about three times more than in 2011 (Table 25 and Figure 52).

The greatest proportion of fires occurred in March (26.3%; i.e. 2 433 fires) - Figure 48 March was followed by May (24.5%) and April (21.5%). The lowest number of fires in the fire season (April-September) occurred in June (5.2%) and September (5.8%). 71.3% of fires occurred in the fire season.

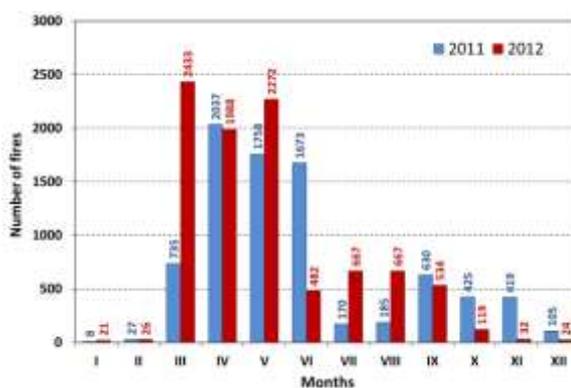


Figure 48. Distribution of number of forest fires by month in 2011 and 2012 in Poland

The largest number of fires in 2012, similarly to last year, occurred in Mazowieckie Province (22%, i.e. 2007 fires).

The lowest number of forest fires occurred in Warmińsko- Mazurskie Province (108), Podlaskie Province (211) and Opolskie Province (212).

The largest burnt forest areas were recorded in:

- Mazowieckie Province (1 359 ha)
- Podkarpackie Province (1 146 ha)
- Świętokrzyskie Province (825 ha)
- Śląskie Province (819 ha).

The smallest areas were in Pomorskie Province (31 ha) and Zachodniopomorskie Province (54 ha). These data are illustrated in Figure 50- Figure 51.

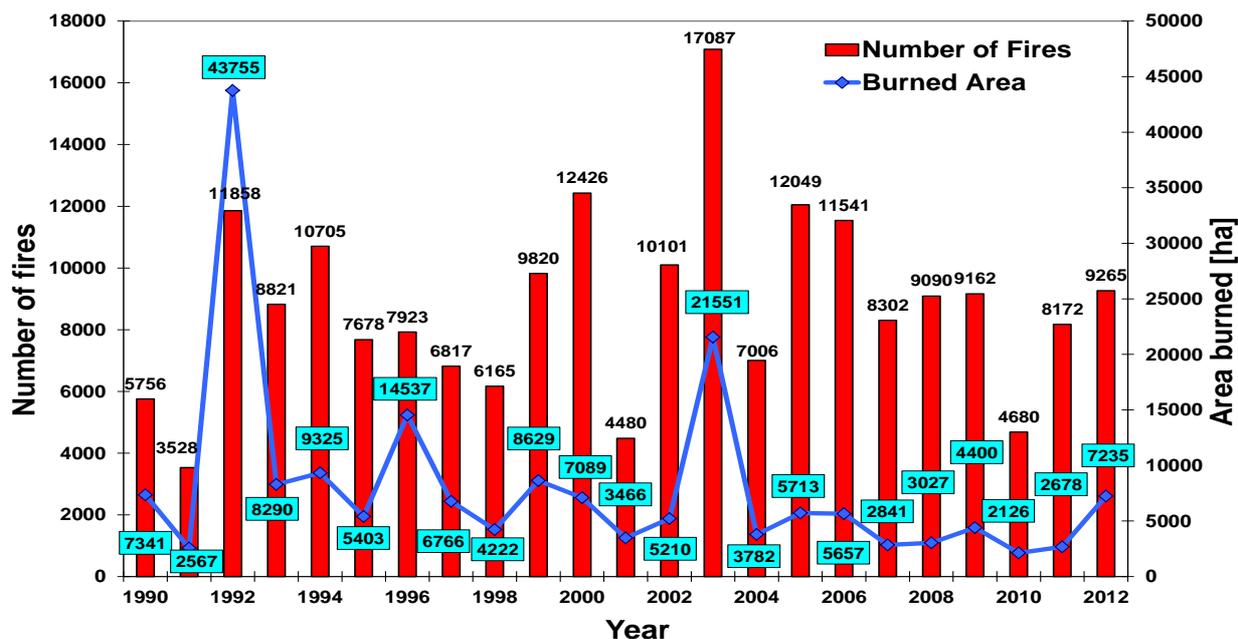


Figure 52. Total number of fires on high forest and area burned in Poland in the period 1990-2012

Table 25. Forest fire database for Poland in the period 1994-2012

Year	Number of forest fires	Burnt area [ha]	Forest fires average area [ha]
1994	10 705	9 325	0.87
1995	7 678	5 403	0.70
1996	7 923	14 537	1.83
1997	6 817	6 766	0.99
1998	6 165	4 222	0.68
1999	9 820	8 629	0.88
2000	12 426	7 089	0.57
2001	4 480	3 466	0.77
2002	10 101	5 210	0.52
2003	17 087	21 551	1.26
2004	7 006	3 782	0.54
2005	12 049	5 713	0.47
2006	11 541	5 657	0.49
2007	8 302	2 841	0.34
2008	9 090	3 027	0.33
2009	9 162	4 400	0.48
2010	4 680	2 126	0.45
2011	8 172	2 678	0.33
2012	9 265	7 235	0.78
<i>Yearly Average in the Period</i>			
1996-2000	8 630	8 249	0.96
2001-2005	10 145	7 944	0.78
2006-2010	8 555	3 610	0.42

The burnt area, number of fires and average fire size for the years 1990 - 2012 are shown in Figure 54.

Fire causes

Human activity was the main cause of forest fires; specifically arson represented almost half of the fires (42.7%), followed by carelessness of adults (30.5%) and unknown causes (19.8%) (Figure 53).

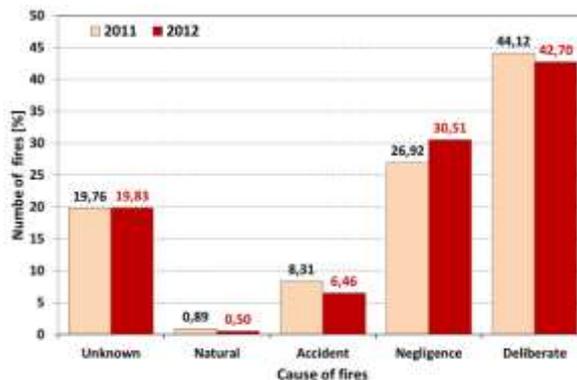


Figure 53. Distribution of the number of forest fires by causes in 2011 and 2012 in Poland

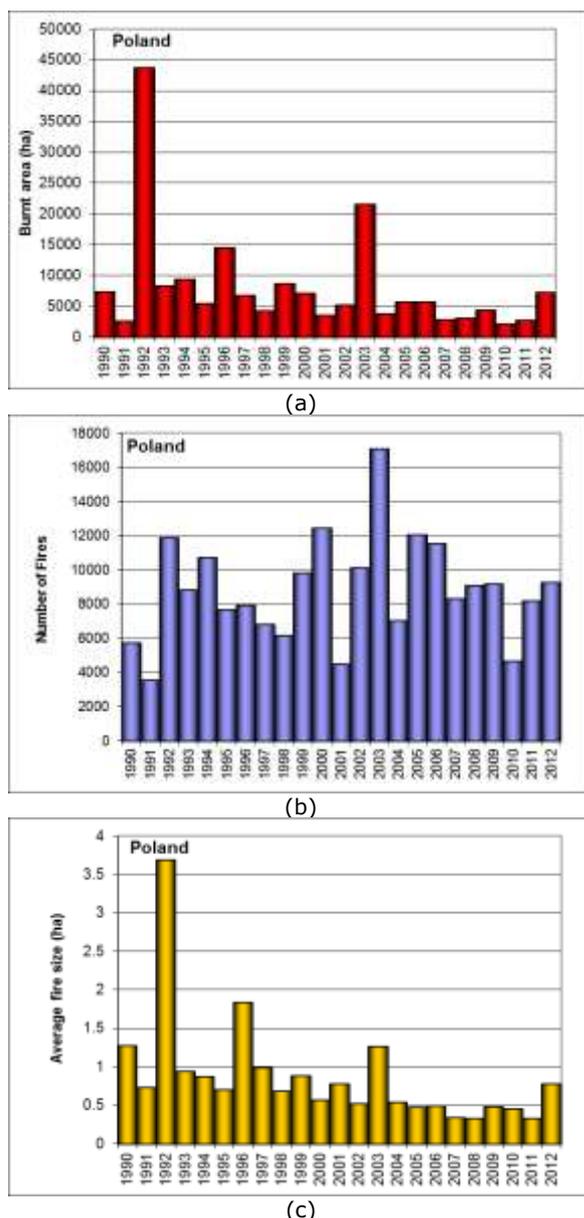


Figure 54. Burnt areas (a), number of fires (b) and average fire size (c) in Poland from 1990 to 2012.

Fire fighting means and information campaigns

In 2012, as part of information and promotion activities, the following measures in the State Forests National Forest Holding (State Forests NFH) were taken:

- More than 10 thousand lectures in schools and youth camps,
- about 7 thousand information boards were erected,
- more than 1 000 communications were provided in the mass media on fire danger and the principles of safe behaviour in forests,
- More than 153 thousand posters, information leaflets and calendars related to forest fires were disseminated.

In forest areas, works were carried out to prevent the conditions for fire outbreaks and to reduce their spread, by repairing 5 500 km of fuel breaks and building 28 km of new fuel breaks; in addition, forests were cleaned over a surface area of 27 thousand ha, by reducing the quantity of inflammable biomass.

The observation system of the State Forests NFH consisted of:

- 656 fire protection lookout points, including 226 equipped with a system of TV cameras,
- 8 patrol airplanes.

The effectiveness rate of fire detection by fire protection lookout points was 35%, airplanes detected 1% of fires and civilians notified of 57%. The other 7% of fires were detected by fire protection patrols.

The communication and alarm network in the State Forests NFH consisted of: 7 590 radio-telephones, including 1 283 base sets, 2 902 mobile sets and 3 305 hand held sets.

Water supply for fire suppression purposes was provided by 12 229 water supply points, including 4 663 natural points and 2 754 artificial ones. Moreover, water was supplied by about 4.8 thousand hydrants located in the vicinity of forests.

The State Forests NFH had its own equipment, consisting of:

- 27 fire suppression airplanes and 7 helicopters,
- 373 patrol and fire suppression vehicles,
- 17 medium and heavy vehicles,
- 273 portable pumps.

These means were used to extinguish 4% of all the fires, whereas the other fires were suppressed by units of the State Fire Service and voluntary fire brigades.

In 2012, the fire protection costs incurred by the State Forests NFH amounted to 76.3 million PLN (16.4 million EUR).

Information on Poland's National Forest Fire Information System can be found on https://bazapozarow.ibles.pl/ibl_ppoz/faces/index.jsp and 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)

2.2.15 Romania

Meteorological characteristics of Romania during 2012

In Romania, the summer of 2012 was warmer than 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 55 and Figure 58). The precipitation recorded a small deficit in most of the country especially during the summer. The increased temperatures, with daily maximum values of 32°C, meant that the thermal temperature-humidity comfort index ITU critical value was also frequently exceeded, resulting in tropical nights ($\Sigma T_{\min} 17^{\circ}\text{C}$), for almost three months in a row, for June, July and August. At 82 meteorological stations, especially during August (on 7th and 25th), the absolute maximum recorded values of temperature were exceeded for these stations. At 39 of those stations, the maximum value of August 2012 became the maximum annual recorded value of the meteorological station. Also the month of July 2012 was the warmest in the last 52 years in România; the average monthly temperature value was 23.7°C, compared with the monthly multiannual average of 19.2 °C; so a positive deviation of 4.5°C, which increased the drought effect in the country (Table 26), also due to the precipitation deficit.

Table 26. Severe drought years in Romania since 1901

Decade	Severe drought years
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 regime during 2012 was slightly below normal, and the average quantity of rain falling at country level (618.9 mm), compared with the climatological norm (637.9 mm), resulted in a deficit of just 3%. The exceeding pluvial regime of the months January, February, April, May, October and

December, almost compensate the precipitation deficit from the other remaining months, mostly in summer. (Figure 56 and Figure 59).

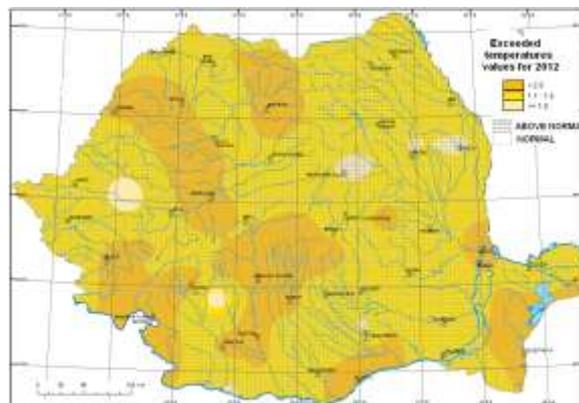


Figure 55. The deviation of the monthly average temperature in 2012 comparing with the multiannual average temperature (1961-1990).

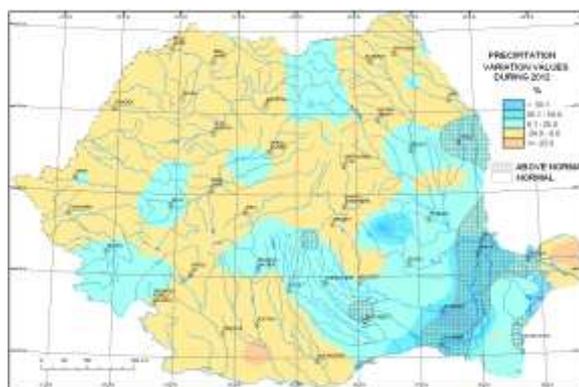


Figure 56. The deviation of the total monthly precipitations in 2012 comparing with the multiannual average values (1961-1990).

The soil drought occurred from June, July, and became successively during August and September, isolated strongly, because of the precipitation deficit especially in the south-east, east and locally in the western part of the country (Figure 57).

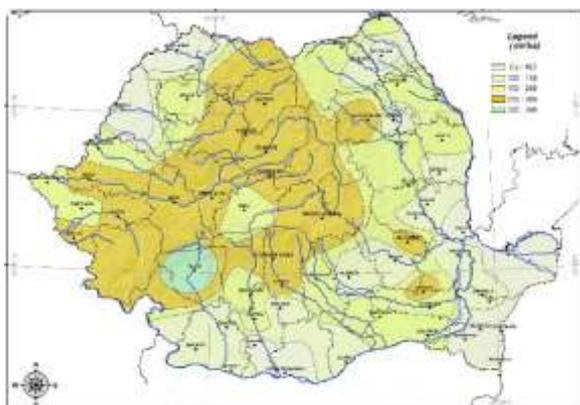


Figure 57. Water soil reserve at the beginning of September 2012 in the depth layer of 0-20 cm

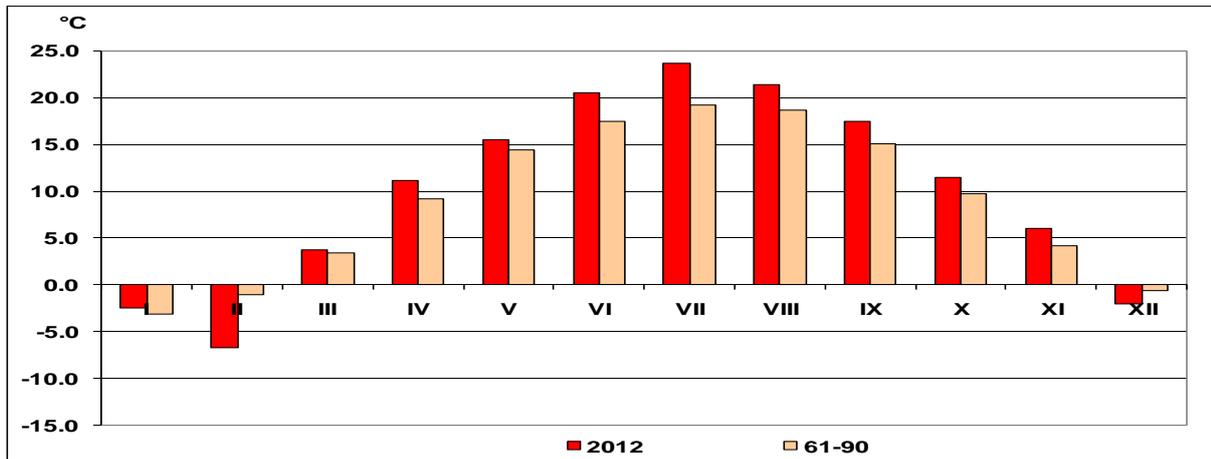


Figure 58. Average monthly temperature in Romania during 2012, compared with the climatological norm (1961-1990)

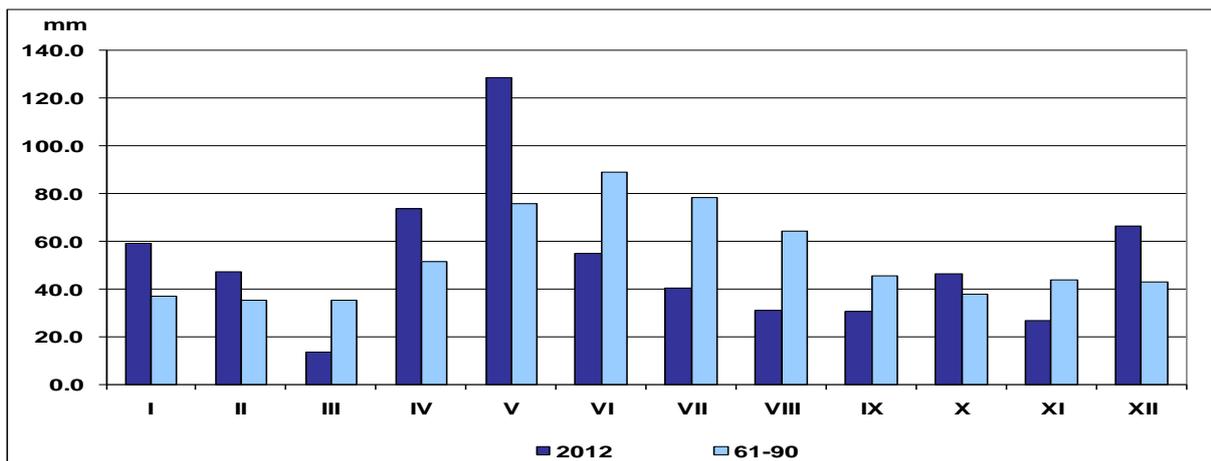


Figure 59. The monthly average precipitations recorded during 2012, compared with normal climatological values (1961-1990)

Fire damages and injuries

The economic losses due to forest fires were the highest (Figure 60), compared with the previous years, even though the population and the authorities intervened to extinguish the forest fires at early phase, but the costs are low, compared with other European countries (especially the Mediterranean). The lower level of economic losses is determined by the geographical condition of our country, and by the forest composition. The economic losses assessed are relatively small because the damages are calculated only as the value of young forest burned or as the timber value (Figure 60).

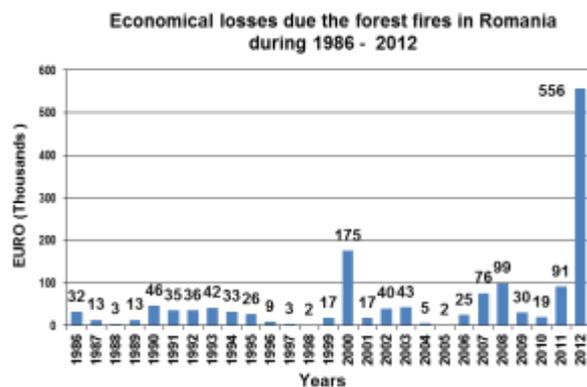


Figure 60. Economic losses due to forest fires in Romania from 1986 to 2012

Fire occurrence and affected surfaces

The trend of the burnt areas, number of fires and average fire size in Romania for the years 1986-2012 are shown in Figure 61. In 2012 there were 882 fires burning 6 299 ha.

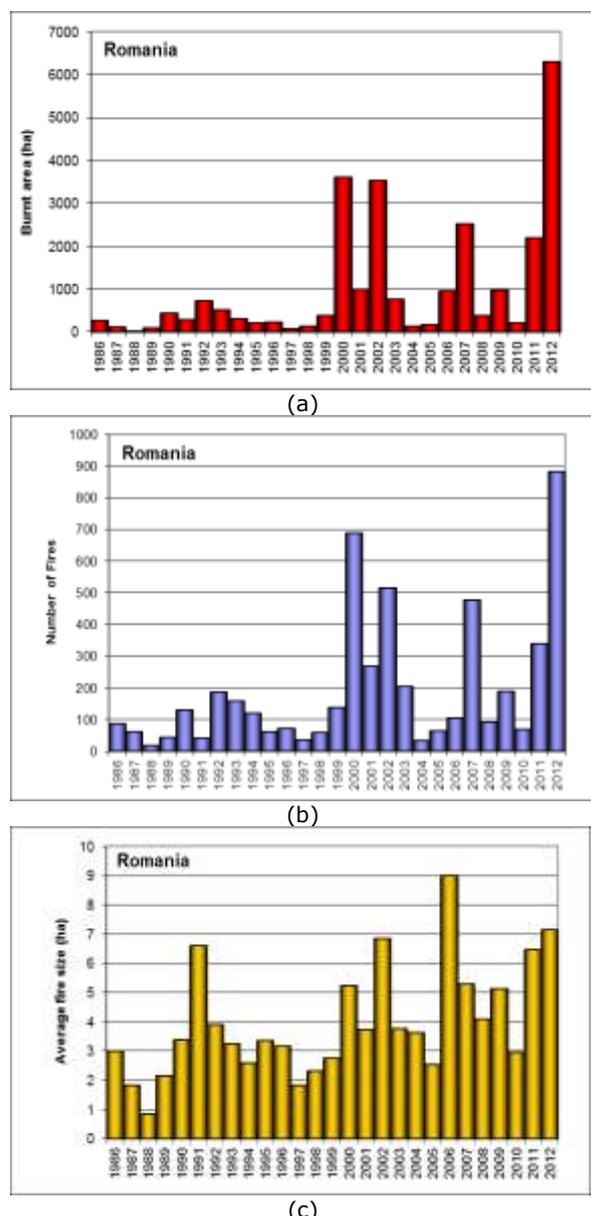


Figure 61. Burnt area (a), number of fires (b) and average fire size (c) in Romania from 1986 to 2012

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 causes

During 2012, the major causes of forest fires, as in the recent years, was represented by the agricultural practices of the people from the rural areas, represented by the cleaning of the fields by uncontrolled ignition of dried plant wastes (comparison with the previous year of 2011, in terms of forest fires causes, are shown in Figure 62).

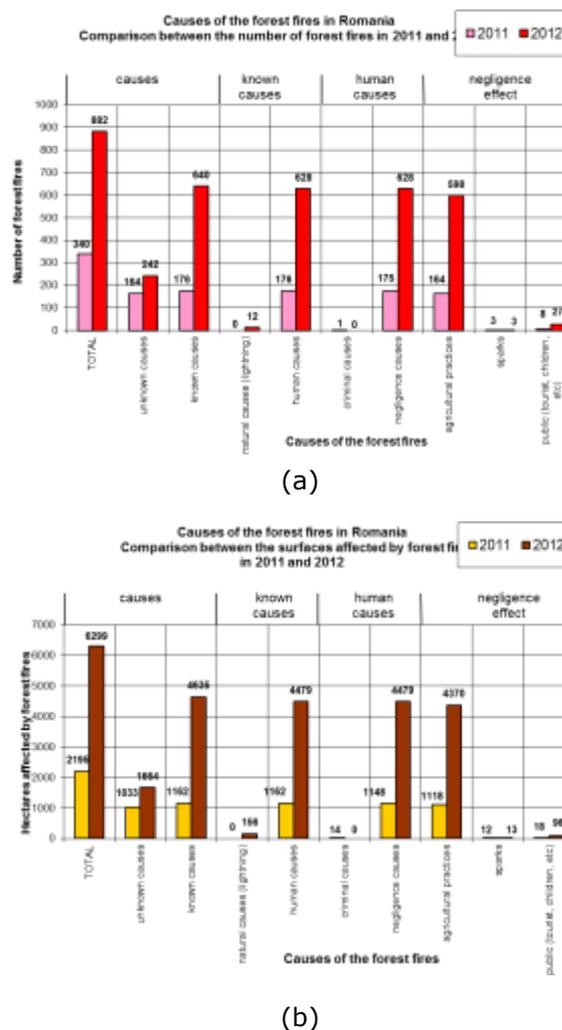


Figure 62. Comparison of forest fires causes in Romania: 2011 and 2012. (a) Number of fires; (b) Burnt area (ha)

(Source: Ministry of Environment and Climatic Changes, Romania)

2.2.16 Russian Federation

Fire danger in the 2012 fire season

Extreme forest fire conditions were observed during 2012 in the Ural, Siberian and Far Eastern Federal Districts.

Emergency situation was declared in 16 regions of Russia. 54% of all fires and 92% of the burned area were concentrated in 10 most severely affected regions: Chelyabinsk Region (34.2 thousand hectares, 1.7%), the Amur Region (42.4 thousand hectares, 2.1%), Yamal-Nenets Autonomous Okrug (63.1 thousand hectares, 3.2%), the Republic of Buryatia (130.4 thousand hectares, 6.5%), Tomsk region (101.6 thousand hectares, 5.1 %), Khanty-Mansi Autonomous Area (118.7 thousand hectares, 5.9%), the Republic of Sakha (Yakutia) (188.9 ha, 9.5%), Khabarovsk region (352.8 thousand hectares, 17.7%), Amur region (400.2 thousand hectares, 20%), Krasnoyarsk region (410.9 thousand hectares, 20.6%).

Fire occurrence and affected surfaces

In 2012 in the protected forest territories of Russia 19 535 forest fires affected 1.9 million ha of forest lands. In comparison with 2011 the number of fires decreased by 6%, while the area affected by fire rose up by 22%.

As compared to 2011 the area burned by forest fires increased due to many reasons: the early beginning of the fire season (the first forest fires were recorded on 26 March 2012 in the Trans-Baikal region), the anomalous weather conditions in some regions with more than 150 days of extreme fire danger conditions), the starting of a number of fires in remote areas.

Fire fighting means and information campaigns

The Government of the Russian Federation provided to 79 regions of Russia 3.5 billion rubles (about 80 million EUR) for the continuation of the program on modernization of the specialized forest fire agencies of the Russian Federation. The initial plan is to purchase 3 000 units of machinery and equipment.

During the 2012 fire season, 59 teams of fire fighters (a total of 2 454 people) were dispatched to the regions with extreme burning conditions, under the program of interregional assistance.

Fire causes

The main causes of forest fires in 2012 were the following:

- Negligence - 31.1%, which is 1.4 times less in comparison with 2011 (45%) and 1.6 times less the five-year average (49.4%)
- Lightning - 21.7%, which is 1.6 times higher compared with 2011 (13.7%) and 2.4 times higher the five-year average (9%)
- Agricultural burns - 6.6%, which is 1.3 times higher compared to 2011 (4.9%) and 1.1 times less than the five-year average (7%).
- Not determined - 40.6%, which is 1.1 times more compared with 2011 (36.4%) and 1.2 times higher the five-year average (34.7%)

Fire prevention activities

Analysing the problems of forest fire protection in the regions of Russia, the following major shortcomings must be highlighted:

1. Lack of fire spreading control
2. Lack of preventive measures in the forest lots and in neighbouring territories with economic assets and other land uses. Until May 2012 no region had fully carried out all the foreseen fire-prevention measures.
3. Late detection of forest fires.
4. Lack of aerial monitoring and fire fighting operations.

(Source: Aerial Forest Fire Centre, Russian Federation)

2.2.17 Slovak Republic

Fire danger in the 2012 fire season

The fire danger was high at the beginning of the 2012 fire season particularly in some parts of the country. The number of fires increased and the average fire size decreased as compared to previous years. The number of fires was influenced substantially by the weather conditions, 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 517 forest fires were reported in Slovakia in 2012, corresponding to a total burnt area of 1 683 ha. The average burned area per fire was 3.2 ha.

Figure 63 and Figure 64 show the pattern of fire occurrence and burnt area by month during the year. The burnt areas, number of fires and average fire size for the years 1999-2012 are shown in Figure 65.

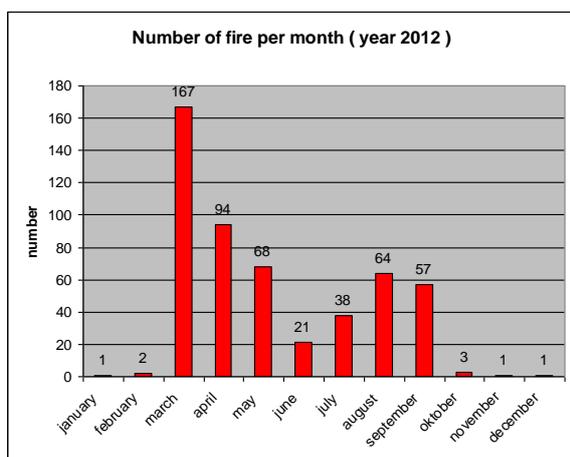


Figure 63. Fire frequency by month in 2012

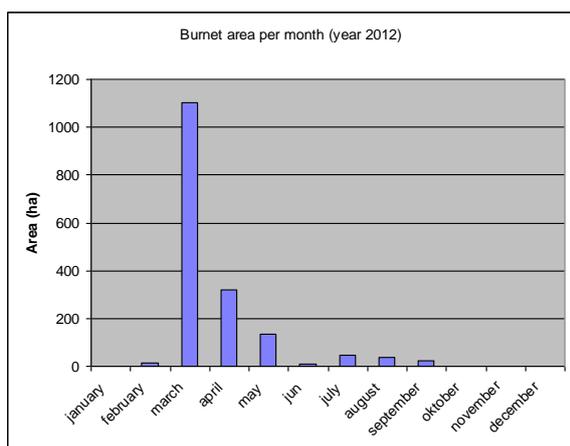
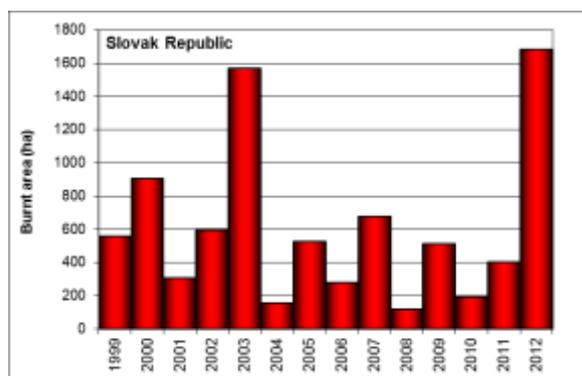
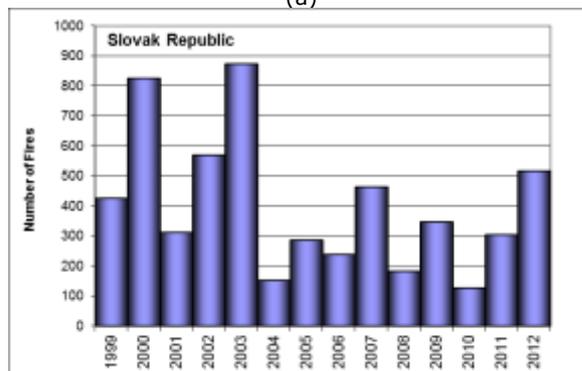


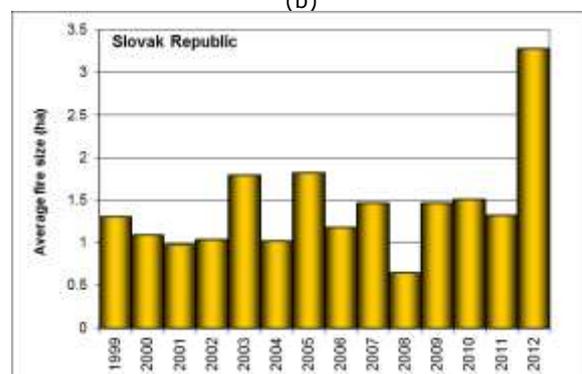
Figure 64. Burnt area by month in 2012



(a)



(b)



(c)

Figure 65. Burnt areas (a), number of fires (b) and average fire size (c) in the Slovak Republic from 2002 to 2012.

Injuries and loss of human lives

Five injuries and one casualty were reported in Slovakia during the 2012 fire season.

Fire causes

Forest fire causes for the years 2002–2012 are shown in Table 27.

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

Table 27 Fire causes in Slovak Republic in 2002 – 2012 (number of forest fires).

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

2.2.18 Slovenia

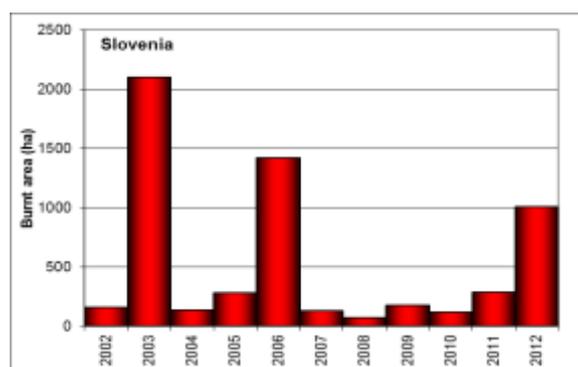
In 2012, according to the data of the Forest Service, 114 forest fires were reported, with a total burnt area of 288.12 ha, of which 123.35 ha were in forest land. Both the number of fires and the burnt area are significantly more than have been reported in recent years. Figure 27 shows the trends in terms of number of fires and burnt area during the last 10 years in Slovenia.

Most fires were caused by negligence; in particular agricultural operations (Table 28).

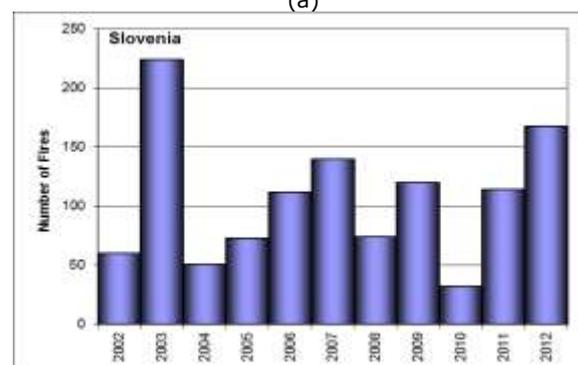
Table 28. Causes of fire in Slovenia in 2012

Fire Cause	Number	Burnt area (ha)
Arson	18	32
Negligence	72	590
Natural (lightning)	7	152
Unknown causes	71	232
Total	168	1006
Negligence subcategories:		
Agricultural operations	29	394
Logging and forest operations	3	6
Other industrial activities	0	0.00
Communications (railways, power line etc.)	35	189
General public (campers, children etc.)	5	1
Other (military, etc.)	0	0.00

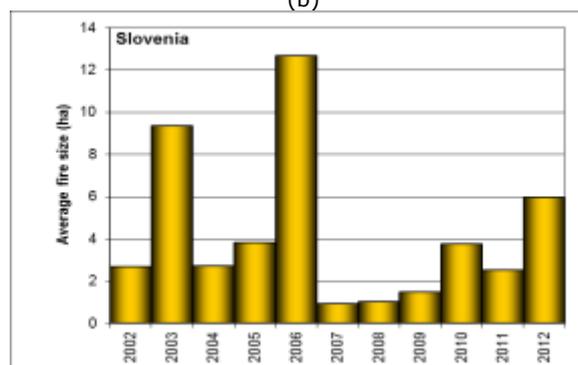
As was the case in 2011, the worst affected region was Sežana, in which two thirds of the fires (71% of burnt area) occurred (Table 29).



(a)



(b)



(c)

Figure 66. Burnt areas (a), number of fires (b) and average fire size (c) in Slovenia from 2002 to 2012.

Table 29. Number of fires and burnt area by forest management unit in Slovenia in 2012.

Region	Number of fires				Burnt area (ha)			
	<1 ha	≥1 ha	>100 ha	Total	Forest	Scrub	Non wooded	Total
Tolmin	5	6		11	44.30	32.31	1.70	78.31
Bled	3	2		5	4.57			4.57
Kranj	1			1	0.20			0.20
Ljubljana	8	2		10	4.13	0.10	0.25	4.48
Postojna	2	2		4	4.55		28.52	33.07
Kočevje	1	2	1	4	110.30	50.00		160.30
Novo mesto	5	1		6	2.14		0.16	2.30
Brežice	1			1	0.50			0.50
Celje		7		7	0.59	0.08	0.08	0.75
Nazarje				0				0.00
Slovenj Gradec	2			2	0.42			0.42
Maribor	8	1		9	3.20	0.05	0.30	3.55
Murska Sobota				0				0.00
Sežana	68	38	2	108	330.73	18.36	368.45	717.54
Total	104	61	3	168	505.63	100.90	399.46	1005.99

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

2.2.19 Sweden

Fire danger in the 2012 fire season

The grass fire risk started early in the beginning of March. The fire danger was low in the middle of season but increased in August. It was a cold June and summer with a lot of rain and the humidity was high during the summer. However March was warmer earlier than normal seasons. The fire season 2012, similar 2009 to 2011, had fewer fires and less burned area than the mean of the last 15 years. Most of the fires in 2012 appeared from March to May and normally affected the old grass from the year before.

- 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-)

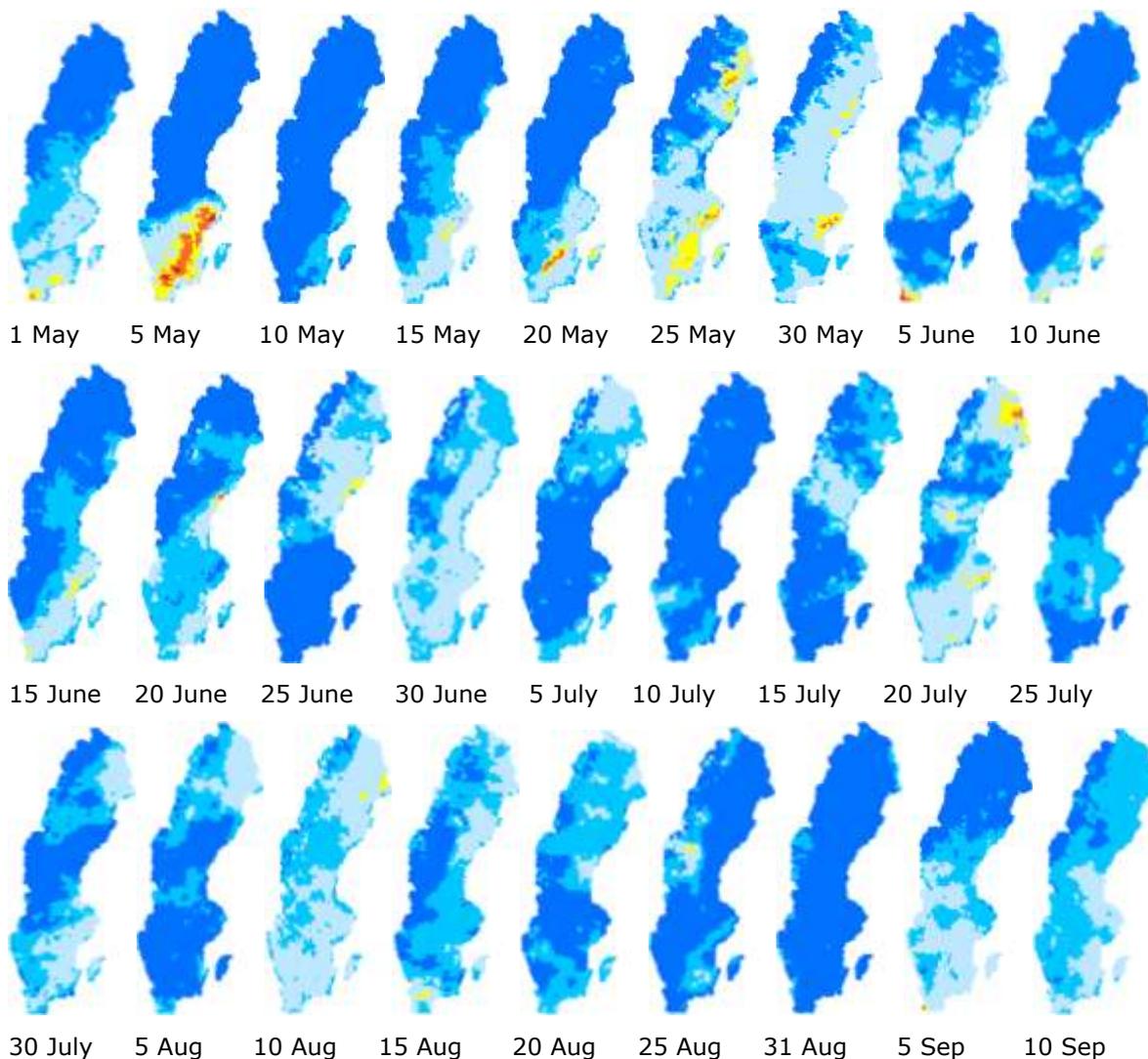
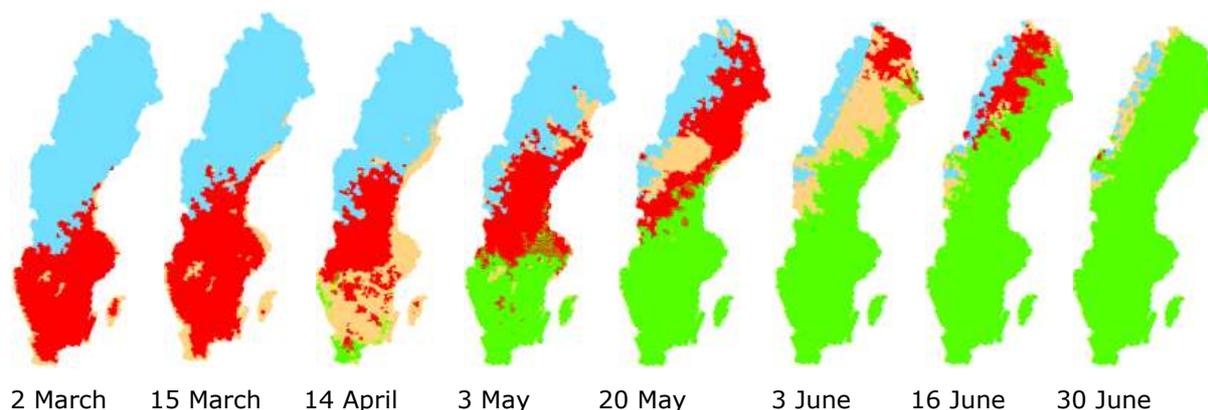
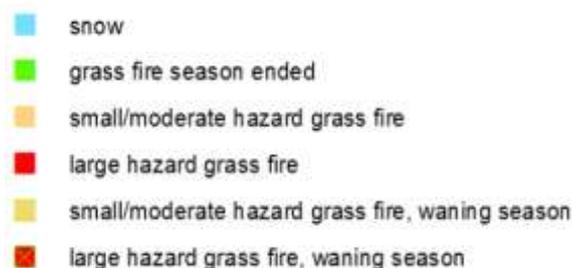


Figure 67. Maps of Forest fire danger shows the low fire danger season 2012

Grass and forest fire danger 2012

The grass fire danger season was rather long in 2012. Already in early March there was a high risk and for more than four months parts of the country were affected by the danger. The forest fire risk was very low in general and only during some few days in June to August the risk level was high enough to spread the fire. (grass fire index and FWI-index normalised to Sweden).



Fire occurrence and affected surfaces

During 2012 the number of fires recorded was 2 213, burning 109 ha of forest land, 85 ha of other wooded land and 289 ha of other land.

The largest fire which was recorded started on the 5th of April. In this fire, about 100 ha burned of other land (grass). The second largest fire started on the 27th of May and affected about 30 ha of forest. Both of these fires were in the south east part of Sweden.

Figure 68 and Figure 69 show the pattern of fire occurrence and burnt area by month during the year. The burnt area, number of fires and average fire size for the years 1998-2012 are shown in Figure 70.

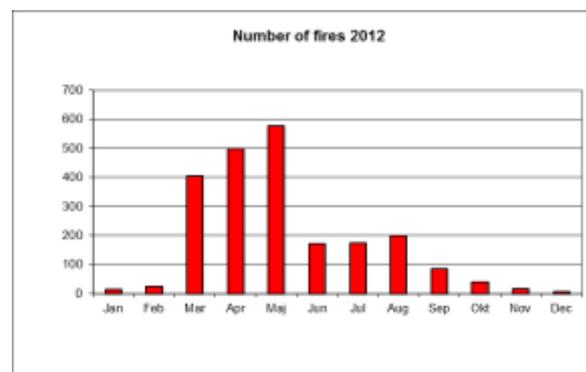


Figure 68. Fire frequency by month in 2012

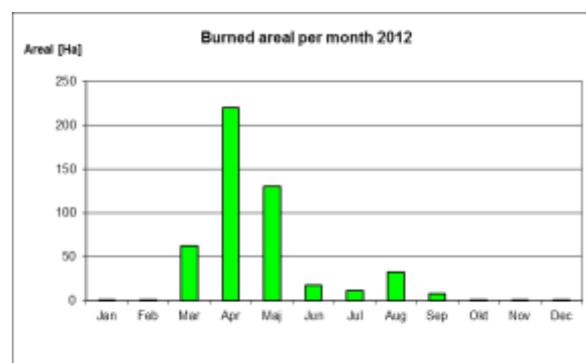
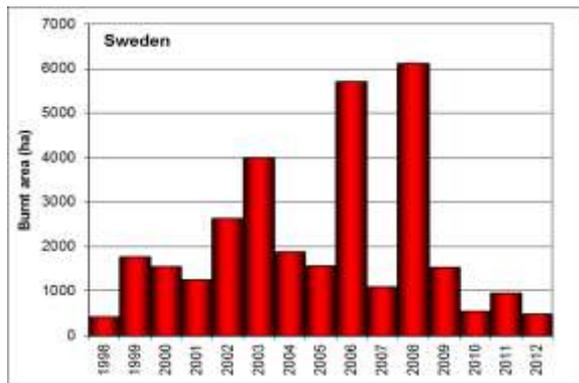
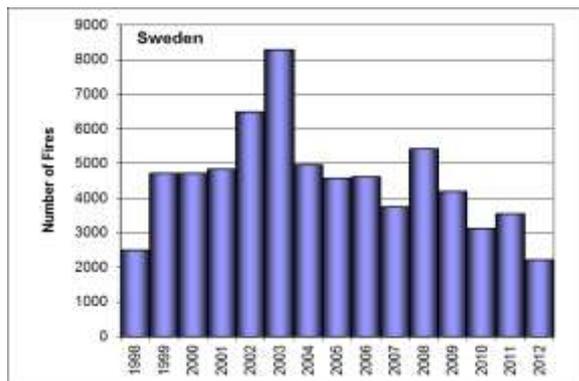


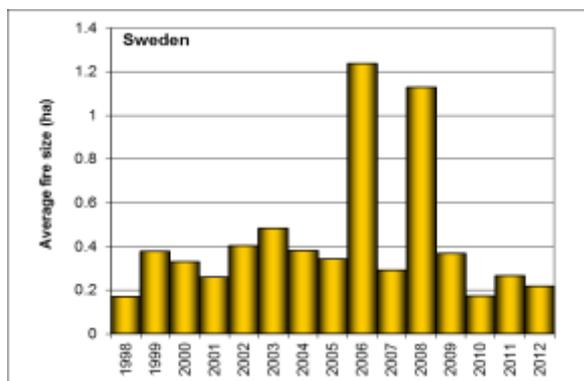
Figure 69. Burnt area by month in 2012



(a)



(b)



(c)

Figure 70. Burnt areas (a), number of fires (b) and average fire size (c) in Sweden from 1998 to 2012.

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

2.2.20 Switzerland

Fire danger in the 2012 fire season

The year 2012 was overall mild and wet. On average, temperatures were about 1.3 degrees Celsius above the 1960-1990 average. Precipitation was abundant and most regions experienced wetter conditions than usual.

Except in the South of Switzerland, January was rather wet and mild with much snow in the Alps.

February, on the other hand, was very cold and maximum temperatures ranged between -6°C and 10°C, locally even -20°C.

Despite this exceptionally cold beginning of February, winter temperatures were overall slightly higher than the 1960-1990 mean values. March was extremely mild, very sunny and dry.

Contrasting conditions prevailed in April, with a significant Foehn storm that dried out superficial material in the forests. Foehn is a very dry and hot southern wind on the northern slopes of the Alps.

May began with summer conditions, but polar air came in with snowfall even in the lowlands. June and July were very wet and cool in the northern Alpine areas as opposed to the situation in the South.

August brought high summer temperatures and a heat wave in mid-August. Despite an uneven distribution of precipitation over the summer months, the average precipitation was higher than the mean annual trend.

September and October were alternatively overcast and wet and it started snowing even at lower elevations.

November was very wet due to westerly and southerly winds and there was much snowfall on southern Alpine slopes.

Exceptional snowfall, even at low elevations occurred in December, but the mild temperatures combined with precipitation warmed up the air, so that snow melted very fast.

With the exception of the dry spell in mid-January in the South and during March all over the country, when solar radiation affected the forest floor (lack of green

canopy), 2012 was a rather low danger year for forest fires.

The availability of "green" vegetation and the preceding wet summer conditions during the August spell kept fire danger low to medium.

Fire occurrence and affected surfaces

For 2012, fires from cantons Appenzell Aussenrhode, Argovia, Berne, Grisons, St Gallen, Ticino, Uri, Valais and Vaud were recorded in the database.

A total of 57 forest fires were registered in 2012 (as reported by June 2013), burning 25.62 hectares, which corresponds to a low occurrence compared to the yearly average since 1980. Average fire size was 0.48 ha and median fire size 0.06 ha.

63% of the fires happened during the winter season (November to April), when 73% of the burned surface occurred.

The yearly trends of number of fires and burnt area during the last 33 years in Switzerland are shown in Figure 27 on next page.

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 2012, warnings were issued over short periods and mostly in the southern territory. There were fire bans in Ticino and Grisons in January and from the end of February to the end March.

Vaud also issued a fire ban by the end of March. Other Cantons such as Berne, Jura, Solothurn, Valais and the Principality of Liechtenstein reminded their population of the fire risk in relation to the dry and mild conditions.

All measures (bans and precautionary reminders) were resumed during the first days of April.

The Foehn storm at the end of April dried out the upper vegetation layers and some

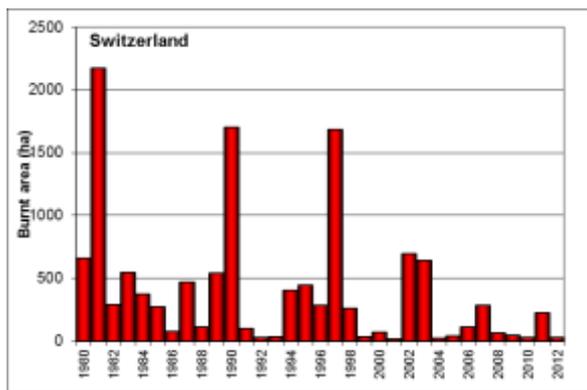
fires occurred such as in the Martigny area, in Valais, where the strong winds led to electrical discharges from high voltage power lines.

In August, Berne, Ticino, Grisons and St Gallen informed again about the potential fire dangers in some part of their territory, without issuing fire bans, however.

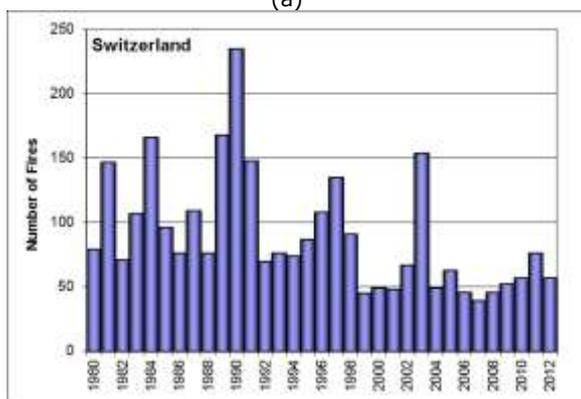
Loss of human lives

No losses of life or major damage to buildings were reported in 2012.

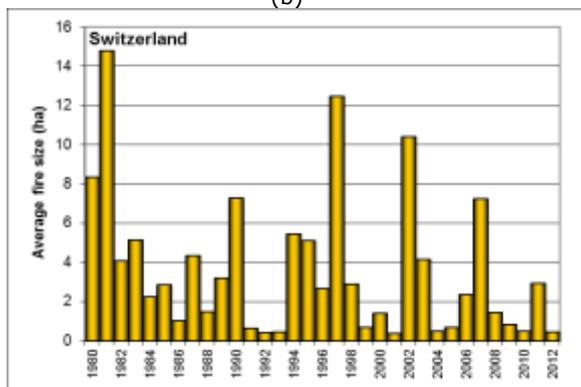
(Sources: Federal Office for the Environment, MeteoSwiss, WSL Federal Research Institute).



(a)



(b)



(c)

Figure 71. Burnt areas (a), number of fires (b) and average fire size (c) in Switzerland from 1980 to 2012.

2.2.21 Turkey

Fire danger in the 2012 fire season

In 2012, the total burnt area was 10 455 hectares. The number of fires reached 2 450 in the same year.

Fire occurrence and affected surfaces

In Turkey, the coast line, which starts from Hatay and extends over the Mediterranean and Aegean up to İstanbul, has the highest fire risk. In another words, approximately 60% (12 million ha) of Turkey's forest area is located in fire sensitive areas.

Forest fires mostly occur during the period of May-November, particularly in June, July and August. When we look at the number of forest fires, we see that August ranks the highest with 667 fires damaging 4 521 ha of forest (see Table 30). 87% of the forest fires occurred during the fire season (between May and November) in 2012 damaging 9 254 hectares of forests.

Table 30. Monthly distribution of forest fires in Turkey

Month	Number of Fires	Burnt Area (ha)
Jan	12	14.2
Feb	9	5.1
Mar	70	82.1
Apr	150	1082.9
May	69	43.0
Jun	250	290.9
Jul	444	819.6
Aug	667	4520.5
Sep	455	3010.3
Oct	267	537.6
Nov	41	32.1
Dec	16	16.2
TOTAL	2450	10454.6

Fortunately, around 79% of the fire incidents were controlled before spreading. There were only three fires bigger than 500 hectares (totalling 2 698 ha) and there were five fires exceeding 100 hectares (totalling 1 599 ha): see Table 31.

The burnt area, number of fires and average fire size for the period of 1990-2012 are shown in Figure 72.

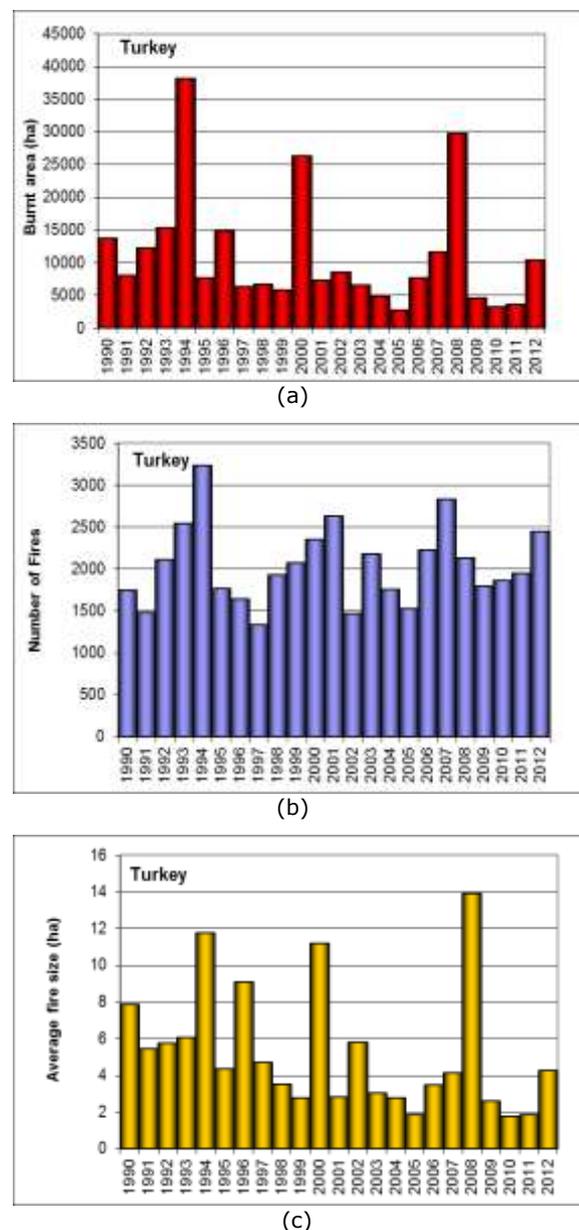


Figure 72. Burnt areas (a), number of fires (b) and average fire size (c) in Turkey from 1998 to 2012

Table 31. Number of fires and burnt area in 2012 by region and fire size class

Region	A <1.0 Ha		B 1.1 - 5.0 Ha		C 5.1 - 20.0 Ha		D 20.1 - 50.0 Ha		E 50.1 - 200.0 Ha		F 200.1 - 500.0 Ha		G >500.0 Ha		TOTAL	
	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area	Nr Fire	Brt Area
ADANA	76	26.4	16	39.8	3	41.0	1	36.0	4	506.1	1	267.0			101	916.3
ADAPAZARI	39	16.0	12	28.8	4	31.3	1	23.0							56	99.1
AMASYA	68	35.6	22	56.5	5	47.0									95	139.1
ANKARA	89	33.6	19	46.9	4	55.0	1	23.0							113	158.5
ANTALYA	175	40.2	29	69.6	6	69.9	2	75.0	1	148.0	1	250.0			214	652.7
ARTVİN	1	0.4	2	6.5											3	6.9
BALIKESİR	49	15.8	18	41.8	1	8.2	3	114.5	1	60.0	1	418.0			73	658.3
BOLU	29	9.2	10	22.6			1	32.7							40	64.5
BURSA	60	16.7	15	35.3	3	23.0	2	70.0	1	198.0					81	343.0
DENİZLİ	50	16.7	11	28.3	3	38.5	4	151.5							68	235.0
ELAZIĞ			2	3.7	2	16.5									4	20.2
ERZURUM	3	2.5	9	22.0	4	41.0									16	65.5
ESKİŞEHİR	20	10.7	15	34.9	2	29.0	1	30.0							38	104.6
GİRESUN	21	10.1	9	22.2											30	32.3
ISPARTA	82	11.7	17	47.0	2	27.3	2	73.0	2	138.5					105	297.5
İSTANBUL	202	25.4	23	54.9	3	27.0									228	107.3
İZMİR	219	53.0	33	74.7	13	123.4	2	95.0	2	128.1					269	474.2
K.MARAŞ	84	26.6	27	67.5	5	46.0	4	128.0	8	874.0	2	664.0	2	1863.0	132	3669.1
KASTAMONU	105	26.6	11	25.4	2	15.0	1	37.5	1	100.0					120	204.5
KAYSERİ	4	1.6	10	33.1	2	16.0									16	50.7
KONYA	36	15.2	11	26.3	2	13.5	1	30.0							50	85.0
KÜTAHYA	49	13.8	4	9.3					1	159.5					54	182.6
MERSİN	61	18.5	8	17.6	2	14.0	1	25.0	3	430.0					75	505.1
MUĞLA	356	56.4	18	39.3	8	111.2	1	35.0							383	241.9
Ş.URFA	10	4.7	6	15.0	7	69.5									23	89.2
TRABZON	4	0.4	1	1.1			1	37.0							6	38.5
ZONGULDAK	43	9.3	10	32.9	1	6.0	1	48.0	1	82.0			1	835.0	57	1013.1
TOTAL	1935	497.0	368	902.9	84	869.3	30	1064.2	25	2824.2	5	1599.0	3	2698.0	2450	10454.6
%	79.0	4.8	15.0	8.6	3.4	8.3	1.2	10.2	1.0	27.0	0.2	15.3	0.1	25.8		

Fire causes

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

These areas are:

- Densely populated areas
- Areas of high migration
- Areas where there are valuable lands
- Places with Cadastral Problems
- Tourism Areas

Most of the fires were caused by human activities (85% in total). The causes of forest fires in 2012 are shown in Figure 73.

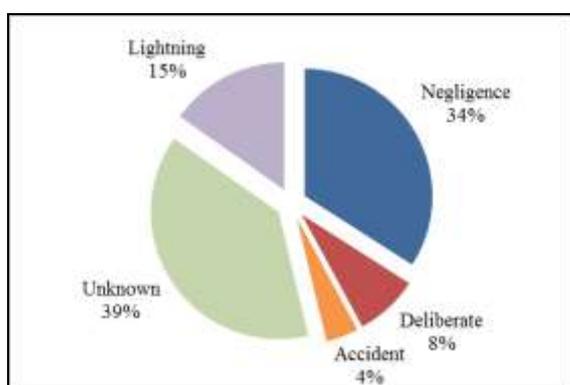


Figure 73. Main causes of forest fires in 2012

Fire fighting means

In addition to forest fires, General Directorate of Forest has been intervening in agricultural fires for the recent years, which is a high burden with about 3 000 non-forest incidents in 2012.

In 2012, 2 500 technical staff, 5 000 forest preservation officers and 12 000 workers were involved in detection, communication and suppression efforts. Ground and air equipment used for fire fighting in 2012 are presented in Table 32.

Preventive measures

In Fire Sensitive Regional Forest Directorates

- Planting fire-resistant species in rehabilitating burning areas
- Converting existing forests to fire-resistant forests (YARDOP Project).
- Creating differential elements (road etc.) in order to stop probable fires in settlements and agriculture lands from spreading towards forest
- Planting fire-resistant species along roadsides in order to hinder forest fire from turning into crown fire.

Table 32. Land and aerial means in 2012

<i>Land Means</i>		<i>Aerial Means</i>	
Bulldozer	187	Leased Helicopter	21
Grader	164	Leased Aircraft (Dromaders)	14
Trailer	63	Amphibious Aircraft (CL 215 Canadair)	6
Fire Truck	973	Administrative helicopters (owned by forestry organisation)	6
Water Tank	282		
First intervention vehicle	504		
Motorcycle	856		

Early Fire Warning Systems

- So far, a total of 776 fire towers have been built to detect fires and to report to suppression teams.
- The system enables rapid detection of forest fires through visible range optical cameras. (Fire Command Centres can also monitor the progress through these cameras).

Construction of Pools and Ponds

- During 2012, for the purpose of shortening the periods of forest fire attacks in forested areas where water sources are scarce, 2694 fire pools and ponds were constructed and will continue to be constructed.

Creation of fire risk maps

- Weather factors such as wind, temperature, relative humidity are taken from meteorology to create fire risk maps.
- With the aid of fire risk maps, risk points and areas are determined and their coordinates submitted to mobile teams. Thus, in addition to monitoring the forest, teams are mobilized towards fire risk areas and points.

Education, Public awareness and information campaigns

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

Training of Technical staff

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

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

Training of Technicians

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

Training of Workers

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

Public awareness and information campaigns

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

a) Awareness-raising activities for target groups.

Activities for children and young people:

During 2012, conferences were held, plays were staged by Sincap Children Theatre, and brochures, books and magazines on forest were distributed to schools and other places to raise awareness about environmental, social and economic issues, fire causes and how they can be avoided.

Activities for forest villagers, hunters and shepherds

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

b) Awareness-raising activities at national level:

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

Injuries and loss of human lives

Unfortunately, five staff members lost their lives during fire suppression operations (helicopter accident) in 2012.

Operations of mutual assistance

In response to requests for assistance, Turkey sent its aerial means to forest fires in Albania, Bosnia-Herzegovina, Libya and Northern part of Cyprus. The assistance provided is summarized in Table 33.

Table 33. Assistance provided to other countries by Turkey during 2012

<i>Country</i>	<i>Aircraft type</i>
Albania	1 Amphibious Aircraft (CL 215 Canadair) 1 Helicopter
Bosnia-Herzegovina	1 Helicopter
Libya	1 Amphibious Aircraft (CL 215 Canadair)
Northern part of Cyprus	1 Amphibious Aircraft (CL 215 Canadair) 4 Helicopters

(Source: Forestry Directorate of Antalya, International Forest Fires Training Centre, Turkey)

2.3 MENA COUNTRIES



2.3.1 Algeria

Fire danger in the 2012 fire season

Forests in Algeria are heterogeneous in terms of species, and are unevenly distributed across the country. Out of the 48 wilayas of Algeria, 40 have forest cover and eight provinces of the South are totally devoid of forests.

The provinces of the north-eastern region of the country are those with the highest rates of forest cover, as opposed to those of the Sub-Saharan region which have lower rates (Figure 74).

This distribution can be explained largely by the climate that characterizes these areas; the more humid coastal massifs of the Northeast are also the most forested regions.

The 4.7 million hectares of forest cover represent an afforestation rate of 10.89% considering only the north and only 1.72% if we take into account all the national territory.

The 2012 campaign against forest and scrub fires was held in very adverse weather conditions, characterized by a succession of strong and protracted heat-waves, when temperatures reached peaks of 50°C in the southern regions and 47°C in some provinces of the north.

This situation was mainly due to successive invasions of warm air masses over a large part of the country, which resulted in typical, almost continuous Sirocco conditions. Therefore, ideal conditions for the emergence and spread of fire were constantly together, especially during the months of July and August when the drying of vegetation reached a very high rate, which resulted in outbreaks of a number of very large fires that caused huge losses compared to previous years.

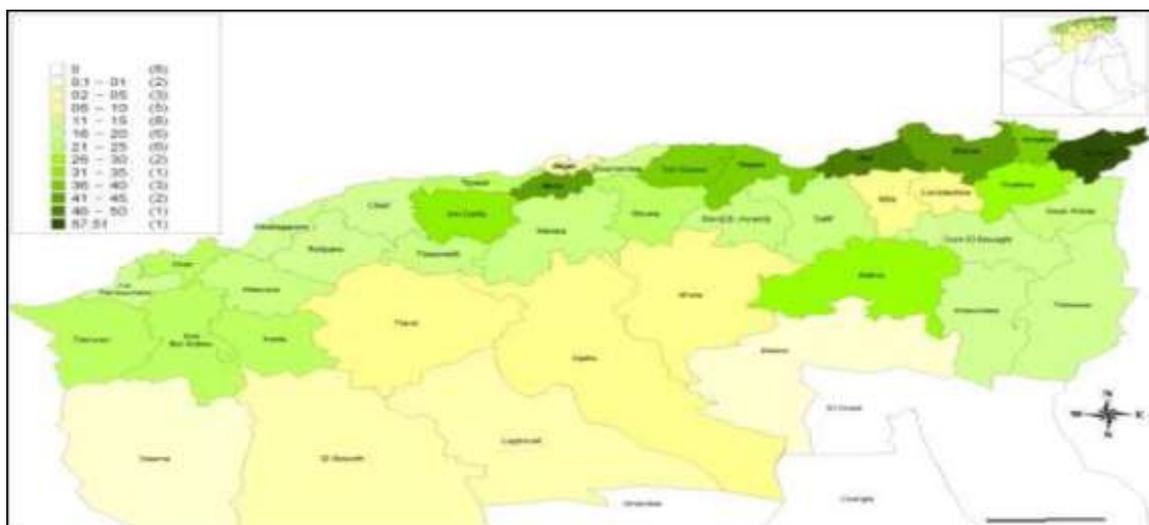


Figure 74. Distribution of forest cover by wilaya in Algeria

Forest fire prevention

Several actions have been undertaken at the beginning of 2012 for the prevention of forest and scrub fires. The main actions are summarized in the following points:

Preventive work

Operation management and maintenance:

Firewall trenches (904 ha), forest trails (1841 km), water points (65), clearings under high voltage lines (794 ha), roadside verges (5255 km), Railway verges (277km) and other forestry work (19 452 ha).

New works:

Firewall trenches (124 ha), forest trails (824 km) water points (88), buffer zones around farms (6649 ha).

Awareness campaigns

- Promotion of more than 350 conferences and debates on the theme "forest fire" for the benefit of citizens and schoolchildren across regions and vulnerable communities at risk.
- Organization of more than 250 exhibitions and open days for the benefit of the local population in forest areas.

- Distribution of leaflets and posters containing measures for preventing forest fires: at least 40,000 flyers were distributed by the authorities concerned.
- Organization of tours and meetings with local farmers and residents of remote rural areas to raise awareness about the precautions to prevent the outbreak and spread of forest fires.
- Promotion of many televised broadcasts on national and local channels on the theme "wildfire risk".
- At least 300 sermons and religious lectures by imams, throughout the wilayas, on the importance of forest conservation.

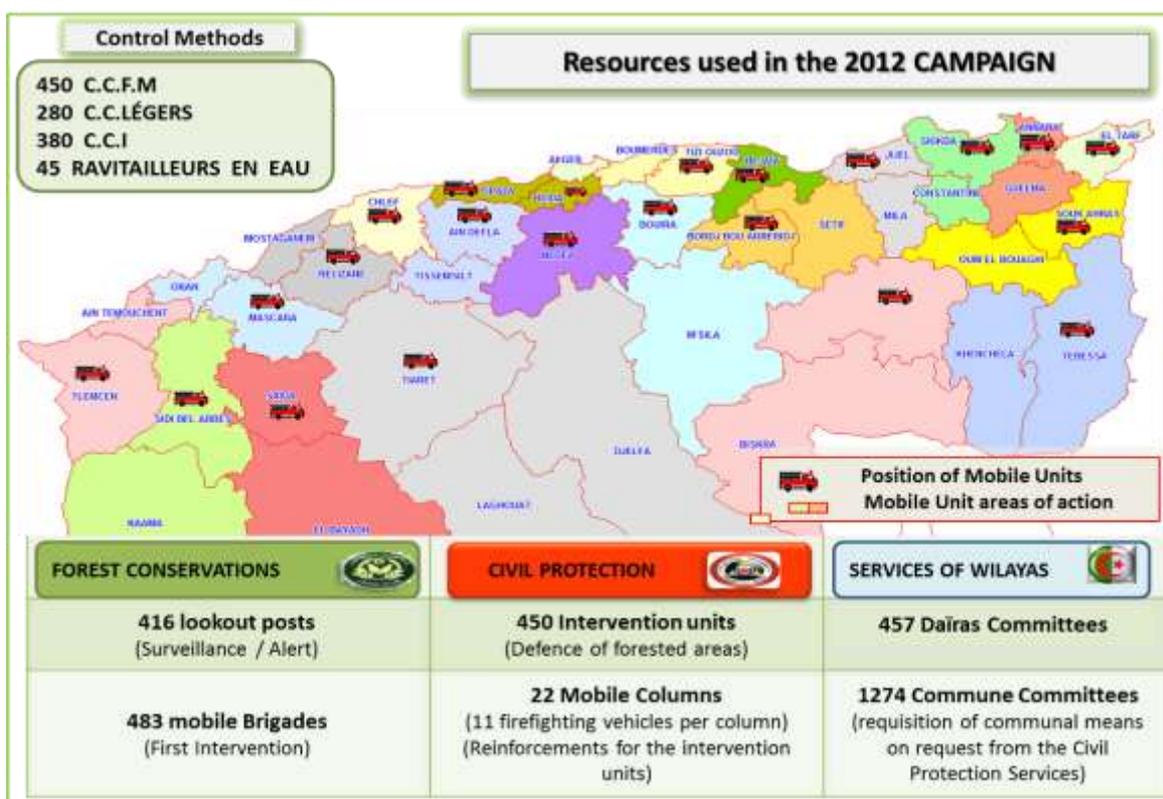


Figure 75. Resources used in the 2012 campaign

Organizational

- 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.

Monitor, alert, and response reinforcement

The general plan of organization for the fight against forest fires in the summer of 2012 (Figure 75) has not changed compared to the year 2011; however, the systems put in place were strengthened, particularly in relation to:

- Number of watch positions and mobile brigades of Custody Forest, responsible respectively for monitoring, warning and first intervention, in accordance with the Algerian regulations.
- Number of new intervention units of the Civil Defence located in forest areas and having forest sectors to defend.

- Material composition of twenty-two (22) Mobile Columns of the Civil Protection, responsible for strengthening intervention units in extinguishing forest fire operations.
- Number of proximity devices installed for the protection of sensitive areas.

Fire occurrence and affected surfaces

The overall assessment for the period from 1 June to 31 October 2012, reveals 5 110 outbreaks of fire, burning a total area of 99 061 ha of Forests, Maquis, Scrub, Alfa and other new reforested land, giving a ratio of about 19 ha/fire, which is substantially higher than that of 2011, estimated at 07.5 ha/fire.

The distribution of the areas affected by fire, classified by vegetation (Figure 76) shows that the forests paid the heaviest price with respect to fires in the summer 2012, confirming the vulnerability of our forests to fire due to the domination of Aleppo pine, which is a highly combustible species.

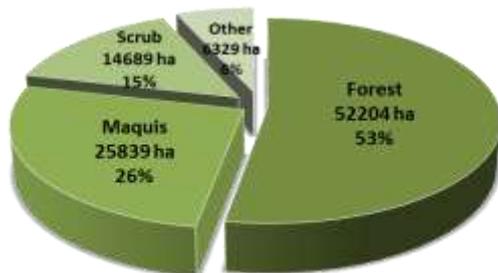


Figure 76. Burnt area classified by vegetation type

The distribution of the areas affected by fire, according to the three main regions (Figure 77), shows that it is the regions located in the east and centre of the country, characterized by the presence of forests, heavily wooded and densely populated, which experienced more fires and losses during the 2012 season.



Figure 77. Burnt area classified by regions of the country

The distribution of the areas affected by fire during the five months of the 2012 season (Figure 78) indicates that the highest number of fires start during the hottest month and the driest part of the year (August), causing more damage.

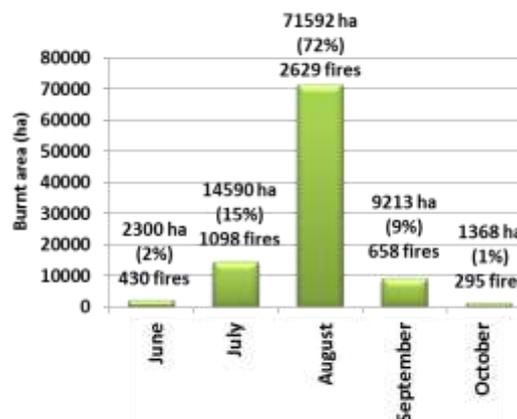


Figure 78. Number of fires and burnt area by month

Loss of life

Despite the significant risk which affected several villages and homes located within forests, no deaths among citizens were recorded following the 2012 fire season.

However, two members of the Civil Protection and a forester from the Forest Conservation, were killed as a result of burns when working for forest fire in the wilaya of Souk-Ahras located to the east of the country.

In addition, several less serious accidents related to fractures, respiratory troubles, burns and minor injuries were reported among the members of the intervention teams of the Civil Protection during certain control operations.

Mutual assistance operations between states

Algeria did not request any assistance in the fight against forest fires during the 2012 season, nor did the General Directorate of Civil Protection participate in any intervention operation for forest fires outside Algerian territory.

Fires reported near the Tunisian border were quickly mastered without recourse to the implementation of the agreement on cooperation and mutual assistance between the two countries.

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

2.3.2 Morocco

Background

In over 9 million hectares of forest domain representing more than 20% of the national area, forest formations in Morocco cover an area of 5 814 000 ha (broadleaves, conifers...) and 3 318 260 ha of *stipa tenacissima* (Figure 79), and are distributed among the different bioclimatic zones, from semi-arid to humid.

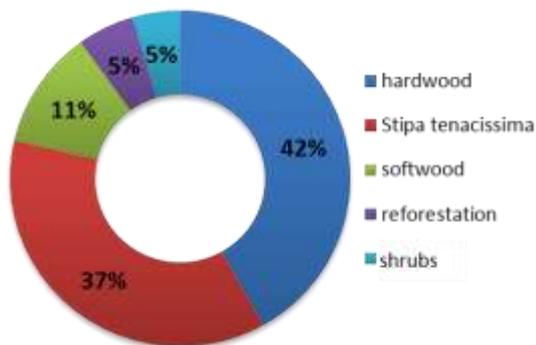


Figure 79. Composition of forest land in Morocco

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 2011, an average of 277 fires per year is calculated for an annual average area affected of 3 114 ha (HCEFLCD, 2011).

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 2012, a total of 14 205 outbreaks of fire (Figure 80) 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 81). The absolute minimum is recorded in 2002 with 593 ha (Figure 81).

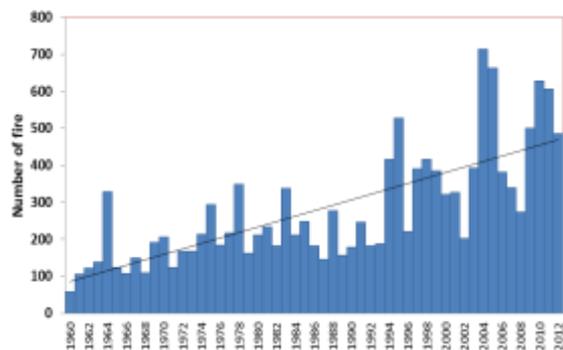


Figure 80. Evolution of forest fire numbers from 1960 to 2012 (HCEFLCD, 2012)

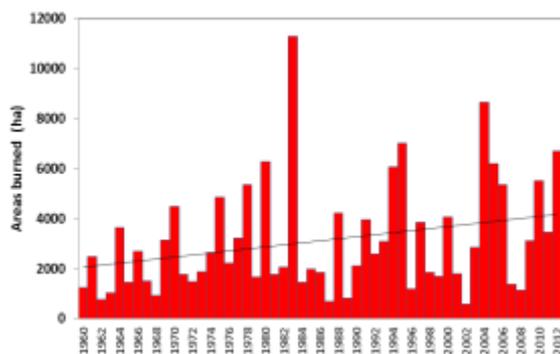


Figure 81. Evolution of the areas burned from 1960 to 2012

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 431 forest fires between 2005-2010 and even reached 606 forest fires in 2011 (Figure 80).

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 3 114 ha). We note that the area affected per fire, which reached the value of 7.5 ha during the period 2005-2009, has decreased by 37% compared to the national average recorded since 1960, which is 12 ha per fire (Figure 81).

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

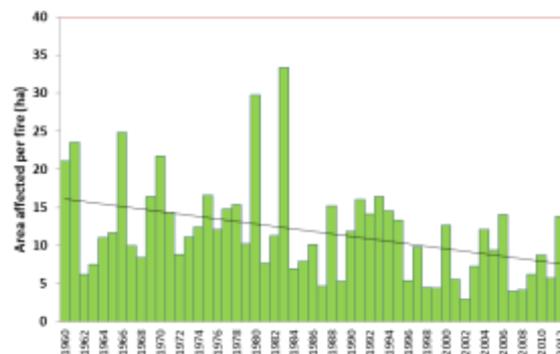


Figure 82. Evolution of the area affected per fire from 1960 to 2012

2012 fire season

During 2012, there was recorded a total of 484 fires affecting an area of 6 696 ha, an average of 13.8 ha per fire.

The distribution of fires recorded in 2012 (Figure 83), based on the type of vegetation affected, is as follows:

- For wooded land, an area of 2 783 ha (41% of the total area burned) was affected by 174 fires (36% of the total number of fires), averaging 16 ha per fire;
- The shrub and herbaceous covers were affected by 310 fires that covered an area of 3 910 ha, equivalent to 64% respectively of the total number of reported fires and 58% of the total area burned.
- For wooded stands, the cork oak is in first place with an area of 1 433 ha affected, equivalent to 21% of the total area burned in this category, followed by pine trees with an area of 771 ha affected (14%).



Figure 83. Map locating the forest fires recorded in 2012 in Morocco

Table 34. Distribution of fires based on the type of vegetation affected in 2012

Category	Species	Number	% Number	Area	% Area
Coniferous	Cedar	19	4	12	0.18
	Juniperus oxycédre	1	0.21	0.5	0.01
	Juniperus	3	1	0.2	-
	Pines	63	13	771	14
	Thuya (tetracolis articulata)	8	1.65	449	6.7
Subtotal coniferous		94	19	1 234	18
Broadleaves	Argan	3	0.62	10.3	0.15
	Cork oak	27	5.58	1 433	21.41
	holm oak	39	8.06	76	1.14
	Eucalyptus	9	1.87	26	0.39
	holm oak	1	0.21	1	0.01
	Oleaster	1	0.21	2	0.03
Subtotal broadleaves		80	17	1 548	23
Others	Shrub	188	39	3 690	55
	Herbaceous	123	25.21	223.4	3.34
Subtotal others		311	64	3 913	58
General total		484	100	6 696	100

The data relating to the distribution of fires according to size classes of affected areas are represented in the table below (Table 35). Indeed, 90% 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 3 fires (1% of the total number of fires) affected an area of over 250 hectares, representing over 62% of the total area burned.

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

Size Class (ha)	Number		Area (ha)	
	Count	%	Area	%
0-5 ha	435	90	318	5
5-10 ha	16	3	122	2
10-20 h	10	2	156	2
20-50 ha	11	2	351	5
50-100 ha	3	1	231	3
100-250 ha	6	1	1 334	20
>250 ha	3	1	4 183	62
Total	484	100	6 696	100

The data showing the distribution of fires by forest region are reported in Table 36.

Table 36. Fire numbers and area affected by forest region

Region	Number		Area (Ha)	
	Count	%	Area	%
Centre	12	2	8	0.12
Fes-Boulmane	20	4	12	0.18
Haut-Atlas	5	1	40	0.59
Moyen-Atlas	37	8	160	2.39
Nord-Est	69	14	180	2.68
Nord-Ouest	15	3	34	0.52
Oriental	62	13	1 929	28.80
Rabat-Sale-Zemmour-Zaer	23	5	8	0.13
RIF	219	45	3 690	55.11
Sud-Ouest	13	3	630	9.41
Tadla-Azilal	9	2	4	0.06
Total	484	100	6 696	100

The Rif region occupies the first place in terms of number of fire outbreaks and areas affected with respectively 219 fires (45% of the total number of fires at the national level) and 3 690 ha (55% total area burned). The Oriental region comes second with 62 fires and 1 929 ha burnt, followed by the South West with 13 fire starts affecting 630 ha.

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

Fire Causes

Natural fires (lightning) are very rare. Forest fires of unknown origin represent a dominant share (95%). Almost all forest fires result from human action, either intentionally or by negligence (Table 37).

Table 37. Causes of fires

Origin	Cause	Number		Area	
		Count	%	Area	%
Accidental	Landfill	2	0.41	0.21	1.91
	High tension line	3	0.62	31.89	0.48
	Manufacture of coal	6	1.24	6.02	0.13
	cigarette butt	2	0.41	25.50	0.20
	Burning of stubble	3	0.62	126.5	0.03
unknown	unknown	459	94.83	5510.0	97
Intentional	Land clearing	4	0.83	2.38	0.02
	Vengeance	2	0.41	993.0	0.09
Natural	lightning	3	0.62	0.10	0.00
Total General		606	484	100	6696

Information campaigns

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

Since 2005 and until 2011, 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 2012 season.

Fire fighting means

The means mobilized by the different departments in 2012 in Morocco for the operations against forest fires, are as shown in Table 38:

Table 38. Fire fighting means in Morocco in 2012

Activities	Department	Quantity
Monitoring and alerts	High Commission of Forests, Water and combating Desertification	1100 watchers
	Ministry of the Interior	NC [Estimated to 1000 watchers]
Ground intervention	High Commission of Forests, Water and combating Desertification	332 forests fighters with 65 vehicles for the first intervention
	Civil Protection	NC
	Auxiliary Forces	NC [Estimated to 300 persons]
	Royal Armed Forces	NC [Estimated to 300 persons]
Aerial control	Royal Gendarmerie	Twelve (12) Turbo Trush aircraft
	Royal Air Forces	Two (2) C130 aircraft and Three (2) Canadairs

NC : Not Communicated

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

2.3.3 Lebanon

Number of fires and affected surfaces

Data on fire occurrence and affected surfaces in Lebanon are still not mutually consistent, homogenized and unified at the National level.

A study conducted by the Biodiversity Program (BP) at the Institute of the Environment (IOE), the University of Balamand (UOB) employed satellite remote sensing data (namely Landsat images) to map the extent of relatively large burned areas of forests across Lebanon for the year 2012. Fire affected areas as small as 0.06 ha were mapped and documented. The results showed a total fire affected area of 244 ha. Other data acquired through the Global Fire Information Management System (GFIMS) showed a total of 73 hotspot/fire locations between 4/4/2012 and 30/10/2012.



Figure 84. A photo showing a forest affected by an intense recurrent fire in North Lebanon in 2012
(Photo courtesy of George Mitri)

Fire fighting means and information campaigns

Military helicopters along with Civil Defence teams have been involved in putting out a number of wildfires that broke out in different locations across Lebanon specifically in the regions of Mount-Lebanon and North-Lebanon. One of the largest fires in 2012 had been raging for five consecutive days in the North Governorate of Lebanon. Local residents provided support to fire fighters from the Lebanese Army and the Civil Defence who faced many difficulties in suppressing the fire.

Until 2012, the Directorate of the Civil Defence has comprised approximately 22 regional stations, 209 substations, 780 professionals, 2500 volunteers, and 820

vehicles (including fire engines, ambulances and rescue vehicles).

Several training workshops on various aspects in forest fire management were conducted in 2012. A total of 120 officers from different Lebanese army brigades were trained on various methods and techniques in combating forest fires. Also, 20 officers from the army and 10 fire fighters from the Directorate of the Civil Defence followed a training session on Incident Command System in forest fire control.

The Programme for the Prevention Preparedness and Response to Natural and Man-Made Disasters (PPRD South), together with the Italian Forest Corps and the National Fire-fighters Corps, trained 21 officers from the Lebanese Civil Defence on "New Techniques and Technologies for investigating the causes of Forest Fires". In June 2012, a follow-up initiative addressed to the same officers from the Lebanese Civil Defence, took place always in Lebanon.

Also, participants from Lebanon attended the "Euro-Mediterranean Training on Forest Fire Causes and Investigation Post Fires: how to prevent wildfires in the Mediterranean" in October 2012. The training, jointly organized by the Italian Forest Corps (CFS - Italy), the Committee on Mediterranean Forestry Questions-Silva Mediterranea and the German Cooperation (GIZ), aimed to share best practices and scientific methods developed by the Investigation Task Force against Forest Fires on the subject of forest fires in the last 10 years.

A project entitled: "Towards a better assessment and management of wildfire risk in the Wildland-Urban Interface (WUI) in Lebanon: gaining from the US experience" has started in 2012 with the aim to provide information for municipalities and land managers to better anticipate and mitigate wildfire risk and hazard in the WUI of Lebanon. The primary objective of the project is to use models to identify areas most vulnerable to wildfire risk due to changing fuel conditions, land-use and climate warming. This project is managed by the Biodiversity Program at IOE-UOB and funded by the Agency for International development (USAID) in agreement with the US National Academies of Science (NAS) within the Programme Partnerships for Enhanced Engagement in Research (PEER).

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

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 Centre (ERC), formerly Monitoring and Information Centre (MIC), of Civil Protection and the European Parliament with up to date and harmonized information on forest fires in Europe.

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

The purpose of EFFIS is to provide information for the protection of forests against fire in Europe addressing both pre-fire and post-fire conditions. It also centralises the national fire data that the Member States collect through their national forest fire programmes. A web mapping interface has been set up on the EFFIS website¹ 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 queried². 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 75% to 80% of the total area burnt in Europe each year.

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

3.1 EFFIS DANGER FORECAST: 2012 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 2012 fire season are presented, comparing them with previous years.

¹ <http://effis.jrc.ec.europa.eu>

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

In 2012, significant fire activity was observed quite early in the fire season in southern Europe, with over 100 000 ha burned by the end of March. In June, severe forest fires broke out in Greece, which had been experiencing hot and dry weather conditions combined with strong winds. July brought critical fire episodes in Spain and Portugal, which led to a number of human casualties. The beginning of August was more critical for the south eastern sectors, particularly southern Italy, Greece and the Balkans. In September conditions worsened again for Portugal, while still remaining critical in the Balkans.

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 2012 as determined by the average FWI values assessed during the fire season in the individual countries.

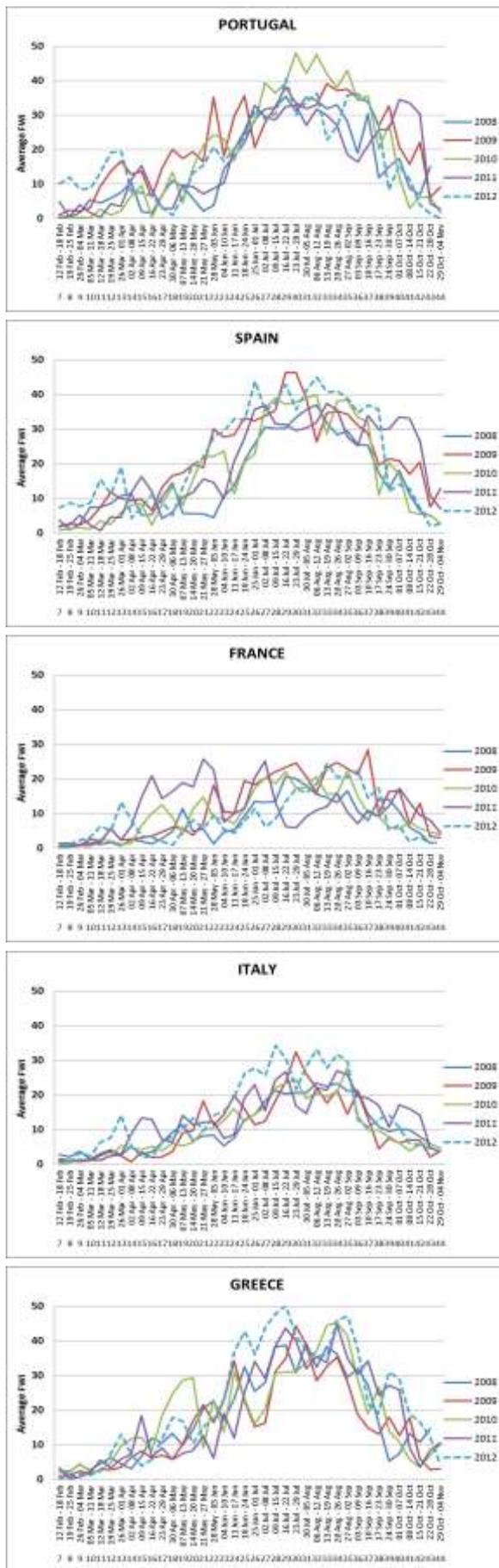
The graphs show the weekly averages of FWI over entire countries; therefore local peaks might have been flattened, especially in those countries such as France or Italy, where there are strong differences in fire danger level with changing latitudes; nevertheless the general trend is depicted providing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

To allow a better comparison with past seasons, the curves of 2008-2011 are presented in conjunction with 2012 for all countries.

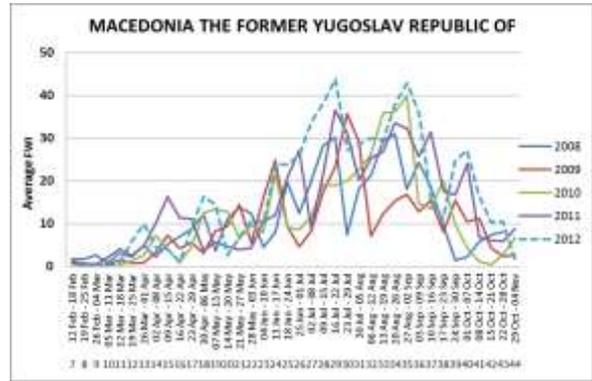
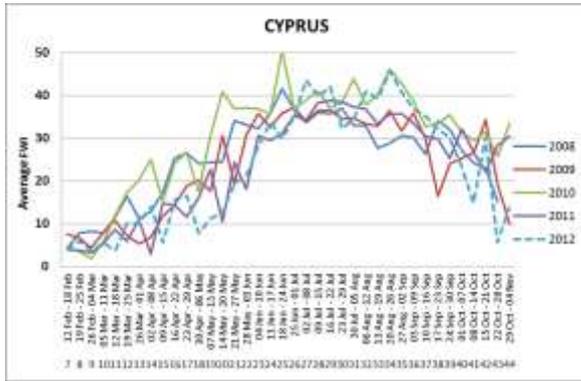
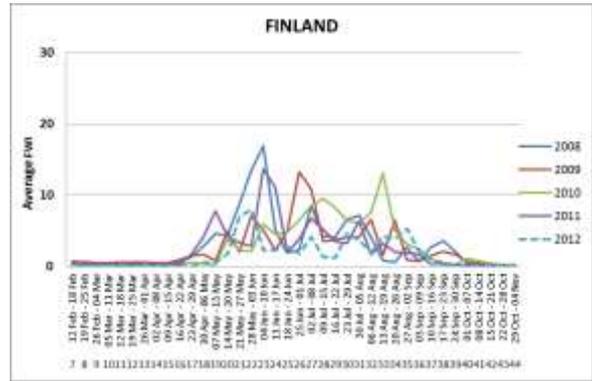
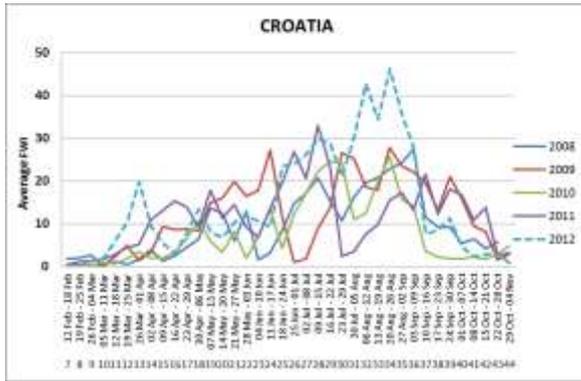
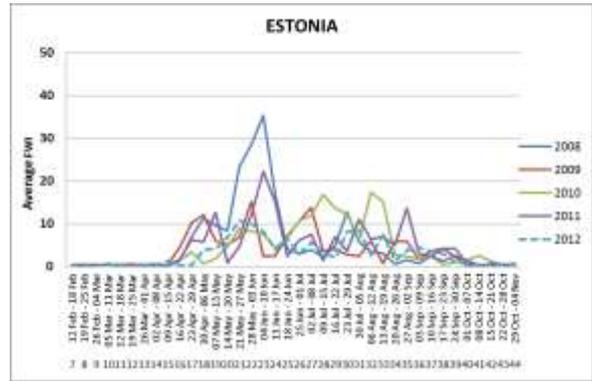
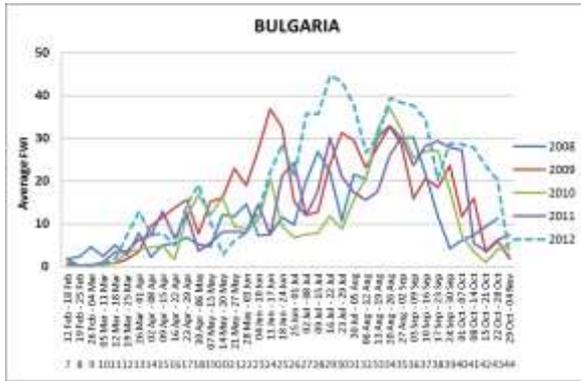
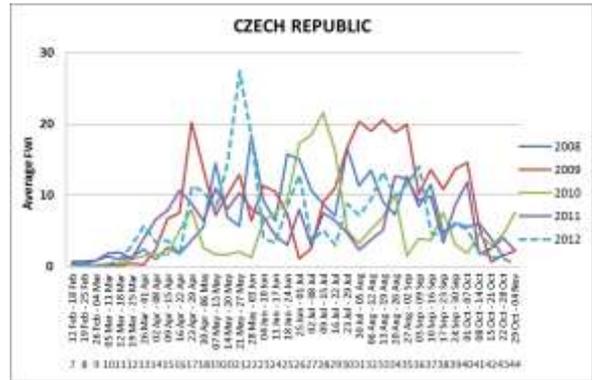
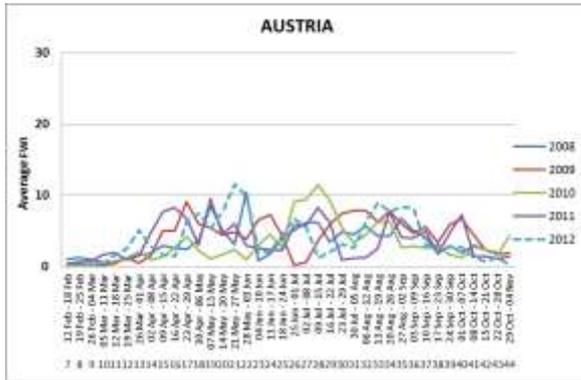
The countries analysed are those participating in the EFFIS network and are presented in alphabetic order within the three groups (5 most affected Mediterranean countries, other European countries and MENA countries) in the graphs that follow.

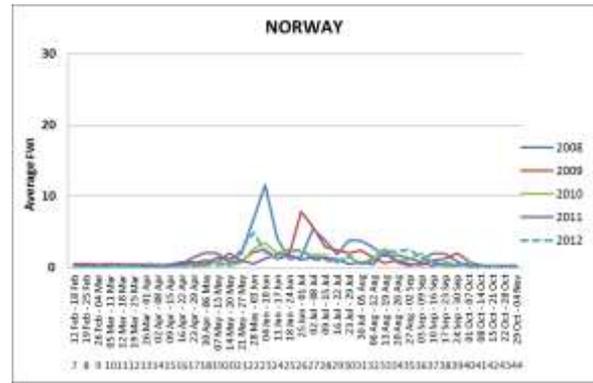
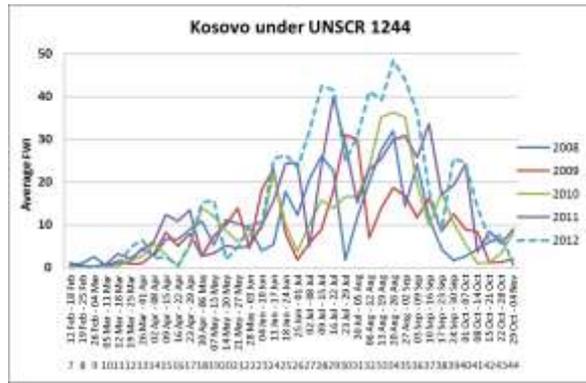
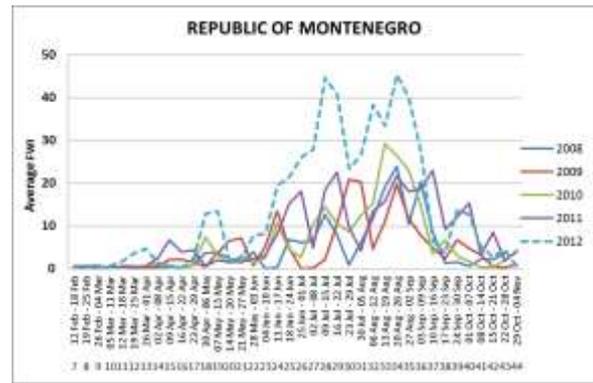
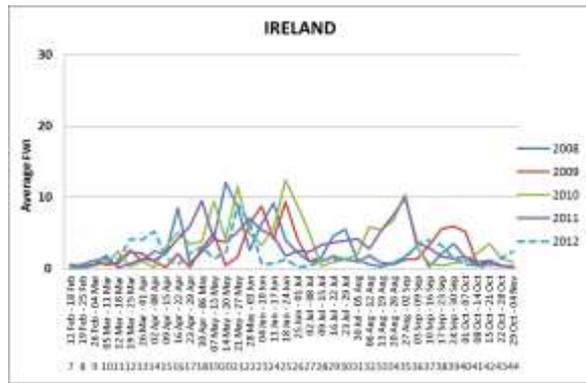
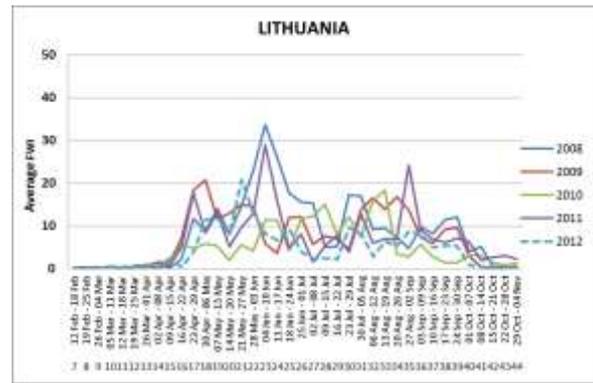
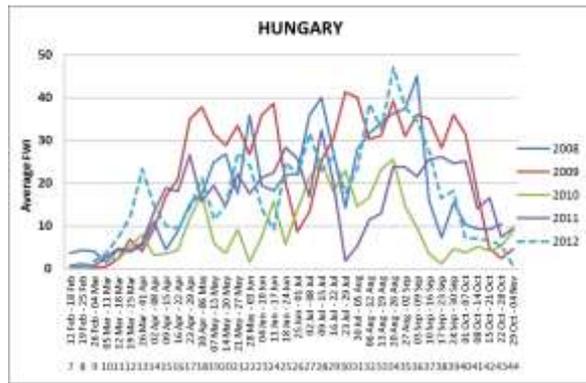
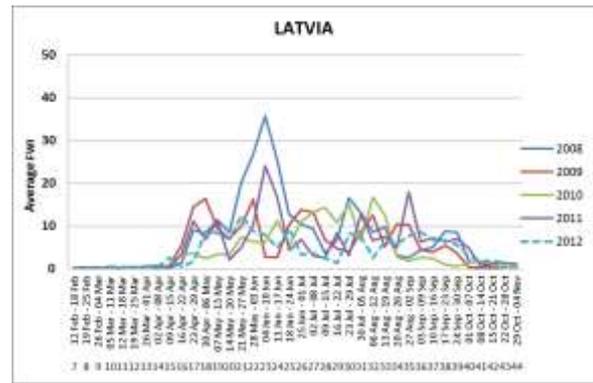
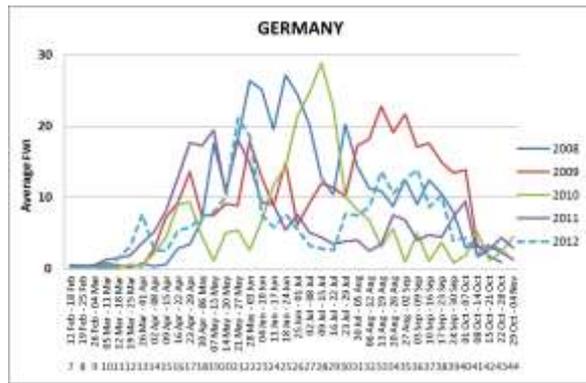
NOTE: In order to make the graphs more readable, 3 scales have been used to present the FWI: 0-30 for the most northern countries where fire danger rarely reaches high levels; 0-50 for most other countries including those in the Mediterranean; and 0-70 for the MENA countries and Turkey.

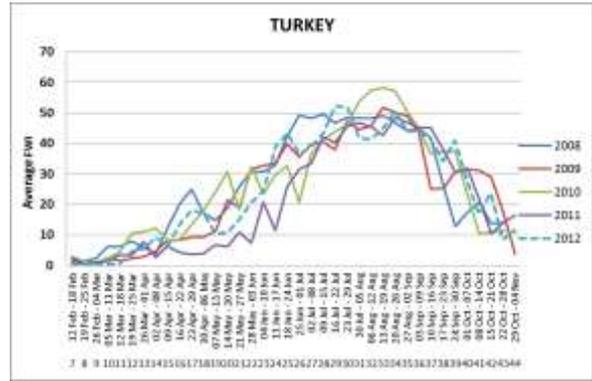
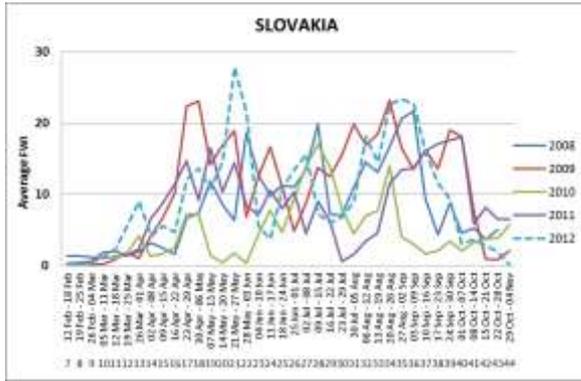
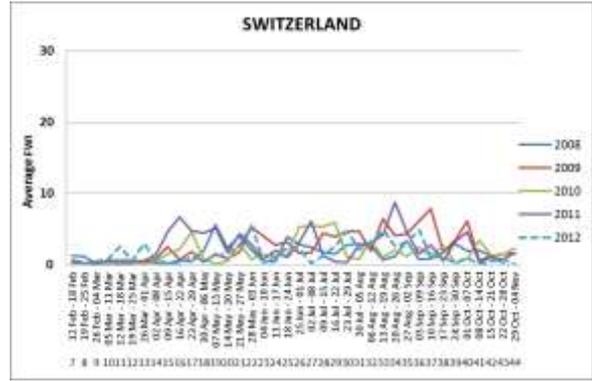
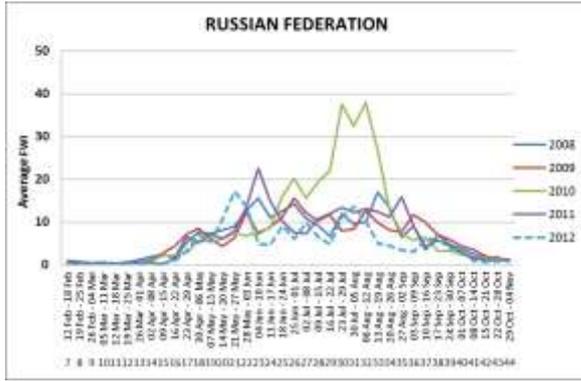
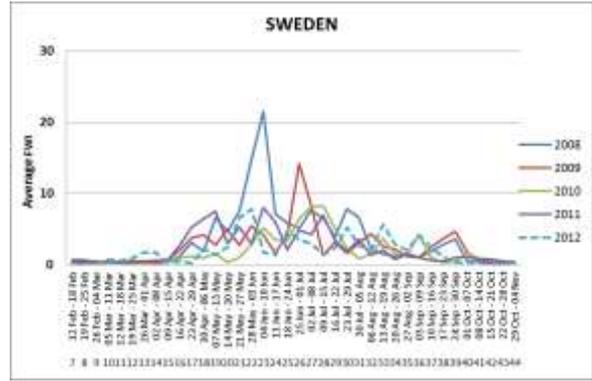
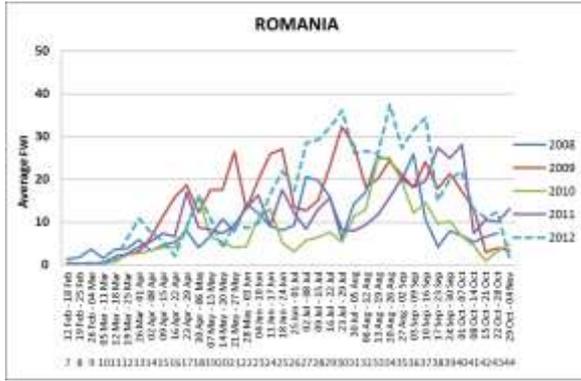
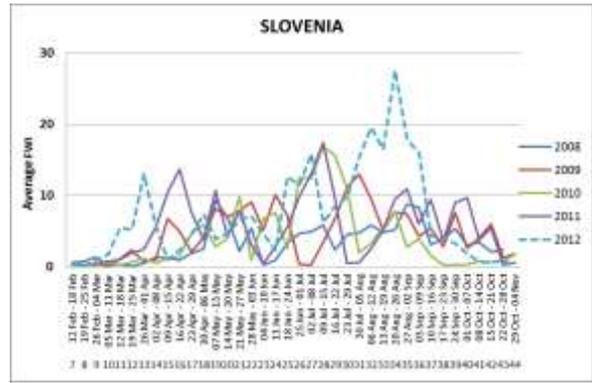
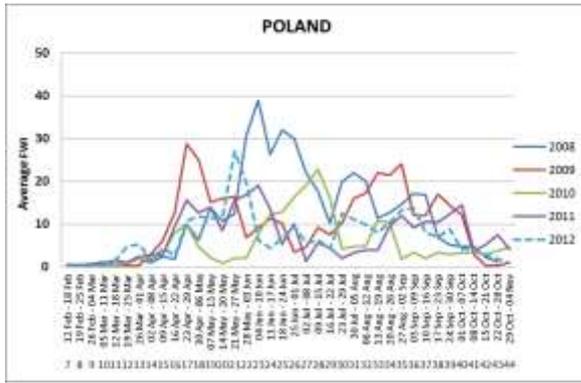
5 Southern Mediterranean Countries

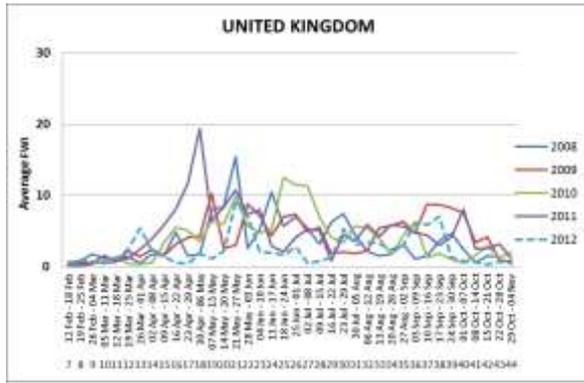


Other European Countries

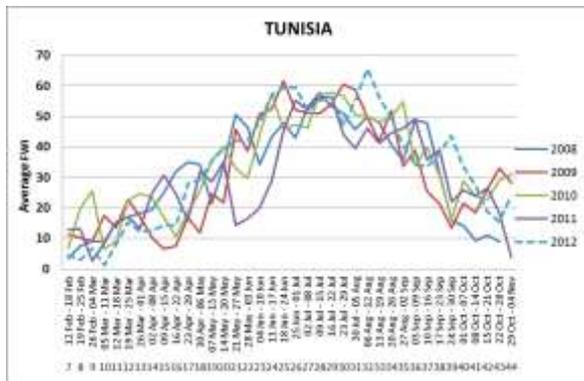
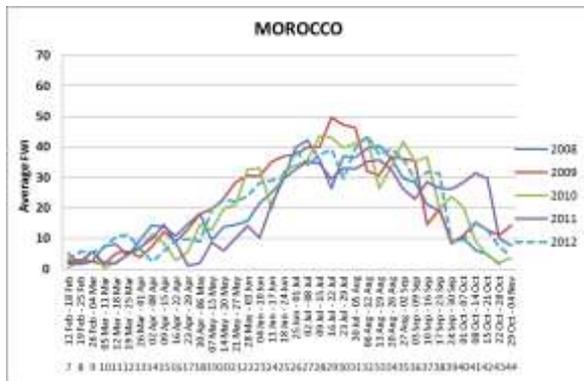
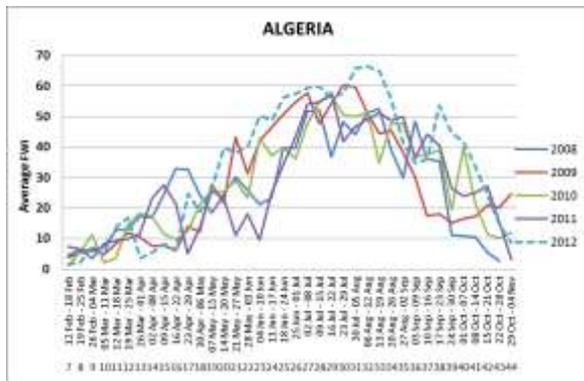








MENA Countries



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

Therefore, to show more clearly the seasonal changes in FWI in the larger EU Mediterranean countries, i.e. Portugal, Spain, France, Italy and Greece, their territory has been further divided for fire danger reporting, according to the map shown in Figure 85. 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 85. Sub-country regions identified for fire danger trend reporting in the five Mediterranean most affected Member States.

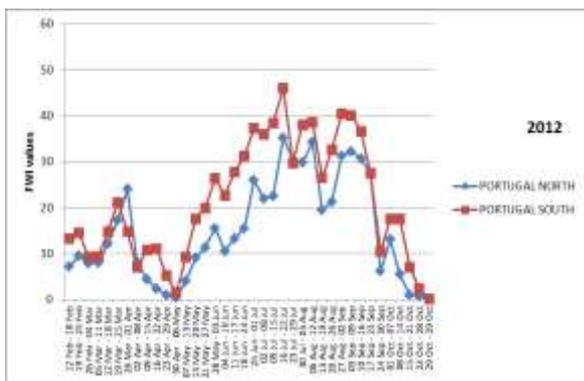


Figure 86. Fire danger trends in 2012 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal

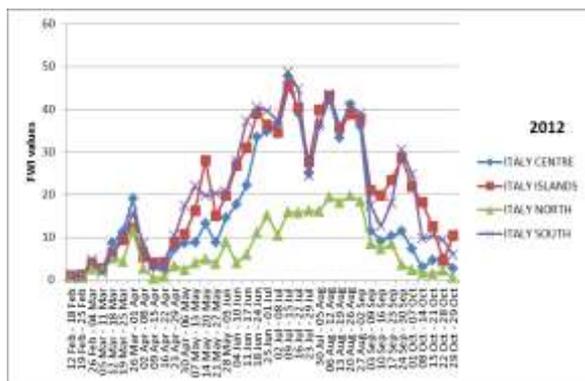


Figure 89. Fire danger trends in 2012 as determined by the Fire Weather Index (FWI) in the regions identified for Italy

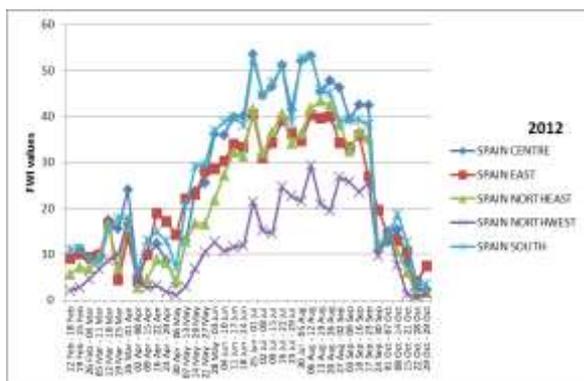


Figure 87. Fire danger trends in 2012 as determined by the Fire Weather Index (FWI) in the regions identified for Spain

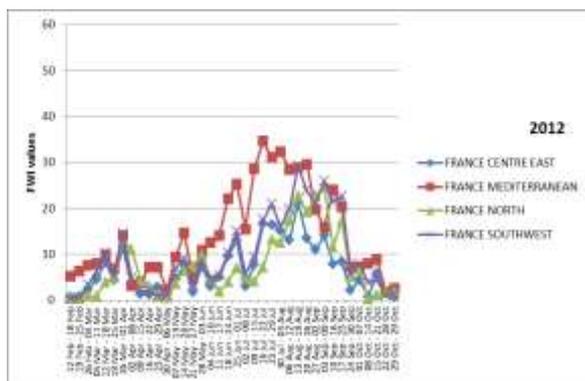


Figure 90. Fire danger trends in 2012 as determined by the Fire Weather Index (FWI) in the regions identified for France.

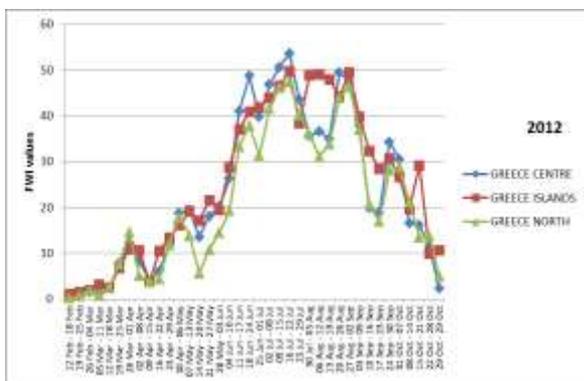


Figure 88. Fire danger trends in 2012 as determined by the Fire Weather Index (FWI) in the regions identified for Greece

To facilitate the comparison among the different countries in EU, in the next graphs (Figure 91 to Figure 96), 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 2010 to 2012.

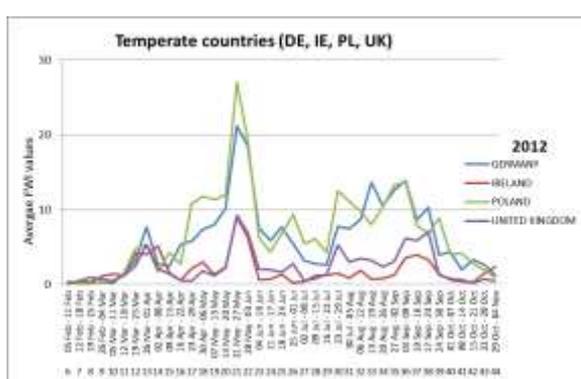
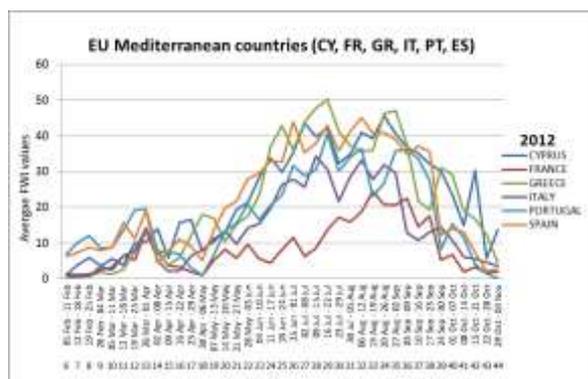
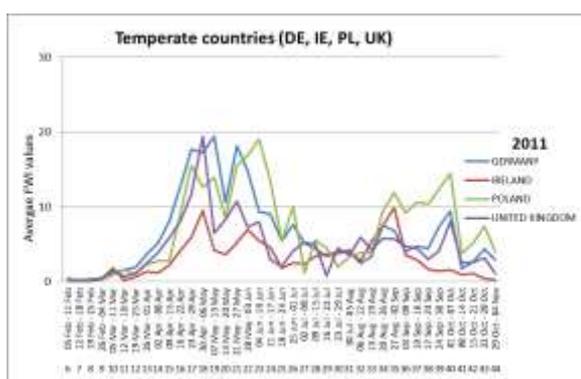
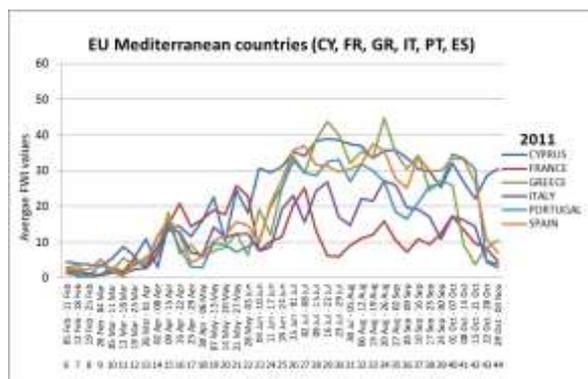
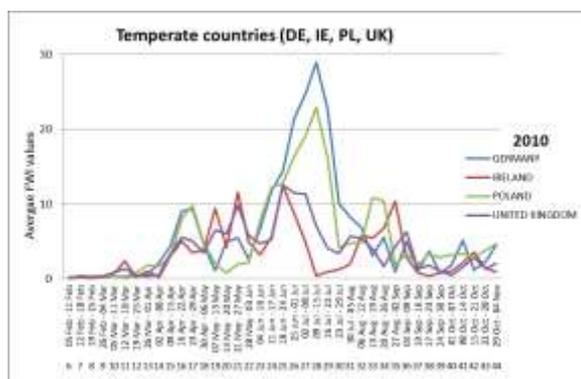
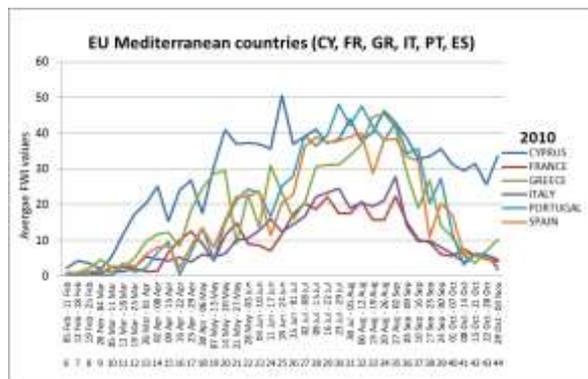


Figure 91. Fire danger trends 2010-2012 in EU Mediterranean countries (CY, FR, GR, IT, PT, ES).

Figure 92. Fire danger trends 2010-2012 in some EU temperate countries (DE, IE, PL, UK).

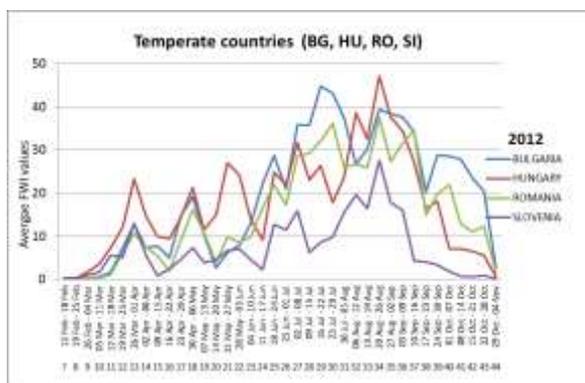
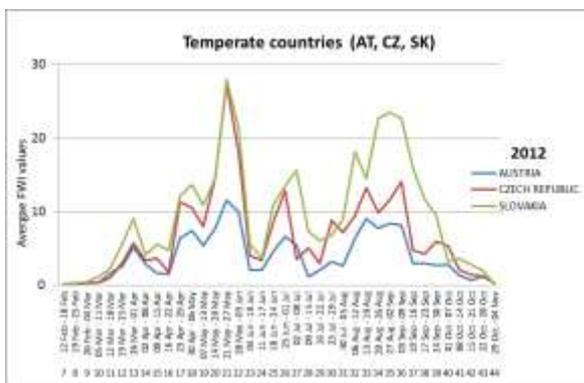
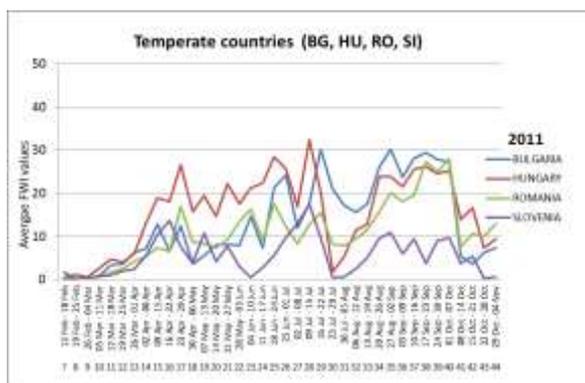
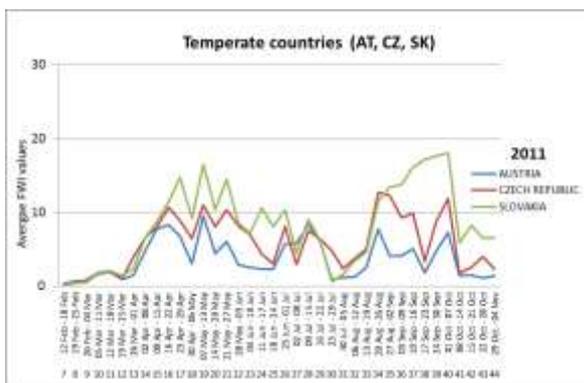
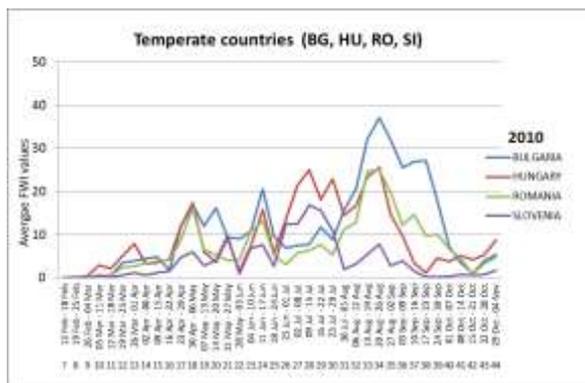
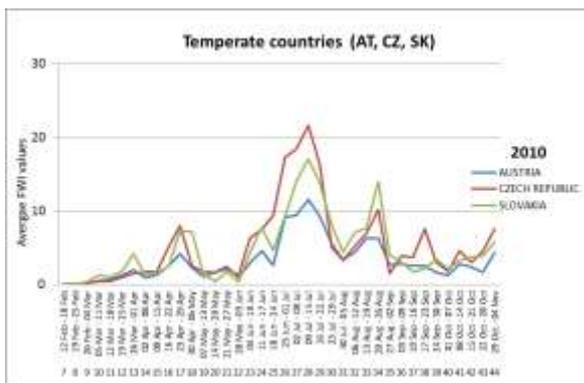


Figure 93. Fire danger trends 2010-2012 in some EU temperate countries (AT, CZ, SK).

Figure 94. Fire danger trends 2010-2012 in some EU temperate countries (BG, HU, RO, SI).

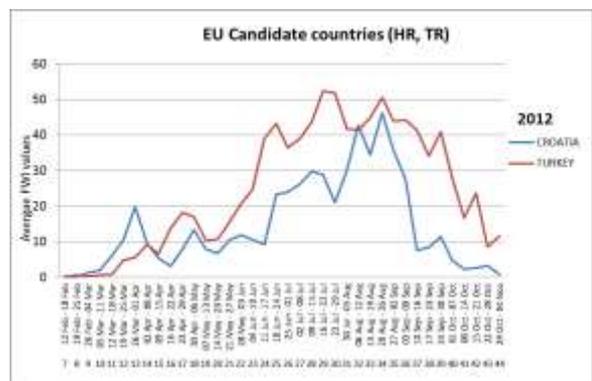
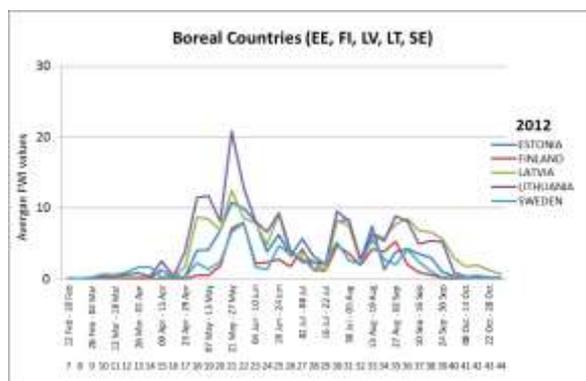
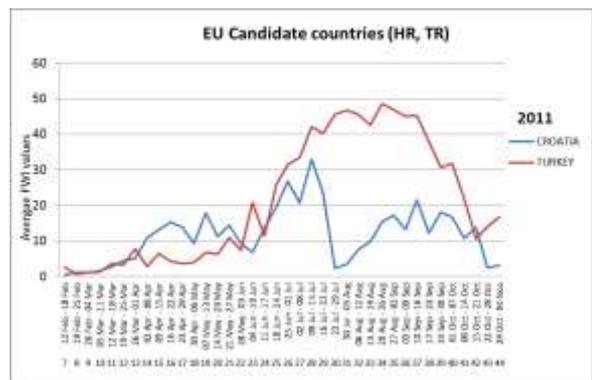
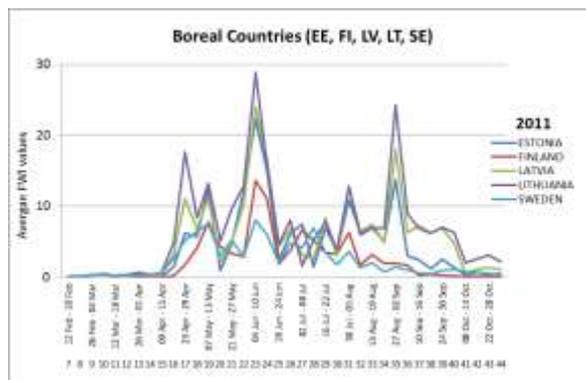
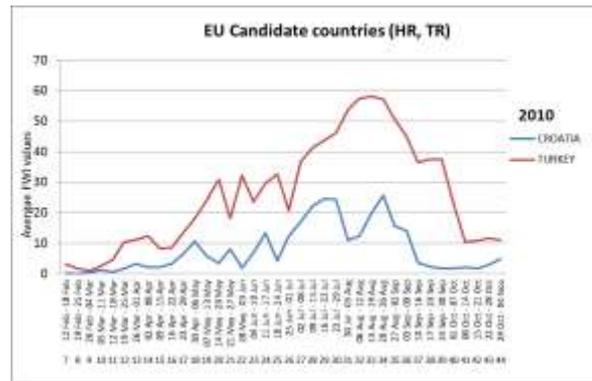
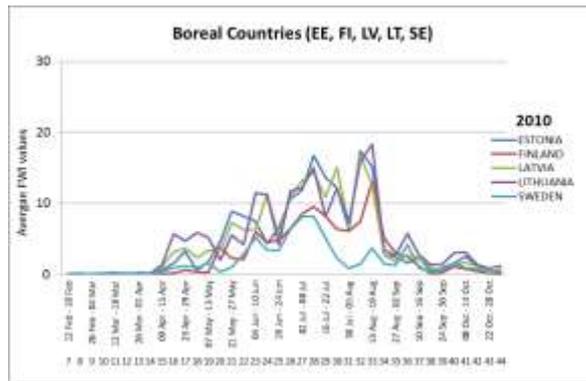


Figure 95. Fire danger trends 2010-2012 in some EU boreal countries (EE, FI, LV, LT, SE).

Figure 96. Fire danger trends 2010-2012 in EU candidate countries (HR¹, TR).

¹ From 1st July 2013, HR became a full member of the EU

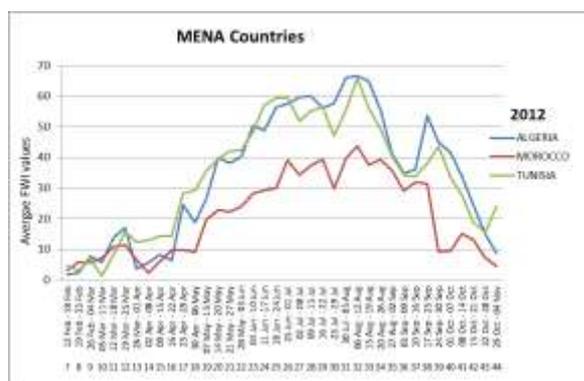
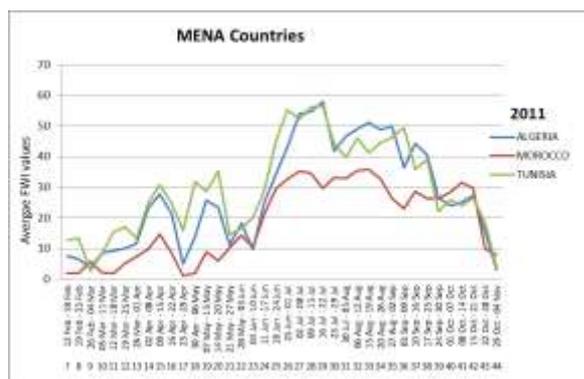
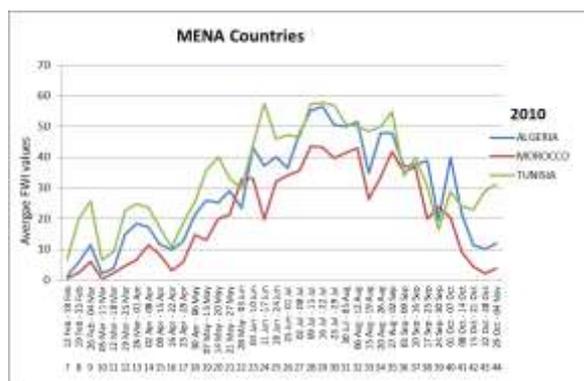


Figure 97. Fire danger trends 2010-2012 in MENA countries (DZ, MA, TN).

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

3.2 EFFIS RAPID DAMAGE ASSESSMENT: 2012 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 EU southern European countries mostly affected by forest fires (Portugal, Spain, France, Italy, Greece, and Cyprus) are given in the following paragraphs. In addition, an analysis for other countries in the region that had large forest

fires is also presented. In 2012, fires of greater than 40 ha were observed in 22 countries and the mapped burnt area was more than double that registered in 2011. In 2012, Spain and Algeria were by far the worst affected countries, between them accounting for more than 40% of the entire burnt area recorded during the year.

The worst month for fires was August, when approximately one half of the burnt area of the season occurred.

The total area burned in 2012 by fires larger than 40 ha, as shown by the analysis of satellite imagery, was 950 020 ha (Table 39). These figures may also include agricultural and urban areas that were burned during the forest fires.

Table 39. Areas burned by fires of at least 40 ha in 2012 estimated from satellite imagery.

Country	Area (Ha)	Number of Fires
Albania	54130.7	158
Algeria	201219.4	364
Bosnia and Herzegovina	87697.01	140
Bulgaria	16700.3	30
Croatia	33240.21	57
Cyprus	2347.59	8
France	3354.31	21
FYROM	27701.14	66
Greece	52318.89	83
Hungary	959.13	2
Italy	83077.25	331
Kosovo under UNSCR 1244	8376.48	49
Montenegro	37024.54	90
Morocco	11174.43	14
Portugal	101279.61	239
Romania	3097.31	23
Serbia	10652.98	40
Slovenia	261.69	1
Spain	189744.27	270
Syria	12965.48	32
Tunisia	3020.93	11
Turkey	9685.75	33
TOTAL	950029.39	2062

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 report. The area burnt within the Natura2000 sites is presented in Table 40. The area affected in 2012 was 60% greater than in the previous year.

In 2012 there were two peaks of fire activity – a relatively small one in March, affecting European regions but not North Africa, and a large peak in August, in which fires were concentrated in more southern and eastern areas.

In Spain and Portugal the worst fire period started slightly earlier than August.

Figure 98 shows the scars caused by forest fires during the 2012 season.

Country	Area (Ha)	% of Natura2000 Area	Number of Fires
Albania	40.78	4.2	1
Bulgaria	7629.17	0.2	19
Cyprus	143.57	0.09	5
France	1474.06	0.02	9
FYROM	23.4	3.31	2
Greece	13820.88	0.39	29
Hungary	903.59	0.05	2
Italy	33311.2	0.58	120
Portugal	22509.79	1.18	73
Romania	1523.88	0.04	18
Slovenia	257.37	0.04	1
Spain	85788.82	0.63	132
TOTAL	167426.52		411

Table 40. Area burnt in 2012 within Natura 2000 sites.

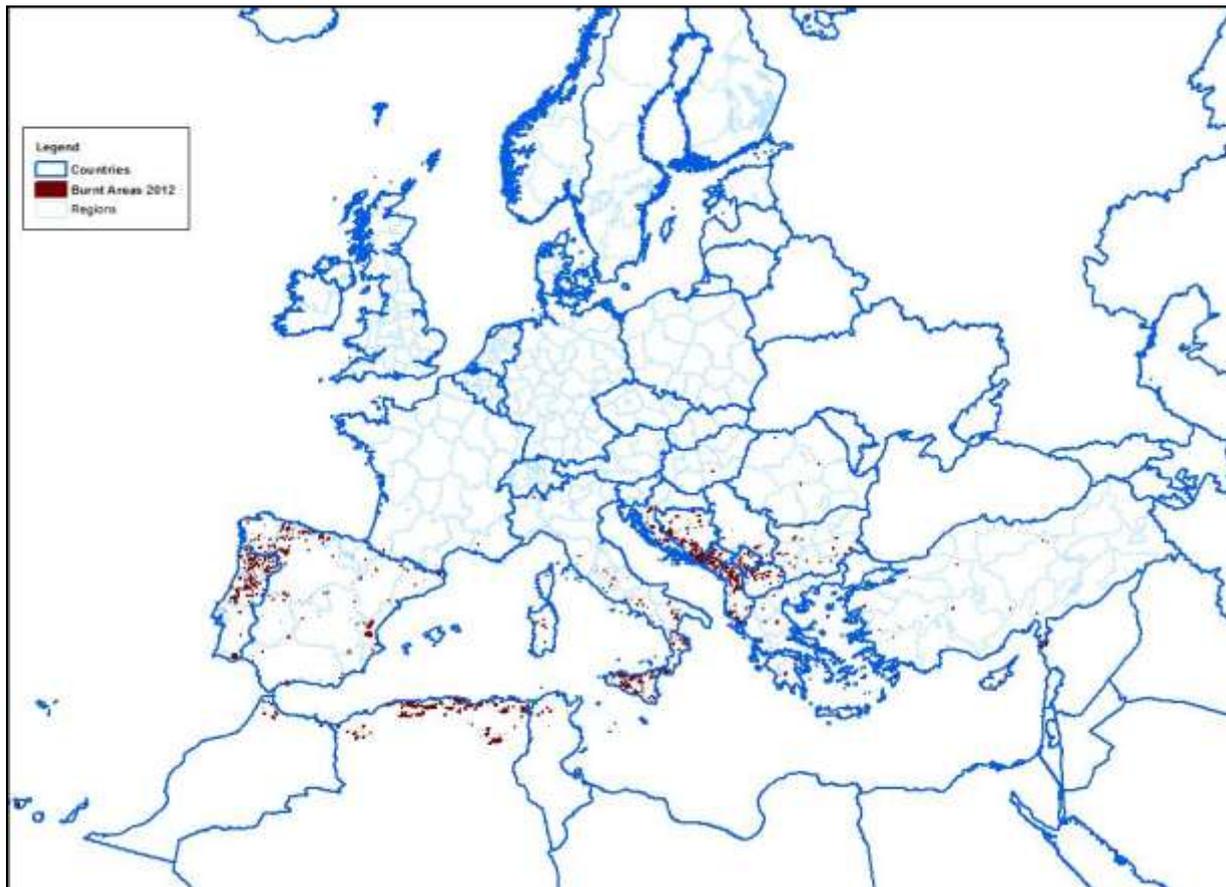


Figure 98. Burnt scars produced by forest fires during the fire season 2012.

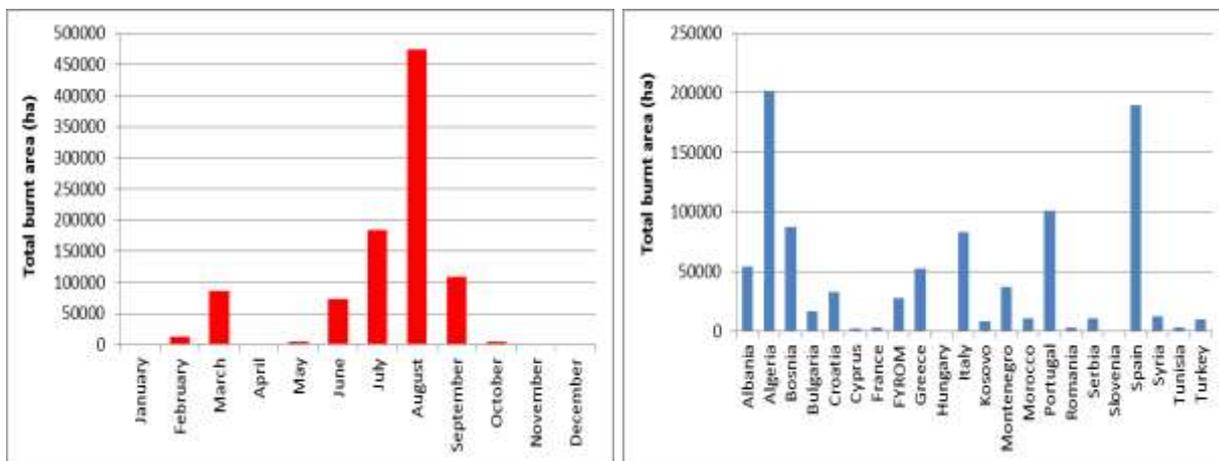


Figure 99. Total burnt area of fires >40 ha by month and by country in 2012

In 2012, 10 of the EU27 countries were affected by fires of over 40 ha: (Bulgaria, Cyprus, France, Greece, Hungary, Italy, Portugal, Romania, Slovenia, Spain), burning a total of 453 140 ha. Of this total, 167 362 ha (37%) were on Natura2000 sites.

Southern most affected countries

3.2.1 Portugal

Portugal was the third country most severely affected by fires in 2012. 239 fires of at least 40 ha were mapped in 2012, occurring in two bursts in July and September. This was over 50% more than the burnt area registered in 2011 (64 840 ha), although it still fell short of the 127 891 ha mapped in 2010. 17 of the fires were over 1000 ha in size. The total burnt area mapped in 2012 was 101 279.6 ha. This area includes 22 509.79 ha on Natura2000 sites, corresponding to 22 % of the total area burnt, and 1.18 % of the total Natura2000 areas in Portugal. Table 41 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, of the total burnt area mapped, 65 034 ha were burnt in forest and other wooded lands, 17 045 ha were on agricultural land and 18 273 ha in other natural lands. Figure 100 shows the burnt scars in Portugal in 2012, including a fire of 24 442 ha which occurred in the Algarve in July – the second largest burnt area from a single fire recorded in 2012.



Figure 100. Impact of forest fires in Portugal in 2012

Table 41. Distribution of burnt areas (fires of at least 40 ha) by land cover class in Portugal.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	65033.89	64.21%
Other Natural Land	18272.54	18.04%
Agriculture	17044.75	16.83%
Artificial Surfaces	799.91	0.79%
Other Land Cover	128.53	0.13%
Total:	101279.61	100%

3.2.2 Spain

Spain was the European country most affected by fire in 2012, and suffered its worst damage by far for several years. Only Algeria recorded a slightly higher burnt area. Most of the damage occurred over three months June-August and resulted in a total mapped burnt area of 189 744.27 ha from 270 fires, more than twice that recorded in 2009 and three times the burnt area registered in 2011. The largest fire recorded anywhere in 2012 was in Valencia (32 424 ha), and the same region also suffered three other fires of more than 1000 ha. 85 788.82 ha occurred on Natura2000 sites, corresponding to 45% of the total area burned, and 0.63% of the Natura2000 areas in Spain. Table 42 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. In terms of land cover, from a total of 189 744 ha of burnt area mapped, 136 095 ha was forest and other wooded lands, 24 083 ha was on other natural lands and 28496 ha were on agricultural land. Around 1000 ha of artificial surfaces and other land cover was also affected.

The most noticeable fires in Spain during 2012 are presented in Figure 101, showing clearly the scars left by the very large fires in Valencia.



Figure 101. Impact of forest fires in Spain in 2012.

Table 42. Distribution of burned area (ha) in Spain by land cover type

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	136094.6	71.73%
Other Natural Land	24083.15	12.69%
Agriculture	28496.43	15.02%
Artificial Surfaces	714.67	0.38%
Other Land Cover	355.42	0.19%
Total:	189744.27	100%

3.2.3 France

France was the only one of the 5 Mediterranean countries to suffer less damage in 2012 than in the previous year. Only 21 fires of more than 40 ha were recorded in 2012, giving a total burnt area mapped of 3 354.31 ha (30% less than in 2011 and the lowest since 2008). From this area 1 474.06 ha were on Natura2000 sites, corresponding to 44% of the total area burned, and 0.02% of the total Natura2000 areas in the country. Table 43 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. In terms of land cover, from a total of 3 354 ha of burnt area mapped, 1 918 ha of land were burnt in forest and other wood lands, 1 041 ha were on other natural lands, and 318 ha were agricultural land. 78 ha of artificial surfaces, including urban, industrial and social areas, was also affected.

Table 43. Distribution of burnt areas (fires of at least 40 ha) by land cover type in France.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	1918.45	57.19%
Other Natural Land	1040.55	31.02%
Agriculture	317.59	9.47%
Artificial Surfaces	77.73	2.32%
Total:	3354.31	100%

3.2.4 Italy

The total burnt area in 2012 was significantly worse than 2011, although still far short of the worst year recorded in 2007. The main damage occurred in the south of the country and in Sicily between July and September, during which period 13 fires of more than 1000 ha were mapped. The total burnt area was 83 077.25 ha from 331 fires over 40 ha, of which 33 311.2 ha were on Natura2000 sites. This corresponds to 40% of the total area burned, and 0.58% of the total Natura2000 area in the country.

Table 44 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. In terms of land cover, from a total of 83 077 ha of burnt area mapped, 35 488 ha of land were burnt in forests and other wooded lands, 20 041 ha were other natural lands, and 27 086 ha were on agricultural land. A small amount of other land cover and artificial surfaces were also affected. Figure 102 shows the distribution of major forest fires in southern Italy and Sicily.



Figure 102. impact of forest fires in Italy in 2012.

Table 44. Distribution of burnt areas (fires of at least 40 ha) by land cover type in Italy.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	35488.14	42.72%
Other Natural Land	20040.81	24.12%
Agriculture	27086.43	32.6%
Artificial Surfaces	413.17	0.5%
Other Land Cover	48.68	0.06%
Total:	83077.25	100%

3.2.5 Greece

The 2012 fire season in Greece was worse than that of recent years, although below the peak of over 271 516 ha mapped in 2007. In 2012, 83 fires of more than 40 ha burned 52 318.89 ha. The peak time of the season occurred in August, when 70% of the year's total was burnt, including a single fire in Chios that burned 15 201 ha. Of the total burnt area in 2012, 13 820.88 ha were on Natura2000 sites, corresponding to 26% of the total area burned and to 0.39% of the total Natura2000 areas in the country. Table 45 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from the total of 36 873 ha of burnt area mapped, 25 536 ha were forests and other wooded land, 12 885 ha were other natural land, 13782 ha were agricultural areas, and 115 ha were on artificial surfaces and other land cover.

Figure 103 shows the damage caused by forest fires in Greece.

Table 45. Distribution of burnt areas (fires of at least 40 ha) by land cover class in Greece.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	25535.82	48.81%
Other Natural Land	12884.83	24.63%
Agriculture	13781.77	26.34%
Artificial Surfaces	114.7	0.22%
Other Land Cover	0.16	0%
Total:	52317.28	100%



Figure 103. Satellite image showing impact of forest fires in Greece in 2012.

Other European Countries

In most of Europe the worst part of the fire season occurred in August. The area as a whole was quite badly affected by forest fires compared with the last few years.

3.2.6 Cyprus

The 2012 fire season in Cyprus was the worst since 2007, with a total burnt area of 2 347.59 ha caused by 8 fires, including one of 1 307 ha which took place in Pano Lefkara in August. In 2012, 143.57 ha of Natura2000 areas were burnt, corresponding to 6% of the total area burned, and 0.09% of the total Natura2000 areas in the country. Table 46 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. Of the total 2 348 ha, 1 691 ha were burnt in forests and other wooded lands, 367 ha were in other natural land and 290 ha were in agricultural areas.

Figure 104 shows the damage caused by forest fires in Cyprus.

Table 46. Distribution of burned area (fires of at least 40 ha) by land cover class in Cyprus.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	1691.29	72.04%
Other Natural Land	366.64	15.62%
Agricultural Areas	289.66	12.34%
Total:	2347.59	100%



Figure 104. Satellite image showing impact of forest fires in Cyprus in 2012

3.2.7 Albania

The 2012 fire season in Albania was quite similar to 2011, making the country once again one of the most severely affected regions. 158 fires of at least 40 ha occurred, mostly July-September, burning a total of 54 130.7 ha. Table 47 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. 43 795 ha were burnt in forests and other wooded lands, 9 305 ha in other natural lands, 985 ha in agricultural areas and a small amount (46 ha) in artificial surfaces, i.e. urban, industrial or social areas and other land cover types. Figure 105 shows the damage caused by forest fires in the Albanian territory and neighbouring countries.

Table 47. Distribution of burned area (ha) in Albania by land cover types.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	43794.61	80.91%
Other Natural Land	9305.31	17.19%
Agriculture	984.61	1.82%
Artificial Surfaces	45.71	0.08%
Other Land Cover	0.46	0%
Total:	54130.7	100%



Figure 105. Forest fires in Albania, Kosovo and FYROM in 2012

3.2.8 Bosnia-Herzegovina

Bosnia-Herzegovina was particularly affected by fires in 2012, suffering a worse year in 2012 than the last five years combined. After 25 058 ha burnt in March (already more than last year's total) a further 62 639 ha brought the annual total to 87 697 ha. 25 of these fires were more than 1000 ha in size. Table 48 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. In terms of land cover, 51 275 ha were burnt in forests and other wooded lands, 25 931 ha occurred in other natural lands, and 10 480 ha burned agricultural areas. A small amount was also registered against artificial surfaces and other land cover types. Visible fire scars caused by forest fires in Bosnia-Herzegovina can be observed in Figure 106.

Table 48. Distribution of burned area (ha) in Bosnia-Herzegovina by land cover types.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest /Other Wooded Land	51274.79	58.47%
Other Natural Land	25931.27	29.57%
Agriculture	10479.92	11.95%
Artificial Surfaces	4.15	0%
Other Land Cover	6.87	0.01%
Total:	87697.01	100%



Figure 106: Forest fires in Bosnia-Herzegovina, Croatia and Montenegro in 2012

3.2.9 Bulgaria

The 2012 fire season in Bulgaria was the worst since 2007, although still significantly lower than the 67 598 ha mapped in that year. The greatest peak of activity was in August, when three-quarters of the annual total burnt. 19 of the 30 fires over 40 ha occurred on Natura2000 sites, burning 7 629.17 ha. This represents 45% of the area burnt and 0.2% of the Natura2000 areas in the country. Table 49 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. In terms of land cover, from a total of 16 700 ha of burnt area mapped, 5 150 ha were forests and other wooded land, 3 885 ha were other natural land, 7 586 ha were agricultural areas, and 79 ha were artificial surfaces. Figure 107 shows the damage caused by forest fires in Bulgaria.

Table 49. Distribution of burned area (ha) in Bulgaria by land cover types.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	5149.77	30.84%
Other Natural Land	3884.9	23.26%
Agriculture	7586.48	45.43%
Artificial Surfaces	79.15	0.47%
Total:	16700.3	100%

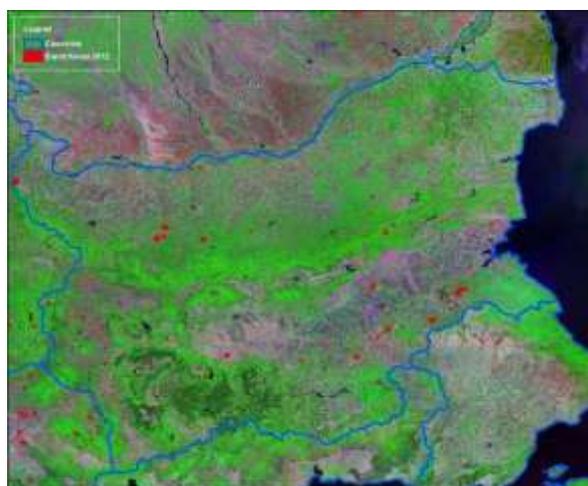


Figure 107: Forest fires in Bulgaria in 2012

3.2.10 Croatia

Croatia suffered its worst fire season for several years, with almost twice as much burnt area recorded as in 2011, including 7 fires of more than 1000 ha in size. There were two peaks of fire activity: one in March, when around half the total burnt area of the season was recorded, and one in July/August. Table 50 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. From a total of 33 240 ha of burnt area mapped, 18 005 ha occurred in forest and other wooded lands, 9 047 ha in other natural areas and 5 775 ha in agricultural areas. 414 ha was mapped in other land types and artificial surfaces. The visible scars left by fires in 2012 can be seen in Figure 106 above.

Table 50. Distribution of burned area (ha) in Croatia by land cover types.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest /Other Wooded Land	18004.91	54.17%
Other Natural Land	9046.74	27.22%
Agriculture	5774.65	17.37%
Artificial Surfaces	232.56	0.7%
Other Land Cover	181.35	0.55%
Total:	33240.21	100%

3.2.11 Former Yugoslav Republic of Macedonia (FYROM)

In 2012, FYROM suffered its worst year for fires since 2007. 66 large fires occurring from March to October resulted in damage of 27 701 ha. In August, three-quarters of the damage occurred, including 4 of the 5 fires of over 1000 ha that were recorded for the country. Table 51 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 27 701 ha of burnt area mapped, 17 532 ha were burnt in forests and other wooded lands, 5 783 ha were other natural lands, and 4 376 ha were in agricultural areas. A small amount (11 ha) was also recorded in artificial surfaces.

Table 51. Distribution of burned area (ha) by land cover types in FYROM.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/ Other Wooded Land	17531.68	63.29%
Other Natural Land	5783.22	20.88%
Agriculture	4375.49	15.8%
Artificial Surfaces	10.76	0.04%
Total:	27701.14	100%

3.2.12 Hungary

Hungary was affected by fires of more than 40 ha for the first time since 2007. 960 ha were mapped from 2 large fires. The largest was in April (882 ha). 94% of the burnt area of 2012 (904 ha) was in Natura2000 sites, which amounts to 0.05% of the total Natura2000 land in the country. Table 52 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. 732 ha were burnt in forests and other wooded lands, 213 ha in other natural lands and a small amount (14 ha) agricultural land and in artificial surfaces.

Table 52. Distribution of burned area (ha) in Hungary by land cover types.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest /Other Wooded Land	732.39	76.36%
Other Natural Land	212.82	22.19%
Agriculture	13.68	1.43%
Artificial Surfaces	0.24	0.03%
Total:	959.13	100%

3.2.13 Kosovo (under UNSCR 1244)

In Kosovo, 8 376 ha were mapped from 49 fires of over 40 ha in 2012. The season started relatively late (in June) and the last large fire was mapped in October. As was the case for most other countries, the worst month was August when half the damage of the year occurred, although the biggest fire of the year (1202 ha in Đakovica) was in July. Table 53 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. 5 902 ha were burnt in forests and other wooded lands, 1 379 ha in other natural lands, 1 085 ha were on agricultural land, and a small amount (10 ha) was mapped in artificial surfaces and other land cover.

Table 53. Distribution of burned area (ha) in Kosovo by land cover types

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest /Other Wooded Land	5902.48	70.46%
Other Natural Land	1379.32	16.47%
Agriculture	1084.63	12.95%
Artificial Surfaces	1.32	0.02%
Other Land Cover	8.74	0.1%
Total:	8376.49	100%

3.2.14 Montenegro

The burned area mapped in Montenegro in 2012 was the worst seen for several years, and double the amount recorded in 2011. 90 fires of over 40 ha burnt a total of 37 025 ha. 80% of this damage occurred in August, including 6 fires of over 1000 ha. Table 54 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, 23 872 ha were burnt in forest and other wooded lands, 11 395 ha in agricultural areas, 1 732 ha occurred in other natural areas. 26 ha was also registered in artificial surfaces. The visible fire scars caused by forest fires in Montenegro can be observed in Figure 106 above.

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

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	23872.34	64.48%
Other Natural Land	11394.52	30.78%
Agriculture	1732.04	4.68%
Artificial Surfaces	25.65	0.07%
Total:	37024.54	100%

3.2.15 Romania

In Romania, 23 fires caused 3 097 ha of damage. This is ten times the burnt area reported for 2011. 49% (1524 ha) was on Natura2000 sites, representing 0.04% of the total Natura2000 area of Romania. Figure 108 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. 1 072 ha were burnt in forests and other wooded land, 1 267 ha were in agricultural land and 743 ha were in other natural land. 16 ha were registered in artificial surfaces. Figure 108 shows the scars left by fires in Romania i 2012.

Table 55. Distribution of burned area (ha) in Romania by land cover types

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest /Other Wooded Land	1071.62	34.6%
Other Natural Land	742.5	23.97%
Agriculture	1267.22	40.91%
Artificial Surfaces	15.98	0.52%
Total:	3097.31	100%

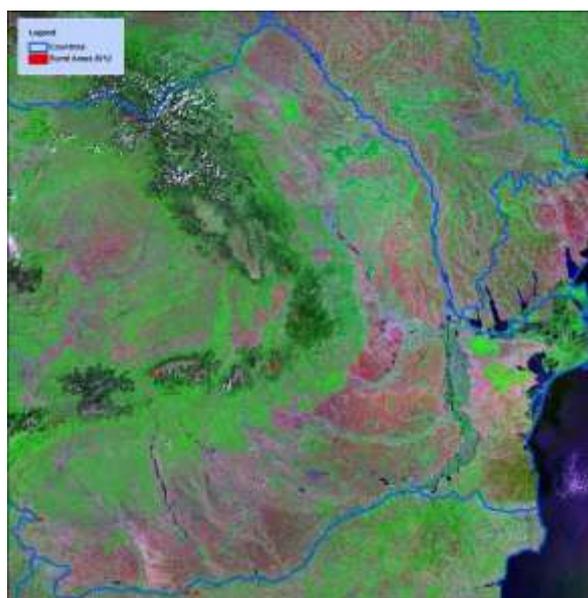


Figure 108. Forest fires in Romania in 2012

3.2.16 Serbia

40 large fires in Serbia resulted in ten times the burnt area of last year, although still nowhere near the 34 830 ha registered for 2007. August was the worst month in which 80% of the burnt area was recorded, including two fires of more than 1000 ha. Table 56 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database.

Table 56. Distribution of burned area (ha) in Serbia by land cover types.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	6799.9	63.83%
Other Natural Land	1306.68	12.27%
Agriculture	2492.29	23.4%
Artificial Surfaces	54.11	0.51%
Total:	10652.98	100%

3.2.17 Slovenia

In Slovenia a single large fire caused 261.69 ha of damage. Practically the entire area (257.37 ha) was on a Natura2000 site, representing 0.04% of the Natura2000 areas in the country.

Table 57. Distribution of burned area (ha) in Slovenia by land cover types.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	167.21	63.9
Agriculture	94.48	36.1
Total:	261.69	100

3.2.18 Turkey

In 2012 there were 33 fires of over 40 ha in Turkey burning a total area of 9 686 ha. In August and September, the worst two months, there were four fires of more than 1000 ha. Table 58 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 111 below.

Table 58. Distribution of burned area (ha) in Turkey by land cover types.

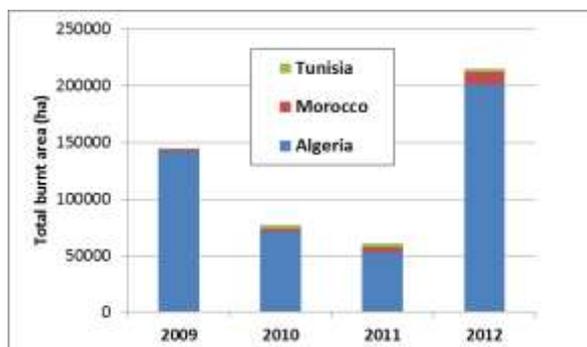
<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	2059.24	22.92%
Other Natural Land	1540.05	17.14%
Agriculture	5385.66	59.94%
Total:	8984.94	100%

North Africa

The fire season in North Africa ran from June to October in 2012 and was particularly severe. In this year more land burnt than in the last two years combined. The vast majority of the damage occurred in August, when 75% of the burnt area was mapped. Total burnt area for these three countries from 2009 to 2012 is presented in Table 59.

Table 59. Distribution of burnt area (ha) in North Africa 2009-2012

	2009	2010	2011	2012
Algeria	141925.13	70747.05	52984.35	201219.4
Morocco	2111.86	2826.08	4666.83	11174.43
Tunisia	128.96	3551.14	3520.34	3020.93
Total:	144166	77124	61172	215415



3.2.19 Algeria

The 2012 fire season in Algeria was extreme. The total amount burnt of 201 219 ha was the highest amount recorded in any of the countries covered by EFFIS in 2012. 35 of the fires were more than 1000 ha, the largest of which burned 25 436 ha in Khenchela. The burnt scars left by these fires can be seen in Figure 109. 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 60.

Table 60. Distribution of burned area (ha) in Algeria by land cover types.

Land cover	Area	% of total
Forest /Other Wooded Land	86947.37	43.21%
Other Natural Land	17703.47	8.8%
Agriculture	96546.02	47.98%
Artificial Surfaces	22.54	0.01%
Total:	201219.4	100%

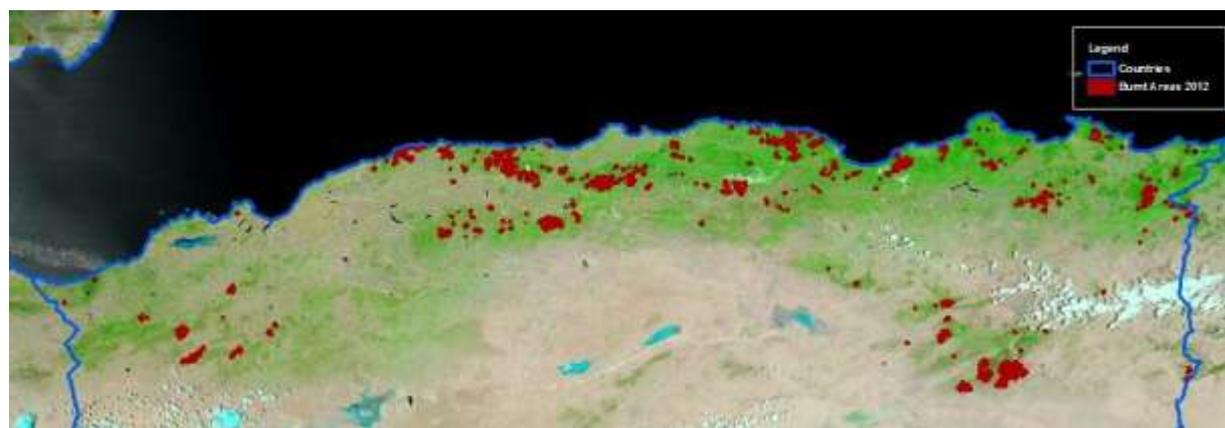


Figure 109: Impact of forest fires in Algeria in 2012

3.2.20 Morocco

Morocco suffered more large fires than in the previous three years combined. Four of the fires were over 1000 ha in size. Figure 110 shows the burnt scars left by these fires, and the distribution of burnt area by land cover types, using Morocco's own land cover map but with terminology harmonised with CLC, is given in Table 61.

Table 61. Distribution of burned area (ha) in Morocco by land cover types.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest /Other Wooded Land	6113.06	54.71%
Other Natural Land	682.29	6.11%
Agriculture	4375.58	39.16%
Other Land Cover	3.51	0.03%
Total:	11174.43	100%



Figure 110. Impact of forest fires in Morocco in 2012

3.2.21 Syria

In Syria, 32 fires of over 40 ha burnt a total of 12 965 ha. Two of the fires were more than 1000 ha (both in Lattakia on the Syria/Turkey border). 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 62 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 at the border country are shown in Figure 111.

Table 62. Distribution of burned area (ha) in Syria by land cover types.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded Land	10699.12	82.52
Other Natural Land	81.31	0.63
Agriculture	2185.05	16.85
Total:	12965.48	100



Figure 111. Forest fires on the Turkey/Syria border in 2012

3.2.22 Tunisia

Of the three North African countries covered by EFFIS, Tunisia was the only one with a fire season comparable to that of the last two years. In fact slightly less burnt area was mapped in 2012 than the previous years. All fires over 40 ha occurred in July and August, 96% of them in August. Figure 112 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 63.

Table 63. Distribution of burned area (ha) in Tunisia by land cover types.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Forest /Other Wooded Land	1659.18	54.92%
Other Natural Land	37.35	1.24%
Agriculture	1324.4	43.84%
Total:	3020.93	100%



Figure 112. Impact of forest fires in Tunisia in 2012

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**.

Structure and collected information

The database contains four types of information: about the time, location, size and cause of the fire (Table 64).

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 million individual fire event records (1.66 million forest fires). See Table 64 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 113). 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 64. 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

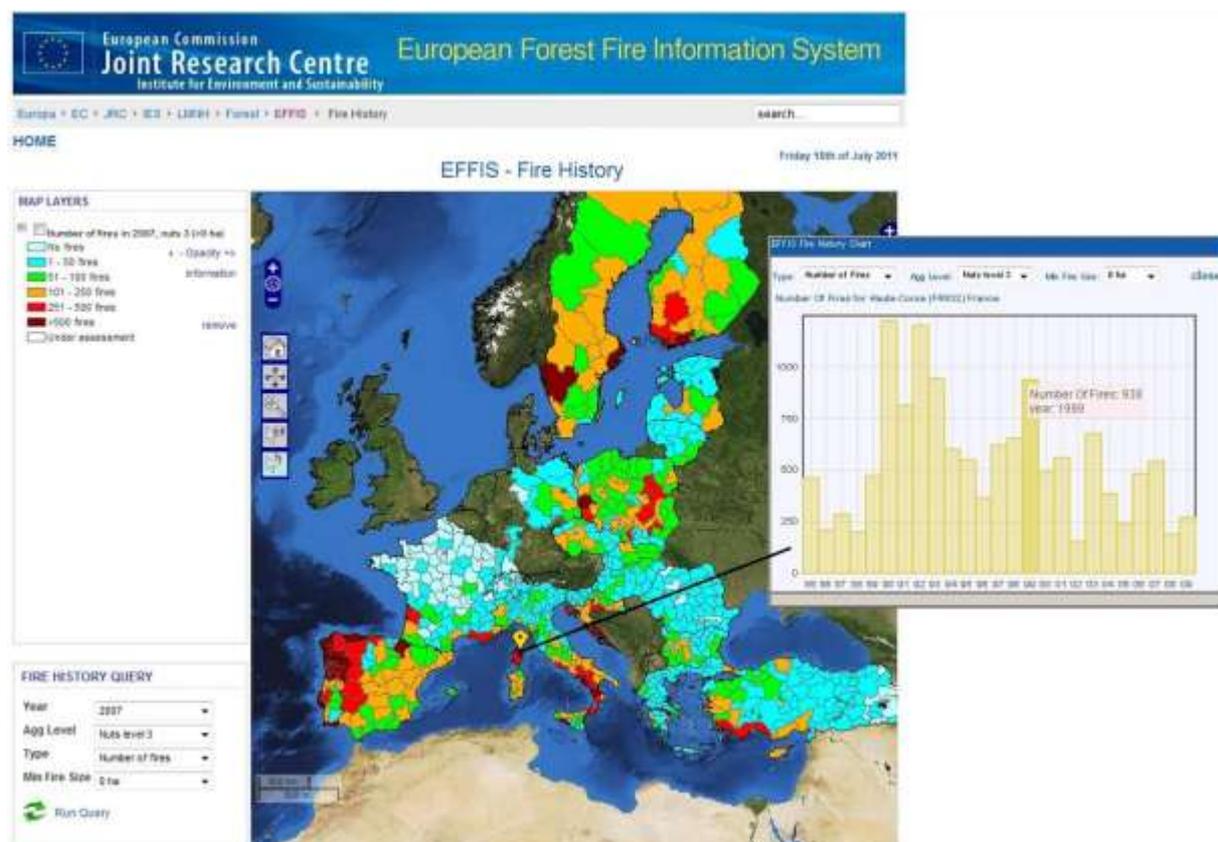


Figure 113. Access to the information stored in the European Fire Database from EFFIS web interface

Development and refinement of the database: fire causes

In 2008 a tender was launched by JRC and a service contract was awarded to a consortium with the aim of developing a common framework for harmonized classification and reporting on fire causes in Europe.

Among the outcomes of the study was a proposal for a common classification scheme of fire causes, more detailed than the 4 basic categories that were previously used (Unknown, Natural, Accident/Negligence and Deliberate).

The classification scheme was presented and discussed in various meetings of the EC Expert Group on Forest Fires, and after some amendments, a harmonized classification scheme was accepted in 2012 for adoption by the countries as a common means to record fire causes when reporting national data to the European Fire Database.

The new scheme was conceived to be applicable with limited changes to the previous country settings, preserving as much as possible the historical data series of each country and exploiting the maximum level of detail of the information available.

Because the level of detail in classified fire causes is quite varied among countries, and the causes of forest fires may also differ significantly, the system was designed in a hierarchical way, providing flexibility and facilitating the mapping of the different systems currently used in Europe to the common scheme.

A key new feature that has been introduced in the scheme is the explicit statement of the confidence level of the knowledge of a fire cause: qualified as "certain" only if, after investigation, the ignition point of the fire has been found and the cause has been identified with no doubts.

In the new European fire cause classification scheme, the cause of each fire event has to be reported with 2 entries (fields):

- a) Certainty of knowledge of the fire cause
- b) The fire cause category

The possible entries in the database item "certainty of knowledge" are the following:

Code	Description
1	Information not given (level of certainty not specified)
2	Cause not investigated (unknown because investigation not carried out)
3	Cause not found (unknown because investigation carried out but cause not found)
4	Cause uncertain (point of origin not found precisely or cause assumed after a number of different elements from the investigation)
5	Cause certain (point of origin found and cause positively determined after investigation)

Code 1 is the default, and it is used when the information on the level of certainty is not provided. Codes 2 and 3 are variations of "unknown".

The new fire causes classification scheme has 3 hierarchical levels.

At the level with higher detail there are 29 fire cause classes, organized into 8 groups which in turns correspond to 6 generic categories.

The 6 categories of the upper level are similar to the 4 former "Common Core" EU scheme and are the following:

1. Unknown
2. Natural
3. Accident
4. Negligence
5. Deliberate
6. Rekindle

In this new scheme the former accident/negligence cause has been split into two categories and a new generic category "Rekindle" for restarting fires has been introduced.

Within each category, different groups and classes define the lower 2 levels of the classification.

Table 65 shows the complete list of classes, groups and categories of the new scheme. The numerical code of each item is also given in the table.

A detailed description of each class can be found in the report *Harmonized classification scheme of fire causes in the EU adopted for the European Fire Database of EFFIS*. (European Commission 2012, EUR25923)

Table 65. Classes, groups and categories of the harmonized fire causes classification scheme

CATEGORY	GROUP	CLASS
100 UNKNOWN	100 Unknown	100 Unknown
200 NATURAL	200 Natural	201 Lightning
		202 Volcanism
		203 Gas emission
300 ACCIDENT	300 Accident	301 Electrical power
		302 Railroads (Railways)
		303 Vehicles
		304 Works
		305 Weapons (firearms, explosives, etc.)
		306 Self-ignition (auto-combustion)
		307 Other accident
400 NEGLIGENCE	410 Use of fire	411 Vegetation management
		412 Agricultural burnings
		413 Waste management
		414 Recreation
		415 Other negligent use of fire
	420 Use of glowing objects	421 Fireworks, firecrackers and distress flares
		422 Cigarettes
		423 Hot ashes
		424 Other use of glowing object
		500 DELIBERATE
512 Conflict (revenge)		
513 Vandalism		
514 Excitement (incendiary)		
515 Crime concealment		
516 Extremist		
520 Irresponsible	521 Mental illness	
	522 Children	
600 REKINDLE	600 Rekindle	600 Rekindle

Table 66. Summary of data records stored in the European Fire Database

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
BG																										251	393	1479	582	314	222	635	
HR																3147	3795	5485	3856	7897	4045	4713	6937	2859	3372	3581	5176						
CY																				285	299	243	427	221	185	172	111	114	91	133	85		
CZ																									957	653	697	809	470				
EE																										65	248	64	71	47	30	24	
FI																										2285	2631	6314	2813	3161	2746	3100	2871
FR						3732	2657	2116	2240	3321	3297	2372	2708	4766	4728	6539	6401	8001	6289	4881	4343	4259	4097	7023	3767	4698	4608	3382	2781	4808	3828	4283	
DE															706	525	822	276	592	794	930	373	278	1238	300	299	717	435	560	575	525	515	
GR				945	1184	1417	1088	1234	1798	1203	1283	1036	2008	2707	1955	1494	1527	2271	605	513	1469	1313	572	622	739	718	764	1226	1071	354	540	953	
HU																							429	373	104	150	97	603	502	608	109	2021	
IT						12931	6115	8506	9785	8328	11560	7580	10044	14317	7153	5505	6064	11608	9565	6956	8609	7227	4607	9716	6341	7918	5651	10736	6648	5423	4884	8181	
LV																									647	365	1929	426	716	890	319	373	
LT																									430	267	1444	245	272	471	106	137	
PL															24365	23822	23587	25070	21346	32650	31811	24513	38154	79018	36320	46546	35634	31311	35804	30914	24443	40059	
PT	2349	6730	3626	4542	7356	8441	5036	7705	6131	21896	10745	14327	14954	16101	19983	34116	28626	23497	34676	25477	34109	27982	28738	26941	26945	40965	23647	23956	18619	29218	25013	38118	
RO																										34	64	105	478	91	190	70	340
SK																										153	287	238	463	182	347	123	303
SI																44	47	55	143	55	100	60	64	227	50	74	106	129	68	122	33	114	
ES						12235	7514	8816	9440	20250	12914	13529	15956	14253	19249	25557	16586	22320	22003	17943	23574	19099	19929	18616	21396	25492	16334	10932	11656	15642	11722	16417	
SE																	4854	7057	2503	4707	4708	4831	6490	8282	4955	4573	4618	3787	5420	4180	3120	3534	
CH	79	147	71	107	166	96	76	109	76	168	235	148	70	76	74	87	108	135	91	45	49	48	67	155	49	63	46	65	46	52	57	88	
TR																										1530	2227	2706	2135		1861		
MA*																											347	304	267	487	597	568	
TN*						75	89	207	158	70	118	97	182	183	131	13	13	98								292	259	199	264	262	493		

* Provisional data – undergoing validation

General notes on Table 66:

- 2012 data (including from DZ and LB) 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 67. Number of forest fires in five Southern Member States (1980-2012)

Table 68. Burnt area (hectares) in five Southern Member States (1980 – 2012)

Table 69. Number of forest fires in other European countries (1990-2012)

Table 70. Burnt area (hectares) in other European countries (1990 – 2012)

NOTE

Every effort is made to ensure that the published figures are correct. However, at the time of printing some data are provisional and may be changed in the future. Where there is a discrepancy between figures published in different reports, the later report should be taken as the definitive version.

Table 67. Number of forest fires in five Southern Member States (1980-2012)

<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	21 394	3 775	6 428	1 748	55 215
2005	35 697	25 492	4 698	7 951	1 544	75 382
2006	19 929	16 355	4 608	5 634	1 417	47 943
2007	18 722	10 915	3 364	10 639	1 983	45 623
2008	13 832	11 612	2 781	6 486	1 481	36 192
2009	26 119	15 391	4 800	5 422	1 063*	52 795
2010	22 026	11 722	3 900	4 884	1 052*	43 584
2011	25 221	16 028	4 500	8 181	1 653*	55 543
2012	21 176	15 902	4 105 [†]	8 252	1 559 [†]	50 994
<i>% of total in 2012</i>	42%	31%	8%	16%	3%	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	18 337	4 406	7 259	1 695	56 645
<i>Average 2010-2012</i>	22 808	14 551	4 168	7 106	1 408	50 040
<i>Average 1980-2012</i>	18 613	15 263	4 880	9 736	1 554	50 046
<i>TOTAL (1980-2012)</i>	614 228	503 690	161 036	321 294	51 282	1 651 530

* Incomplete data

† Provisional figure

Table 68. Burnt area (hectares) in five Southern Member States (1980 – 2012)

<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	148 827	7 844	39 946	12 661	284 788
2007	31 450	82 048	8 570	227 729	225 734	575 531
2008	17 244	50 321	6 001	66 329	29 152	158 621
2009	87 416	110 783	17 000	73 355	35 342	323 896
2010	133 090	54 770	10 300	46 537	8 967	253 664
2011	73 813	84 490	9 630	72 004	29 144	269 081
2012	110 231	209 855	8 600	130 814	59 924	519 424
<i>% of total in 2012</i>	21%	40%	2%	25%	12%	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	125 239	22 342	83 878	49 238	430 798
<i>Average 2010-2012</i>	105 711	116 372	9 433	83 118	32 678	347 313
<i>Average 1980-2012</i>	108 334	171 593	26 383	113 496	47 141	466 947
<i>TOTAL (1980-2012)</i>	3 575 020	5 662 572	870 632	3 745 360	1 555 659	15 409 243

Table 69. Number of forest fires in other European countries (1990-2012)

<i>Country</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>
<i>Austria</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	954 ⁷	912 ⁷	750 ⁷	-	218	192	356	312
<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
<i>Croatia</i>	-	-	-	-	-	-	-	-	-	-	7797	4024	4692	6923	2853	3368	3571	5176	4625	4003	2113	6681	7870
<i>Cyprus</i>	-	-	-	-	-	-	-	-	-	-	285	299	243	427	221	185	172	111	114	91	133	85	78
<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
<i>Finland</i>	-	-	-	-	-	-	1475	1585	370	1528	826	822	2546	1734	816	1069	3046	1204	1456	1242	1412	1215	417
<i>FYROM</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	652	573	80	99	523	483
<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
<i>Hungary</i>	-	-	-	-	-	-	-	-	-	229	811	419	382	375	104	150	97	603	502	608	109	2021 ⁸	2657
<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
<i>Lithuania</i>	-	-	1180	634	715	472	894	565	258	1022	654	287	1596	885	468	301	1545	251	301	471	104	142	81
<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
<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
<i>Slovakia</i>	-	-	-	-	366	254	662	535	1056	426	824	311	570	872	153	287	237	463	182	347	127	303	517
<i>Slovenia</i>	-	-	-	-	-	-	-	-	-	-	-	-	60	224	51	73	112	140	74	120	32	114	168
<i>Sweden</i>	-	-	-	-	-	-	4854	7057	2503	4707	4708	4831	6490	8282	4955	4573	4618	3737	5420	4180	3120	3534	2213
<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
<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

⁷ Database undergoing validation – figures may change in future

⁸ Change in database compilation protocol

* Changed since last year

Table 70. Burnt area (hectares) in other European countries (1990 – 2012)

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
<i>Austria</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	74 ⁹	75 ⁹	48 ⁹	-	22	37	78	69
<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
<i>Croatia</i>	-	-	-	-	-	-	-	-	-	-	129883	27251	74945	77359	8988	21407	18782	63719	23698	15657	6083	49958	80252
<i>Cyprus</i>	-	-	-	-	-	-	-	-	-	-	8034	4830	2196	2349	1218	1838	1160	4483	2392	885	2000	1599	2531
<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
<i>Finland</i>	-	-	-	-	-	-	433	1146	131	609	266	187	590	666	358	495	1617	576	830	576	520	580	86
<i>FYROM</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32665	5915	1307	737	17308	10021
<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
<i>Hungary</i>	-	-	-	-	-	-	-	-	-	756	1595	-	1227	845	247	3531	625	4636	2404	6463	878	8055 ¹⁰	13978
<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
<i>Lithuania</i>	-	-	769	274	279	321	478	226	93	494	352	113	746	436	253	51	1199	38	112	287	22	293	20
<i>Poland</i>	7341	2567	4375 [€]	8290	9325	5403	14537	6766	4222	8629	7089	3466	5210	28551	3782	5713	5657	2841	3027	4400	2126	2678*	7235
<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
<i>Slovakia</i>	-	-	-	-	-	-	-	-	-	557	904	305	595	1567	157	524	280	679	118	510	192	403	1683
<i>Slovenia</i>	-	-	-	-	-	-	-	-	-	-	-	-	161	2100	138	280	1420	128	75	177	121	288	1006
<i>Sweden</i>	-	-	-	-	-	-	1588	5873	422	1771	1552	1254	2626	4002	1883	1562	5710	1090	6113	1537	540	945	483
<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
<i>Turkey</i>	13742	8081	12232	15393	38128	7676	14922	6316	6764	5804	26353	7394	8514 [†]	6644	4876	2821	7762	11664	29749 [†]	4679	3317	3612	10455

⁹ Database undergoing validation – figures may change in future

¹⁰ Change in database compilation protocol

* Changed since last year

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Abstract

This is the 13th “Forest Fires in Europe” report published by the European Commission. The area covered by the report includes also Middle East and North Africa countries, thus the title has been changed accordingly. The report contains a summary of the 2012 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 past 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 EU, 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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