

Report No 5

# Forest Fires in Europe 2004

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DIRECTORATE-GENERAL  
Joint Research Centre

ies  
Institute for  
Environment and  
Sustainability  
LAND MANAGEMENT UNIT

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# Forest Fires in Europe 2004

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### MEMBER STATES AND CANDIDATE COUNTRIES

Sources of data and comments are given in the text.

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## FOREWORD

The European Commission published its first “Forest Fires in Europe” report five years ago, giving the first comprehensive picture of the forest fire situation in Europe.

Since then, there have been some dramatic forest fires, particularly in Southern Europe. They have caused serious damage to our natural environment and many casualties among forest fire fighters and civilians.

Compared with the year 2003, when more than 740 thousand hectares of land were burnt, 2004 was less dramatic. The area burned was less than half of that in 2004, with correspondingly less impact on the environment and in terms of the number of lives lost.

However, this is no reason for complacency. We need to continue our efforts to combat this persistent threat. In fact, although this report does not cover 2005, even by end of July significant damage had already been sustained. Preliminary figures for 2005 already show 19 people killed in some 70,000 forest fires, which have burned an estimated 140,000 ha.

Because of the large number of forest fires, the European Commission in 2004 set up an expert group to advise on how to prevent and fight fires in Europe. This working group suggested a number of ways of improving decision-making and organisation to help tackle the problem.

As our environment has always been exposed to certain fire risks, and always will be, we have to identify the right preventive and remedial measures so as to limit the damage as far as possible. The general principle is to restore nature and not to change the landscape.



Stavros DIMAS  
Commissioner for the Environment

A basic tool for decision-making is information. To provide comprehensive information on forest fires and their effects on the environment, the Joint Research Centre (JRC) - in close collaboration with the Member States - has developed the European Forest Fire Information System (EFFIS).

EFFIS is a portal for accessing EU-wide information on forest fires and relating it to other thematic and environmental information, like the NATURA 2000 database for example.

EFFIS provides harmonized forest fire risk forecast maps for Europe. These are often used as tools for assessing risks when there is a need for international cooperation to fight forest fires. Other maps of burnt areas provide valuable information that is used to analyse forest fire damage and evaluate environmental impact.

EFFIS includes an EU Fire Database of forest fire information compiled by the EU Member States. It allows for statistical analysis that can be used in different sectors of European policy-making, such as environment or regional development.

The outcome of research on forest fires currently being carried out by the JRC will be taken up by EFFIS in the future. Research topics include forest fire atmospheric emissions, vegetation regeneration, and post-fire risk analysis.

We would like to thank all the bodies and authorities in the Member States who contributed to this report, ensuring that it provides a comprehensive overview of the impact of forest fires in Europe.



Janez POTOČNIK  
Commissioner for Science and Research



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## 1. FOREST FIRE PREVENTION ACTIVITIES IN THE EUROPEAN UNION

### 1.1. Council and European Parliament Regulation (EC) No 2152/2003 (Forest Focus)

It was recognised long ago that fires are a serious threat to forests in the Community. This is an environmental, economic and social problem of particularly relevance in the Southern Member States where fires regularly ravage thousands of hectares of forests and other land areas.

Although there are no provisions in the EU Treaty for a comprehensive common forest policy, since this is mainly a national responsibility, the Community has - since the 1980s - supported and contributed to the efforts of Member States facing forest fires, especially in the field of prevention.

The first Community forest fire prevention activities started with Regulation (EEC) No 3529/86 of 17 November 1986, while more extensive and coordinated measures were introduced under Regulation (EEC) No 2158/92 of 23 July 1992 for the protection of Community's forests against fire. The Regulation was implemented by the Member States but expired on December 2002.

Its measures have been replaced by a new scheme for the period 2003-2006, under Regulation (CE) of the European Parliament and Council No 2152/2003 of 17 November 2003 on the monitoring of forests and of environmental interactions in the Community (Forest Focus). It replaces two previous Regulations on forest protection, and takes a new integrated approach aiming to broadly investigate and monitor the state of health of our forests.

The regulation is implemented through biannual national programmes (2003/04 and 2005/06) submitted by the Member States of the European Union. Besides the countries that in 2004 implemented the previous scheme for forest fires (France, Germany, Greece, Italy, Portugal and Spain) another five have joined the new scheme following enlargement (Cyprus, Poland, Slovakia, Slovenia, and Hungary).

Forest Focus offers the same range of forest fire prevention measures as the former Regulation (EEC) No 2158/92, provided these measures are not already included in the rural development programmes in order to avoid duplication. The financial framework for the implementation of the Forest Focus scheme for the whole period 2003-2006 is EUR 65 million, of which EUR 9 million can be used for fire prevention measures.

The measures concerning forest fires are the following:

- Monitoring and collection of data on forest fires through the continuation and further development of the database previously known as the "common core database" (currently managed by the Joint Research Centre and included in the European Forest Fire Information System - EFFIS);
- Protection from forest fires carried out through the co-financing of "intellectual" prevention measures (public awareness campaigns, specialised training) and some practical infrastructure measures (firebreaks, water points, etc) to complement those taken under the rural development regulation;
- Funding of studies on the prevention of fires, both by Member States and the Commission, that have added value at EU level.

Figure 1 and Figure 2 are based on the national Forest Focus programme for 2003-2004, subdivided both by Member State and by measure. They show that Spain, Italy, Portugal, and Greece are the Member States which benefited most from EU co-financing, mainly because of their huge areas of forests prone to high and medium risk of fire. Because of the nature of the regulation the main measures are public awareness campaigns, specialised training, and the development of EFFIS, the European Forest Fire Information System.

Further information about the Forest Focus Regulation is available at:

<http://europa.eu.int/scadplus/leg/en/lvb/l28125.htm>

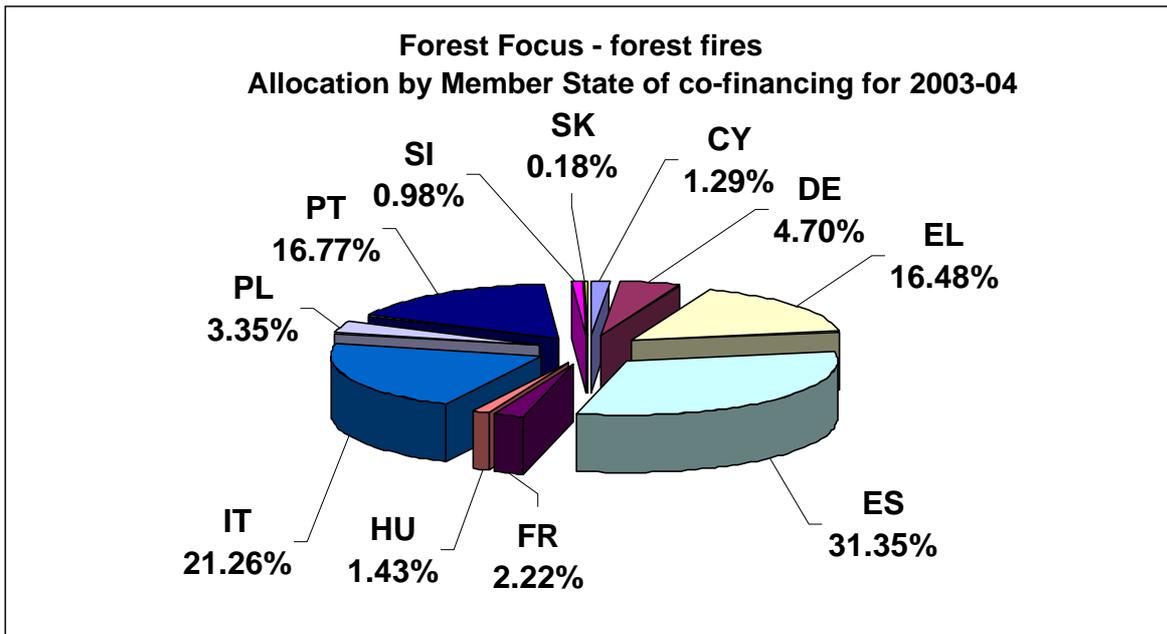


Figure 1. Allocation of resources by Member State.

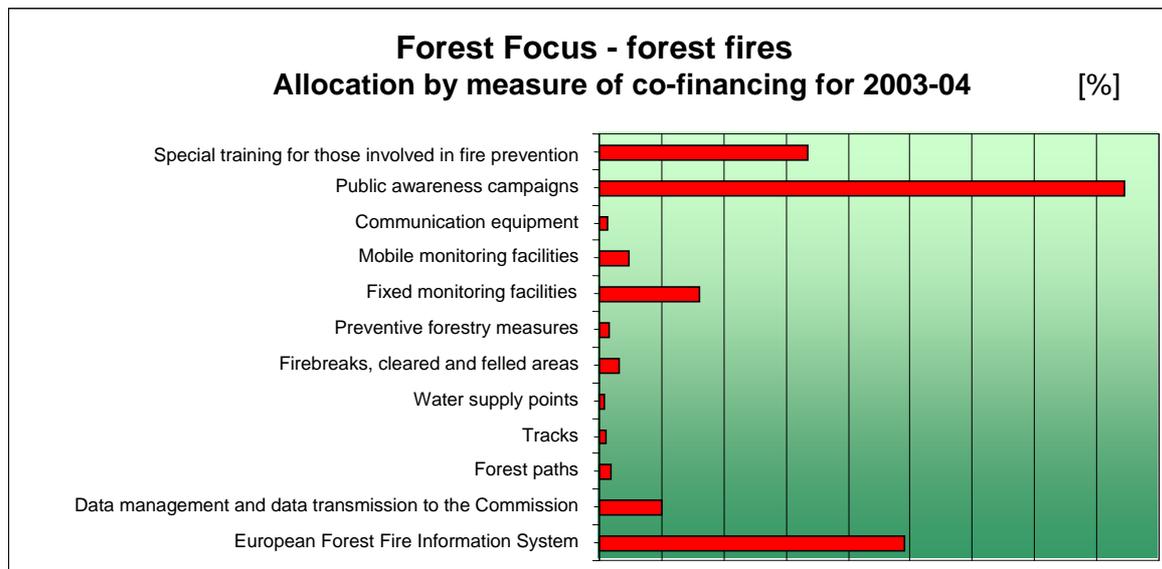


Figure 2. Allocation of resources by measure.

## 1.2. Working Group of forest fire prevention experts

During 2004 the European Commission agreed to a specific request made by the Member States at meetings of the Standing Forestry Committee and organised the setting up of an informal working group of experts on the prevention of forest fires (WGFFP). It consists of national experts representing the Member States most involved and the main non governmental organisations involved in the forest sector.

The mandate of the group covers certain key areas. Its main purpose is to give suggestions about the solution of certain issues of general interest, e.g. the need for a new classification of fire risk, and updating forest fire protection plans following the enlargement of the European Union. It has also been asked to give some clear ideas on EU forest fire prevention policy for after 2006, in the framework of the new EU financial perspectives for 2007-2013.

To prepare a coordinated answer to previously formulated questions, the group has held four meetings: Brussels on 14 May 2004, Zaragoza (Spain) on 28 September 2004, Ispra (Italy) on 9 November 2004 and Brussels on 23 February 2005.

The WGFFP put a set of forward-looking proposals to the Commission, together with critical reflections on the lessons learnt from the previous Community scheme. During discussions the following central principle was established: protection of the environment in the EU cannot be effective without a policy for forest fire prevention reflecting the distribution and intensity of the hazard and developed in cooperation with public and private stakeholders in the forest sector.

It stressed in particular the importance of continuing with a consistent and integrated policy on forest fire prevention through a specific regulation on forest fire prevention coordinated with rural development policy and serving as a horizontal and strategic tool. In addition, any specific instrument or policy covering rural development, environment and regional policy must include horizontal measures on public information, awareness-raising and training in prevention techniques. The group also emphasised that high priority should be given to activities with a real European dimension and added value, like continuation and development of the EFFIS, studies and actions in border areas, and the sharing of lessons learnt.

The outcome of the work of this group and the main documents prepared for the meetings are available at: [http://www.europa.eu.int/comm/environment/forests/home\\_en.htm](http://www.europa.eu.int/comm/environment/forests/home_en.htm)

### **1.3. Conference on “Forest fires in Southern Europe – from prevention to restoration”**

Following the disasters of the summer 2003 and its impact on public opinion, the Commission’s Directorate General for the Environment organised a conference entitled ‘Forest fires in Southern Europe – from prevention to restoration’. It was held in Brussels on 24 and 25 January 2005 and was designed to give a coherent analysis of the problem, to collect suggestions from the sectors involved, to share experiences and to propose best practices following a participatory approach.

Some 100 experts attended the conference. They represented in particular the forest fires authorities at national, regional and local level, the most important non governmental organisations involved in the issue of forest fires and other stakeholders, both private and public (farmers, forest owners, citizens, etc). The conference was also attended by many high level representatives from the European Parliament and the European Commission. It closed with a speech by Stavros Dimas, Commissioner for the Environment.

There was considerable participation by stakeholders and sectors representing civil society that are not usually involved in such activities, but whose support is essential in order to develop a global and efficient policy against forest fires. Apart from the invited speakers from the Mediterranean, other countries were also represented at the conference, thus showing the transboundary dimension of the problem has and how fires can have an impact outside Mediterranean areas too.

Some critical areas were examined in detail, in particular: the wide variety of policy instruments given the lack of a common EU forestry policy framework. The conference considered the general increase in the number of fires, although their size is decreasing, and the risk of bigger disasters in the future as a result of climate change and desertification. Some specific national problems of general relevance were also addressed, such as the need to improve participation and contact with civil society and local stakeholders.

The conference resulted in a list of recommendations from the participants, emphasising prevention and coordination activities. These recommendations, and the discussions in general, showed the need for more coherent approaches and policies to raise the importance of forests on the political agenda, to prioritise EU co-financing for prevention purposes, and to show that forest fires are a problem that involves the whole of society all through the year and not just a few sectors only during the summer. There was much support in favour of an integrated EU forest fire instrument, such as the former Regulation (EEC) No 2158/92

The proceedings of the Conference and all the presentations given by the participants are available at: <http://europa.eu.int/comm/environment/aarhus/index.htm#news>

## 2. FIRES AND BURNT AREAS IN THE SOUTHERN MEMBER STATES

### 2.1. Southern Member States (1980 – 2004)

Since 1 May 2004 the EU has had 10 new Member States, some of which, like Cyprus, are Southern European countries. However, since forest fire data is available for those countries for only a relatively short time, they will be analysed in the separate chapter on the new Member States. So this chapter will focus on the five Southern Member States analysed in all the four previous reports (Portugal, Spain, France, Italy and Greece) for which data is available for a longer period.

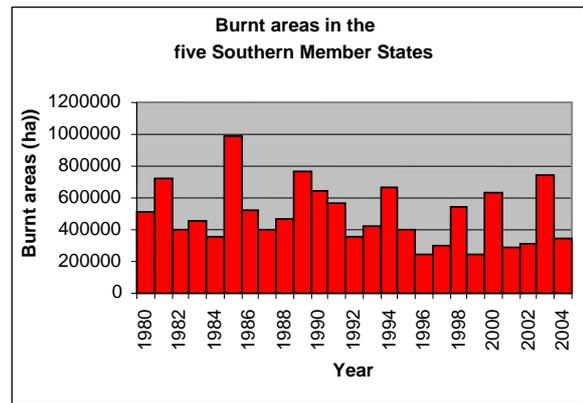
During 2004, fires in these five countries burned a total area of 346 766 hectares, which is below the average for the last 25 years. Conversely, the number of fires that occurred (53 489) is above the average for the last 25 years (see Table 1 for details).

Figure 3a shows the total burnt area per year in the five Southern Member States since 1980. The statistics clearly vary considerably from one year to the next, which clearly indicates how much the burnt area depends on seasonal meteorological conditions. Compared with the disastrous fires in 2003, 2004 can be considered one of the “better” years in terms of the total area burned.

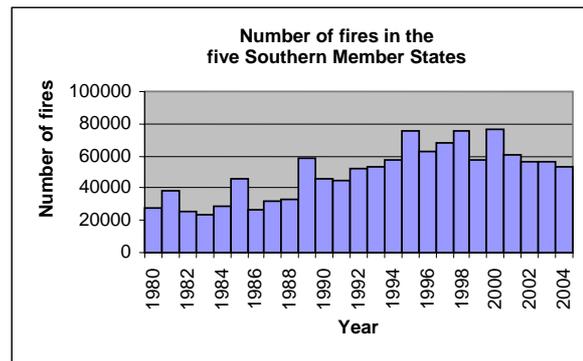
Figure 3b shows the yearly number of fires in the five Southern Member States since 1980. Although fire frequency followed an increasing trend during the 1990s, since 2001 the number of fires has remained more or less stable.

Figure 4a compares the yearly averages for burnt areas for the period 1980 to 2004 with the figures for 2004. It gives a comparison for each Member State and for all the Southern EU Countries, and shows that only in Portugal was the burnt area in 2004 above the average for the last 25 years. However, the overall figure for the five Southern Member States is well below the average for the last 25 years.

Figure 4b compares the yearly averages for number of fires for the period 1980 to 2004 with the figures for 2004. Only France and Italy were below the average for the last 25 years, so the overall figure for the five Southern Member States is definitely above the average.



(a)

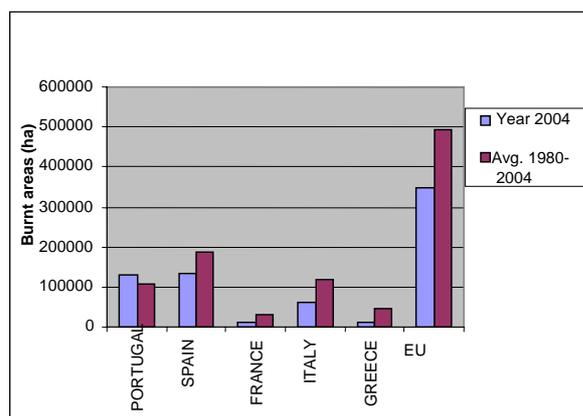


(b)

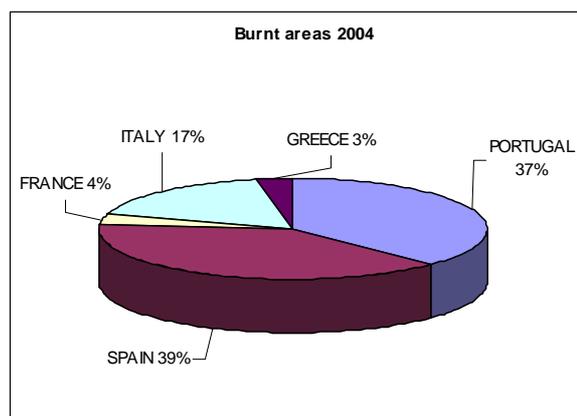
Figure 3. Burnt area (a) and number of fires (b) in the five Southern Member States for the last 25 years.

Figure 5 compares the contribution of each Member State in terms of burnt areas and numbers of fires with the overall figures for the five Southern Member States for 2004.

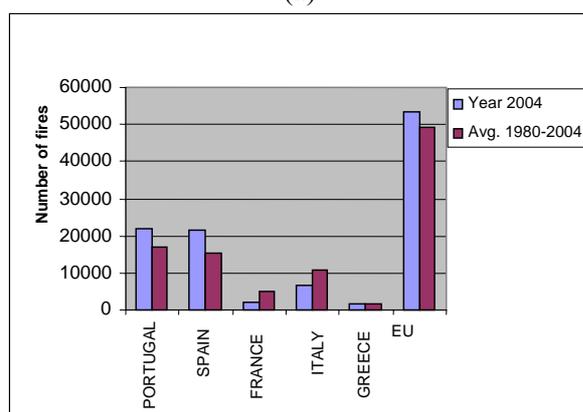
Table 1 gives a summary of the burned areas and number of fires for the last 25 years, the average for the 1980s and 1990s, and the average for the last five years, together with the figures for 2004.



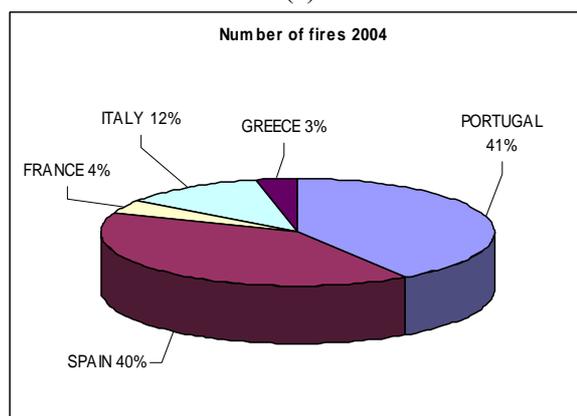
(a)



(a)



(b)



(b)

Figure 4. Burnt areas (a) and number of fires (b) in the five Southern Member States in the year 2004 as compared with average values for the last 25 years.

Figure 5. Percentage of the total burnt areas (a) and the total number of fires (b) in each of the Southern Member State for 2004.

Table 1. Number of fires and burnt area in the five Southern Member States in the last 25 years

Number of fires	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
2004	21891	21394	2028(*)	6428	1748	53489
% of total in 2004	40.9	40.0	3.8	12.0	3.3	100
Average 1980-1989	6778	9514	4910	11571	1264	34036
Average 1990-1999	22250	18151	5537	11352	1748	59039
Average 2000-2004	26059	20779	4207	7696	1891	60633
Average 1980-2004	16823	15222	5020	10709	1583	49357
TOTAL (1980-2004)	420573	380551	125503	267718	39570	1233915

Burnt areas (ha)	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
2004	129652	134171	12500	60176	10267	346766
% of total in 2004	37.3	38.7	3.6	17.4	3.0	100
Average 1980-1989	74486	244788	39157	148485	52417	559331
Average 1990-1999	102203	161323	22695	108890	44108	439219
Average 2000-2004	189532	129106	32078	76764	36610	464090
Average 1980-2004	108582	188265	31156	118303	45932	492238
TOTAL (1980-2004)	2714547	4706633	778900	2957572	1148298	12305950

(\*) number of fires for Southern France only

As mentioned, a total of 346 766 ha were burnt in the five Southern Member States in 2004, which is well below the average for the last 25 years (492 238 ha). However, the number of fires in these countries in 2004 was 53 489, which is above the average for the last 25 years (48 985), but below the average for the decade 1990-99 (59 039) or the last five years (60 633).

Since the area of each country is different, and the area at risk within each country is also different, these comparisons cannot be absolute. During 2004, about 81 % of the fires occurred in Spain and Portugal, accounting for approximately 76% of the total burnt area in the five Southern Member States.

Over the last four years, the previous tendency of the five Southern Member States towards an increase in the number of fires seems to have stabilized. This may possibly be due to the public information campaigns carried out in all the countries and the improvements in the prevention and fire-fighting capacities of these countries.

## 2.2. Portugal

After 2003, one of the worst years on record for forest fires in Portugal, 2004 was much less serious although some of the meteorological conditions carried the same high risks as 2003.

In 2004 there were a total number of 21 891 fires (16 877 of them over less than 1 ha), that burned 129 652 ha of forest areas, including 56 176 ha of woodland. Despite the unfavourable meteorological conditions particularly in June and July, the extent of the burnt area is much less than in 2003, and also less than the ten-year average. The number of fires is also down compared with 2003 and with the ten-year average.

The winter was abnormally dry, which left favourable conditions for fires to start and to propagate. These conditions, and the strong dry winds at the end of March, were responsible for 1 553 fires that burned about 3 340 ha. At the end of March, there was a fire in the Viseu district that burned 1 797 ha, most of it woodland.

June started with very high temperatures that exceeded the 30-year monthly average in some of the inland southern regions of the country, and dried up the fine material. The burned area totalled 14 341 ha, which was three times the ten-

year average for the same month. At the end of the month there were five fires larger than 500 ha, chiefly affecting the southern districts of Faro and Évora.

The weather conditions became worse in July, particularly between 22 and 30 July, when Portugal was hit by a mass of very dry air from the north of Africa (Figure 6), bringing with it a big cloud of fine sand from the Sahara desert in suspension. This increased the difficulty of fire detection.

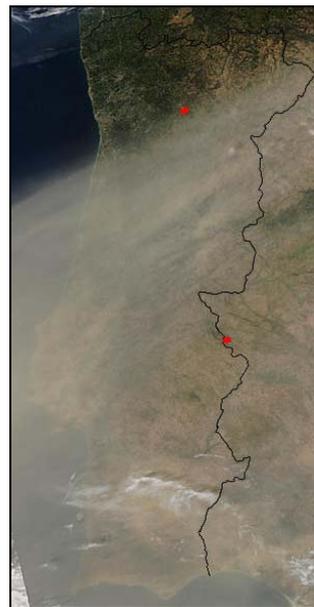


Figure 6. Mass of air from the north of Africa (22/07/2004). Red points represent active fires. Source of images: NASA. Rapid Response System

July accounted for about 65 % of the total area burned that year, and 47 % (60 677 ha) during that one week. In July there were 33 fires of more than 500 ha, 22 of which occurred in this period, accounting for 50 600 ha of the burnt area.

The largest fire of the year started on 26 July in the Serra do Caldeirão in the South of the country (Figure 7). The strong winds spread the fire extensively until it destroyed an area of 25 899 ha. Because there were other fires in other parts of the country on the same day, it requested assistance through the MIC. The request was taken up by Spain and Greece. Meanwhile, in the South of Spain, there was another fire of a similar size and with similar consequences.

Fortunately August brought a drop in temperatures and large amounts of rain, which was particularly strong in some parts of the country. These changes decreased the risk of fires starting and spreading. The burned area (8 591 ha)

was about one third of the monthly ten-year average, in a month that is normally the worst of the year. There was only one fire larger than 500 ha this month.

These conditions continued through the whole of the next month. However, in the last week of September, the increase in air temperature and the dry winds resulted in some big fires in the northern inland regions (Guarda and Bragança).



27 July



28 July



29 July



30 July

Figure 7. Evolution of the Serra do Caldeirão Fire - Source: NASA – Modis Rapid Response System

These adverse meteorological conditions carried on into the first week of October. The total burned area in September (10 396 ha) was about half of the monthly ten-year average, but the burned area for October (4 876 ha) was the opposite because of the fires that occurred in this first week. There were 8 fires larger than 100 ha, burning a total area of 2 352 ha.

The absence of rain during the winter months meant moderate fire risk in November and December with 863 fires and 524 ha of burned area, in a period in which the ten-year averages are around 240 for the number of fires and 314 ha for burnt area.

In 2004, Portugal decided to use Modis images to keep a close eye on burnt area evaluation and mapping. This helped provide accurate information, which was used for internal and public information.

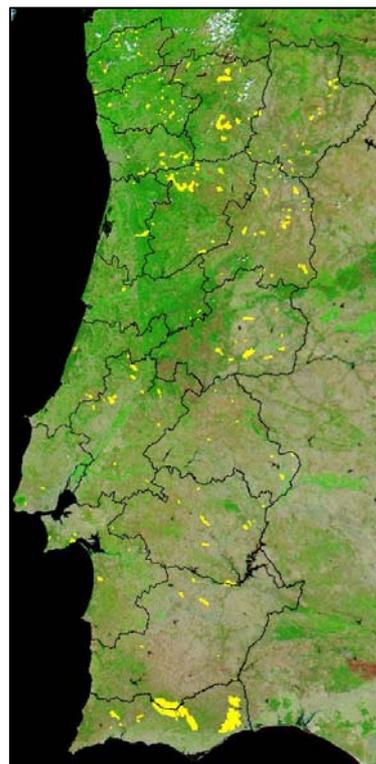


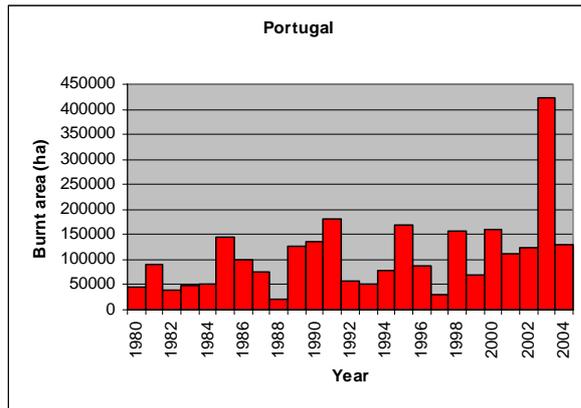
Figure 8. Modis Aqua Satellite Image of 28 September 2004 (in yellow the burnt areas of 2004). Source: NASA - Rapid Response System

In 2004, there were a total of 151 fires larger than 100 ha (91 in July) that burned a total area of 101 226 ha (56% of it shrubland).

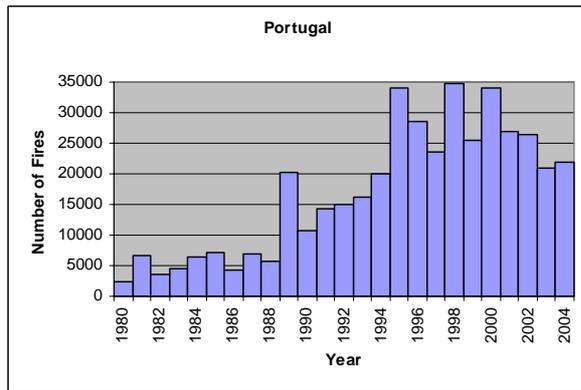
The regions most affected were in the south, where fires burned some important cork oak areas and umbrella pine plantations. The largest burned area recorded was in the district of Faro with 24% (30 672 ha) of the total burnt area of Portugal. However, extensive areas were also burned in the northern inland district of Vila Real and Guarda.

But the districts with the highest number of fires were Porto, Braga and Lisboa, where population density is higher.

Figure 9 shows the year-on-year trend in number of fires and burnt areas in Portugal for the last 25 years.



(a)



(b)

Figure 9. Burnt areas and number of fires in Portugal for the last 25 years.

In 2004 Portugal continued with the public awareness and education campaigns that it had started back in 2002 in some schools (“I Am a Friend of the Forest”) They were extended to more schools during the month of March by the Portuguese National Ranger Corps, involving 575 schools and 22 000 students. Some new materials had been developed (CD ROMs, videos and other material for teachers). The same month saw the publication and distribution of 9 5000 leaflets and 5 000 posters for forest owners giving advice on protection of houses against fire and forest fire prevention.

In June, when Portugal hosted Euro2004, there was a national campaign of television announcements featuring Portuguese footballers and other celebrities (“Together for the Forest. Together Against Fire”).

In Portugal, there were two deaths from fire during 2004, both outside the critical period. The victims were civilians who were unable to escape. No deaths were reported among pilots, forest wardens or fire-fighters. Some 400 fire-fighters were also injured and needed medical assistance

for smoke inhalation, burns, and wounds. Of these, 25 fire-fighters were seriously injured.

During 2004, the abnormal forest fire situation in Portugal led to several requests under the mutual assistance scheme. Those were met either through bilateral agreements or with MIC support.

To tackle the first large fires in June and mid-July, Portugal had to ask Spain to send aircraft under the bilateral cooperation agreement between the Portuguese Republic and the Kingdom of Spain.

By the end of July (during the critical period between 24 and 31 July), Portugal had to request amphibious aircraft to fight the increasing number of forest fires. This request was sent out through MIC and Portugal accepted help from Greece, France and Italy. During this period, and for the next two months, Spain continued to provide aircraft to help Portugal fight fires inside and outside the border area (5 km either side of the border).

On the other hand, at the end of August, Portugal also supplied assistance to Morocco by sending experts to help local authorities with fire-fighting in Tetuan. The Portuguese Fire and Civil Protection Service sent a four-man team specialised in the coordination of aerial fire-fighting and logistics.

(Source: *Direcção-Geral dos Recursos Florestais, Direcção de Serviços de Desenvolvimento Florestal, Divisão de Defesa da Florestal; Serviço Nacional de Bombeiros e Protecção Civil, Portugal*)

### 2.3. Spain

In 2004 there was a total of 22 393 fires and a total burnt area of 127 932 ha (Table 2). The number of fires was higher than in 2003 and also higher than the average of the past decade (1994-2003), whereas the areas affected were smaller in both cases.

Table 2. Distribution of number of fires and burnt areas in Spain by region in 2004.

Region	Number of fires		Burnt area (ha)		
			Woodland		Grass land
	< 1 ha	>=1 ha	Forest	Shrub land	
Pais Vasco	113	57	105	97	30
Cataluña	471	94	394	632	43
Galicia	7761	2857	10128	21492	478
Andalucía	741	371	32148	10820	2030
Asturias	873	1932	652	3713	368
Cantabria	34	144	102	1247	353
La Rioja	40	7	13	17	6
Murcia	91	22	71	326	40
Com. Valenciana	398	85	424	642	41
Aragón	325	96	598	374	263
Castilla La Mancha	787	577	1629	1409	2727
Canarias	99	38	99	155	75
Navarra	181	80	96	195	48
Extremadura	840	783	1722	2805	11614
Illes Balears	143	29	41	29	70
Madrid	240	139	309	580	877
Castilla y León	816	1126	2885	10535	2366
Ceuta	0	3	5	16	0
Melilla	0	0	0	0	0
TOTAL	13953	8440	51420	55085	21426

At the end of 2003 there was a lot of rain that reduced the risk of forest fires. The rain continued in January 2004 throughout the entire peninsula, heavy in the north and lighter in the south. The only intervention required by the General Directorate for Biodiversity (DGB) was on 14 and 15 January, when it sent two CL-215T planes to put out a fire in Almuñecar (Granada).

February was a month of little precipitation and mild temperatures. The lack of rain significantly increased the risks in the northwest. There were 11 fires, all of them in the Autonomous Region of Galicia, requiring the assistance of the DGB's CL-215 and CL-215T planes.

In March it rained heavily in most of Spain, except in Galicia, which had little rain and an increase in temperature due to winds from inland.

As a result, there were many forest fires in the Region. There were 12 fires that needed the help of the DGB's amphibious airplanes, two of them in the province of Avila and the rest in Galicia.

In April too there was abundant rain in most of the country reducing the risk of forest fires. However, in the northwest there was very little rain, intensifying the drought of the previous months. This required the DGB to tackle 28 fires, two of them in the province of Leon and the rest in Galicia.

In May the situation was the same as in April, reduced risk in the south, centre, and east of the peninsula, and too little rain in the northwest. The DGB used its amphibious airplanes to put out 11 forest fires, one in the province of Leon and the rest in Galicia.

June began very hot with no rain, which quickly dried out the abundant herbaceous vegetation that had grown after the spring rains. The drought in the northwest of Spain continued. These conditions resulted in numerous fires during the month, mainly in Galicia and the Operational Centre of the DGB handled 91 requests for help from the Autonomous Regions. In addition there were those requests received by the peripheral departments of the DGB. Galicia accounted for 87 of the 91 requests to the Operational Centre. The most significant fires were those of Portillo (Valladolid) and Escacena de Campo (Huelva). The fire of Portillo began on 18 June and ended on the following day, spreading mainly during the night and ravaged a large area of *Pinus pinea* nut trees. In Escacena de Campo (Huelva) a fire began on 30 June and was pronounced extinguished on 3 July, after damaging large areas of pine, cork oak, oak and eucalyptus. At the end of the month, the DGB sent two CL-215 planes from the base of Talavera la Real (Badajoz) in response to a request from Portugal to help put out a fire in Alentej.

During July all the air and land fire-fighting equipment of the Environment Ministry and the Autonomous Regions were on stand-by. There were some abnormally high temperatures and no rain throughout Spain, increasing the risk of fire everywhere. The drought in the northwest continued with a large number of fires. In the south, the intense heat combined with strong winds was especially conducive to fire propagation. The DGB sent planes to more than 300 fires, and total flying hours exceeded 1500.

Other significant fires were in Fonfría (Zamora), Carballeda de Valdeorras (Orense), Marañoso (Madrid), Olivenza and Cáceres (Cáceres), and Minas de Riotinto (Huelva-Seville). The fire of Minas de Riotinto began on 27 July and was not extinguished until 3 August. It damaged more than 25 000 hectares of forest, and was the third biggest fire in Spain since 1968 (after the fire of Enguera, Valencia, in 1979 the fire of Villarluengo, Teruel-Castellón in 1994). To put it out, it took more than 20 000 working hours of fire brigade time, 8 000 hours of heavy fire-engines, 35 airships flying for more than 766 hours and the dropping of 7.5 million litres of water. It cost the Junta de Andalucía over 1.04 million EUR, and the Environment Ministry over 0.88 million EUR. During this month, Spain answered request for support from Portugal were endorsed for the fires of Portel, Seara, Bragança, Beja and on the border with Cáceres. It, sent CL-215 airplanes from the bases of Talavera Real (Badajoz) and Matacán (Salamanca) and AT-802 transport airplanes from the base of Xinzo de Limia (Ourense).

These conditions continued into the beginning of August, but in the middle of the month dry storms in parts of the country caused several fires. In the second half of the month the storms became generalized with abundant rain across almost all of Spain with the exception of the Mediterranean coast and Atlantic Andalusia. The Mediterranean coast and the Balearic Islands suffered many days of winds from inland that increased the fire risk, but good prevention work and the rapid intervention of the fire services minimized the damage. Only the fire in Serra on 12 and 13 August could not be controlled to begin with and damaged more than 600 hectares. DGB aircraft tackled 515 fires and clocked up more than 1100 flying hours. The most extensive fires were – in chronological order - at Saviñao (Lugo), San Vitero and Faramontanos (Zamora), Serra (Valencia), Aldeaquemada (Jaén) and Calañas – Valverde del Camino (Huelva). The DGB also used its amphibious airplanes in the neighbourhoods of Tetuán (Morocco), on 24 and 25 August, and in Escarigo (Portugal) on 25 August.

In the first half September there were rainstorms throughout Spain, although to a lesser extent on the coast of Andalusia and in the Canary Islands, considerably reducing the risk of fire. However, the second half of the month was very dry with high temperatures everywhere, which favoured

the occurrence and development of fires. The main fires which required DGB intervention were in Serranillos (Avila), Montehermoso and Villar de Pedroso (Cáceres) and Belcaire Empurdá (Girona).

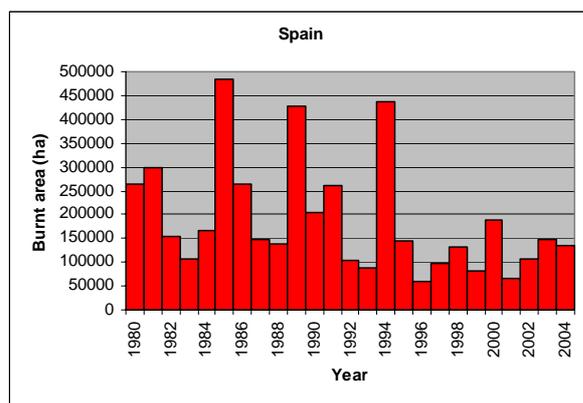
At the beginning of October steady temperatures and little rain meant high fire risk throughout Spain, so it was necessary to extend the operationla period of the three amphibious aircraft bases (Labacolla, Malaga and Talavera la Real) until it rained again. Most DGB intervention was in the north-west of the peninsula during the first third of the month. The largest fire was in Ricote (Murcia) on 23 and 24 October.

During November there was little rain, so risk remained high especially on the Mediterranean coast. However, the aircraft had to be called out only once on 14 November (Almeria).

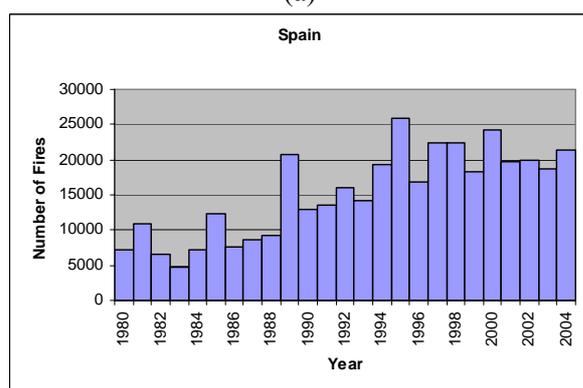
In December too there was only one fire, in Castrocontrigo (Leon), which needed the help of an CL-215 airplane from the base of Matacán (Salamanca).

During 2004 three fire fighters were killed: the pilot of a Dromader PZL airplane contracted by the Xunta of Galicia to put out a fire in Ourense, and two fire-fighters from the brigade of Quintos de Mora (Toledo) attached to the Independent Organism of National Parks of the Environment Ministry who were killed in a car accident. Several civilians also died, including two elderly people who were in a vehicle that was engulfed by flames during the fire of Minas de Riotinto (Huelva).

Figure 10 shows yearly trends in the number of fires and burnt areas in Spain over the last 25 years.



(a)



(b)

Figure 10. Burnt area and number of fires in Spain over the last 25 years.

(Source: Ministerio de Medio Ambiente, Secretaria General para el Territorio y la Biodiversidad, Dirección General para la Biodiversidad, Madrid, Spain).

## 2.4. France

The total surface area affected by fires in the French Mediterranean departments in 2004 was around 10 500 ha, including 8 500 ha since the beginning of the summer. It compares well with previous years: in 2003, more than 61 500 ha was damaged, and for the ten years the annual average was around 17 500 ha. The number of fires was also somewhat lower, 1 017 during the summer of 2004 compared with 2 080 in 2003, and an annual average of 1 410 fires for the summer period over the ten last years.

These results were even better considering that the meteorological conditions created considerable fire risks. The grand total of the sectors classified as very high risk by the French weather forecasters was more than 990, against threaten-year average of 440, although less than the level of 2003 (1 600). This testifies to the effectiveness of the measures taken during

summer 2004, both preventive monitoring on the ground and rapid intervention once fires were detected.

To tackle the fire risk, national and local forest-fire-fighting resources were mobilized as follows:

- *water bomber planes* carried out 3 540 hours of operational flight on 290 fires, including 1 635 hours of missions of aerial armed surveillance (AAS), tackling 160 fires. The time devoted to AAS in 2004 was definitely greater than in previous years (an average of 1 100 hours); in 2004 AAS accounted for a significant proportion of the operational activity of planes (46% against an average of 30%);
- the *UIISC* carried out 512 ground surveillance operations and intervened on 145 fires;
- *330 special monitoring modules (FARMHOUSE)* were mobilized to support the local fire-fighters and for preventive detection and alert operations within the framework of a protocol concluded with the Ministry of Defence; these entailed 250 hours of helicopter time for transport to sites inaccessible to land vehicles;
- *external fire fighting units* were brought in to help local fire fighting crews to monitor sensitive forest areas and to fight the most dangerous fires for a total of 17 500 man/days. Units from the South-east and South-west were committed at the end of July, and other units from the North, West, East and Isle de France were mobilized during August. The overall cost has been estimated at 3.3 million EUR (financing envisaged in LFI: 0.4 million EUR).

Altogether, national resources were used on 350 fires, that is to say nearly 40% of the fires recorded in the French Mediterranean. This percentage is higher than the average for the last ten years (30%). The plan of action made it possible to contain most fires within a very limited area. Only nine fires exceeded 100 ha over the year (less than the average of 17 fires):

- 2 in the Bouches du Rhône (Velaux, July 24, 1930 ha; Rove, July 24, 480 ha);
- 1 in Gard (Poulx, July 27 650 ha);
- 6 at Haute Corse (Calenzana, July 15 100 ha; Calenzana, July 25, 460 ha; Pietracorbara, August 13, 1080 ha; Ventiseri, August 21, 370

ha; Tox, August 21, 1340 ha; Oletta, August 21, 185 ha).

It should be noted that with all these major fires, but also other small fires, there was a very clear danger from the failure to respect the regulations on clearing the undergrowth in inter-urban area. Several buildings were badly damaged, and in many cases people had to be removed to safety.

*The importance of the Haute Corse*

During the summer, 6 of the 10 large fires occurred in Northern Corsica - Haute Corse - where a total of 4 180 ha (49% of area destroyed in the French Mediterranean) were damaged by a total number of 215 fires. Although these figures are lower than the summer averages (5 270 ha burned and 370 fires), the improvement in terms of limiting the area damaged (down by 18%) is not as good as on the mainland (down by 32%) or in Southern Corsica (down by 90%).

Whereas the level of resources deployed in Corsica was the highest ever (the UIISC set up nine forest fire intervention units, three CL415 aircraft, 2 Trackers reinforced preventively in periods of risk, 1 heavy water bomber helicopter), there is still clearly much to be done in Haute Corse to improve fire prevention and fire fighting.

*Reduction of the number of fires*

In spite of the marked reduction in the number of fires, Haute Corse remains the department which had the highest number of fires. At certain times there were so many fires (e.g. on 21 August there were about 20 fires, 10 of them between noon and 2 p.m.) that it was not possible to follow the strategy of putting out fires as soon as they start due to lack of resources. More than 2 000 ha were destroyed on that day alone. The Gendarmerie intensified its efforts to identify the causes of fires and the persons responsible, and was able to take about sixty individuals to court.

*Non-Southern areas*

Away from the South of France, fire risks were generally low: 2 000 ha were burned during the year compared with an average of 7900 ha.

*Accidents*

The end of 2004 was marred by an accident that occurred during an operation with an Aircrane

helicopter in Haute Corse, killing two of the crew. Forty fire-fighters suffered injuries, and one fireman was very seriously burned in the Bouches-du-Rhône.

In the whole of France, a total area of 12 500 ha was damaged by forest fires in 2004 whereas the ten-year average is over 25 000 ha. Figure 11 shows trends in the number of fires and burnt areas in France over the last 25 years.

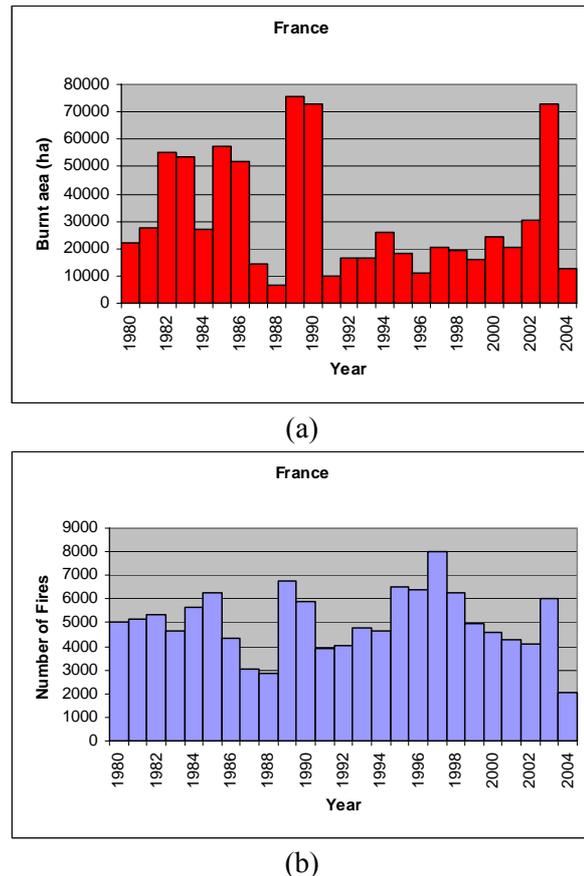


Figure 11. Burnt areas and numbers of fires in France over the last 25 years. The number of fires refers only to Southern France.

(Source: Direction de la Défense et de la Sécurité Civiles, Sous Direction de L'Organisation des Secours et de la Coopération Civilo-Militaire, Bureau de Coordination Interministérielle de Défense et de Sécurité Civiles, France)

## 2.5. Italy

After two extreme but very different summers (2002 and 2003), 2004 saw a return to normality. The summer of 2002 had very variable weather, with a warm June followed by two cool rainy months (July and August), whereas 2003 was exceptionally warm and dry, with very high temperatures from May to September.

In 2004 spring was relatively cool and these conditions continued with occasional warm intervals until July. Forest fires were particularly extensive in August, the month when 38% of all fires occurred, accounting for 46% of the total wooded area burned and 42% of the total burned area for the year. July was the second worst month, with approximately 1 000 less fires than in August, and approximately half the burned wooded area of August, while the burned non-wooded was more or less the same.

September also had a large number of fires, but the burned areas were clearly less than in the previous two months. After the summer, fires continued until the end of October, a month that exceeded March in terms of both number of fires and burnt area (Table 3).

Table 3. Forest Fires in Italy by month in 2004.

Month	Number of fires	Surface affected (ha)		
		Wooded	Non-wooded	Total
January	39	24	16	40
February	153	557	607	1164
March	149	169	175	344
April	129	201	250	451
May	71	84	83	167
June	301	472	1630	2102
July	1432	4724	15344	20068
August	2437	9529	15967	25496
September	1347	3732	4431	8163
October	243	958	652	1.610
November	78	321	61	382
December	49	95	94	189
TOTAL	6428	20866	39310	60176

The different climatic conditions affect the distribution of forest fires during the year. In fact, whereas in 2002 fires were concentrated in March with less activity during the summer months, in 2003 fires were a continuous threat from spring until the beginning of autumn.

In 2004, however, forest fires were scarce during spring, but much more prevalent during the summer months, with a sharp increase in the

second half of August. The critical situation continued during the first half of September when the number of fires was greater than in the first half of August.

In terms of geographical distribution, comparing forest fire data for the period 1999-2003 with 2004, it is clear that the spatial distribution of fires follows a similar pattern, although attenuated in absolute terms in 2004 (see Figure 12 and Figure 13).

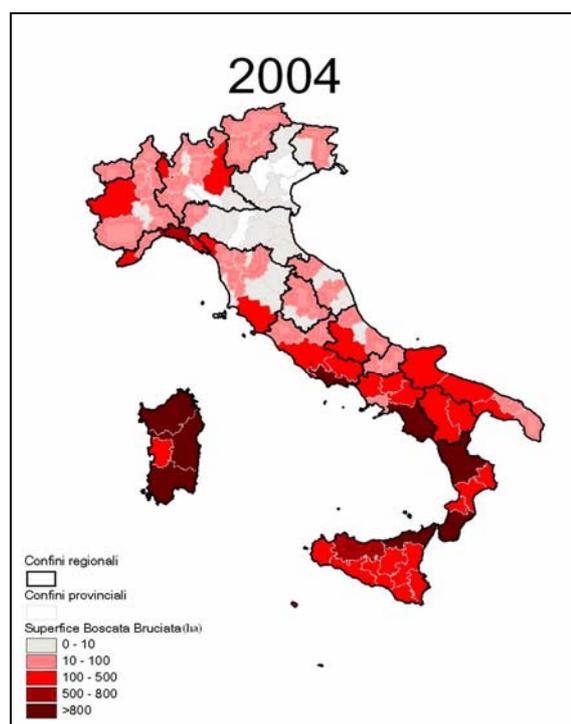


Figure 12. Distribution of forest fires in Italy in 2004.

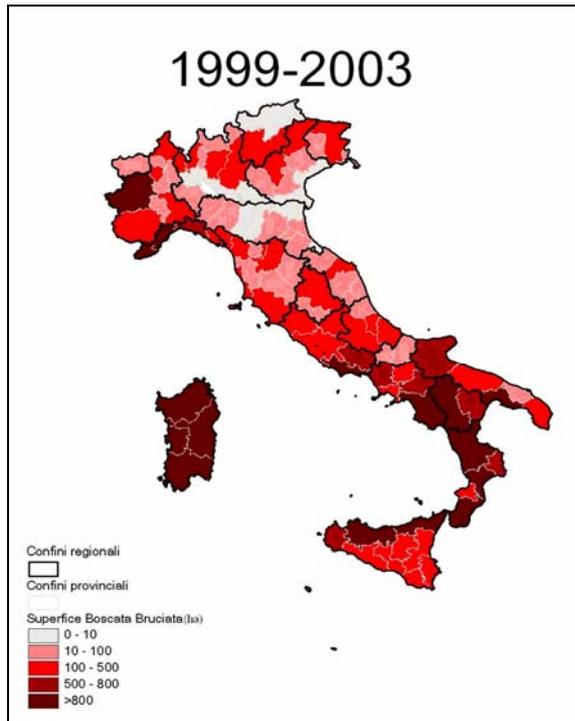


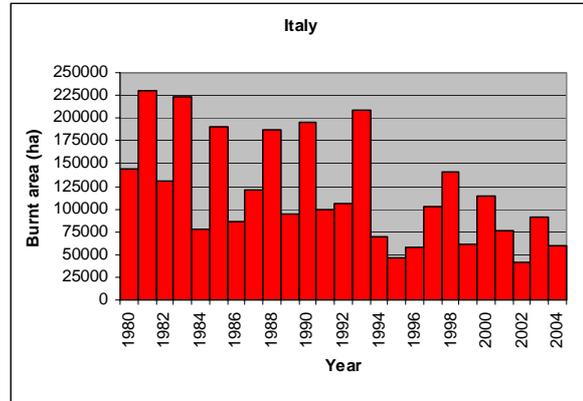
Figure 13. Distribution of forest fires in Italy in the period 1999-2003.

Table 4 shows the distribution of forest fires and burnt areas in the Italian administrative regions.

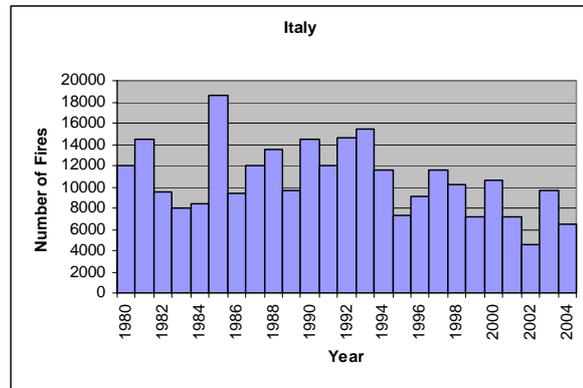
Table 4. Forest fires in Italy by region in 2004

Region	Number of fires	Surface affected (ha)		
		Wooded	Non-wooded	Total
Valle d'Aosta	13	15	23	38
Piemonte	167	493	565	1058
Lombardia	184	448	301	749
Trentino A.A.	52	29	3	32
Veneto	12	4	1	5
Friuli V. G.	35	15	15	30
Liguria	345	1024	244	1268
Emilia R.	48	25	45	70
Toscana	327	815	415	1230
Umbria	65	73	55	128
Marche	37	52	42	94
Lazio	331	2150	1234	3384
Abruzzo	58	232	376	608
Molise	84	50	100	150
Campania	894	1617	1860	3477
Puglia	214	649	1117	1766
Basilicata	218	370	781	1151
Calabria	1289	3677	6139	9816
Sicilia	1163	4076	16562	20638
Sardegna	892	5052	9432	14484
TOTAL	6428	20866	39310	60176

The yearly trends in terms of numbers of fires and burnt areas during the last 25 years in Italy are shown in Figure 14.



(a)



(b)

Figure 14. Burnt areas and numbers of fires in Italy over the last 25 years.

(Source: Dipartimento della Protezione Civile, Ufficio Pianificazione, Valutazione e Prevenzione dei Rischi, Servizio Rischio Incendi Boschivi, Italy).

## 2.6. Greece

The figures for Greece for 2004, as verified by the Forest Service, are shown in Table 5 (provisional data). Table 6 and Table 7 give a full review of forest fires per region in Greece over the year.

Table 5. Forest fires in Greece in 2004 (Provisional data)

		(1)	(2)	(1+2)
Number of fires	<1 ha	1322	5857	7179
	1 - 5 ha	258	402	660
	5 - 100 ha	151	121	272
	100 - 500 ha	12	0	12
	>500 ha	1	0	1
	TOTAL	1748	6380	8128
Burnt areas (ha)	Wooded	8750	0	8750
	Non wooded	1517	4328	5845
	TOTAL	10267	4328	14595

(1) Fire data from Forest Service; (2) additional fire data as reported by Fire Brigades; (1+2) sum of (1) and (2)

Table 6. Numbers of forest fires in Greece by regional forest administration in 2004

Forest administration	TOTAL # fires	<1 ha	1-5 ha	5-500 ha	>500 ha
East Mac. Thr.	77	56	10	11	0
Cent. Macedonia	96	86	9	1	0
W. Macedonia	101	69	20	12	0
Ipeirou	175	130	38	7	0
Thessalias	91	62	21	8	0
Ionian islands	150	105	26	19	0
W. Greece	152	124	14	14	0
St. Greece	185	143	27	14	0
Attikis	98	68	19	11	1
Peloponissou	490	391	58	41	0
N. Aigaiou	61	48	7	6	0
Aigaiou	34	14	5	15	0
Kritis	38	26	8	4	0
TOTAL	1748	1322	262	163	1

Table 7. Burnt areas in Greece by regional forest administration in 2004

Forest administration	Total burned area (ha)	Wooded (ha)	Non wooded (ha)
East Mac. Thr.	196	152	44
Cent. Macedonia	161	150	11
W. Macedonia	356	218	138
Ipeirou	608	149	459
Thessalias	247	142	105
Ionian islands	339	252	87
W. Greece	597	590	7
St. Greece	3870	3734	136
Attikis	619	619	0
Peloponissou	1711	1625	86
N. Aigaiou	169	134	35
Aigaiou	1283	895	388
Kritis	111	90	21
TOTAL	10267	8750	1517

Given that Greece was also busy hosting the Olympic Games, these results can be considered very satisfactory. The number of forest fires

increased in comparison to previous years and reached the annual mean for the last ten years (1 793), while the burnt areas remained relatively small, below 25% of the annual mean for the ten years (41 735 ha).

As regards the weather, compared with 2002 and 2003, 2004 had more days with very strong winds and relatively less rainfall during the summer. More specifically, it rained during the first halves of June, August and October and during the second halves of July and September. The periods with very high fire risk were the first halves of July and September, but despite the difficulties of tackling the fires that occurred, no fire exceeded 1 000 ha. Only 12 fires exceeded 100 ha and one 500 ha. Most of the fires with burnt areas exceeding 100 ha occurred in the Regions of Attiki (Sounio, Parnitha, and Kapandriti), Anatoliki Sterea (Evia Island), Central Macedonia (Halkidiki), South Aegean (Karpathos), and Peloponissos (Lakonia - Molai). The region of Peloponissos also had the largest number of fires and there were some near Olympic Games facilities.

In the first ten days of July the weather conditions in various regions of Greece were conducive to fire. There was a fire in the open land surrounding Athens, not far from some of the Olympic Games venues, which killed two elderly citizens. The aircraft used are listed in Table 8.

Table 8. Aircraft used in Greece during 2004.

STATE OWNED MEANS			
AIRCRAFTS	LARGE	CL-215	14
		CL-415	10
	SMALL	PEZETEL	18
GRUMMAN		3	
HELICOPTERS		H/P PK 117	2
		TOTAL	47
HIRED MEANS			
AIRCRAFT		CL-215	0
HELICOPTERS	H/P MI-26		4
	H/P SIKORSKY 64		2
	H/P MI-14		0
	H/P KA-32		6
	AC355		0
		TOTAL	12

The numbers of people used to fight fires totalled some 15 500 of which 9 500 are permanent staff of the Fire Brigade, and also tackle structural fires, and 6 000 are specially employed to fight forest fireactivities during the summer. The Fire Brigade of Greece owns about 1 500 fire engines, which are used to fight both structural and forest fires. The Municipalities in high risk areas have a

few smaller fire engines which are occasionally to fight fires.

From 27 to 31 July two CL-415 aircraft were sent to Portugal in response to a request for mutual assistance.

Also, in response to a request from Morocco, ground fire-fighting equipment was sent to be used by special airborne fire-fighting teams.

In addition to the regional data on forest fires, the Fire Brigade of Greece has reported the number of fires and other non-forest land areas burned. Data are shown in Table 9.

Table 9. Fires in non-forest land of Greece in 2004

Forest administration	Number of fires					Burned area (ha)
	Total	<1 ha	1-5 ha	5-500 ha	>500 ha	
East Mac. Thr.	531	418	48	15	0	418
Cent. Macedonia	1076	988	74	14	0	589
W. Macedonia	391	263	86	42	0	951
Ipeirou	203	197	6	0	0	54
Thessalias	265	196	53	16	0	657
Ionian islands	282	276	5	1	0	47
W. Greece	669	654	13	2	0	105
St. Greece	267	223	29	15	0	439
Attikis	96	92	1	3	0	109
Peloponnisou	1847	1787	54	6	0	561
N. Aigaiou	21	21	0	0	0	9
S. Aigaiou	186	172	11	3	0	127
Kritis	546	520	22	4	0	262
Total	6380	5857	402	121	0	4328

The trend in the numbers of fires and burnt areas over the last 25 years in Greece is shown in Figure 15.

During 2004 additional special attention was given to prevention and to improving coordination because of the Olympic Games.

A special leaflet in English was prepared informing all visitors about fire risks in Greece and telling them how to behave properly during their time in Greece.

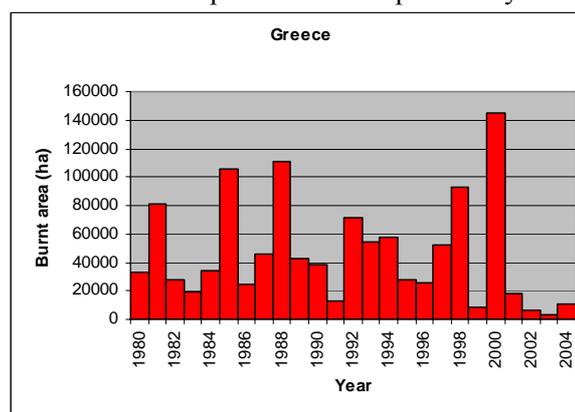
During August and September the high security measures for the Olympics included 24-hour surveillance using advanced air-balloon technology, which helped to speed up reaction times when fires occurred.

The coordination efforts were technologically better supported and there were less fires around Athens on the days of the games.

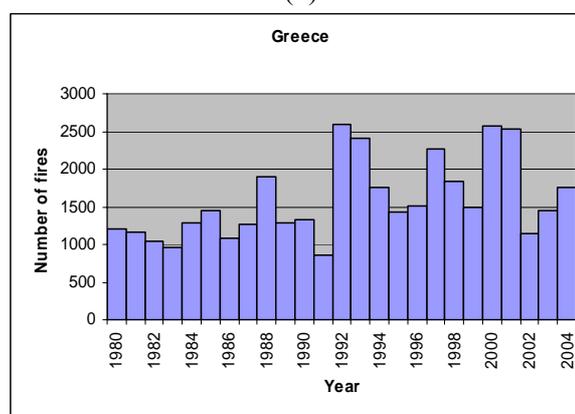
Fire planning has therefore improved over the past three years and this will continue in 2005 with some minor modifications.

Prevention will continue to be the focus in 2005 with additional efforts designed to further reduce fires caused by negligence. It should also be

possible to reduce the numbers of seasonal fire fighters required to the 2003 level (5500). Aircraft will continue to operate as in the previous year.



(b)



(a)

Figure 15. Burnt areas and numbers of fires in Greece over the last 25 years.

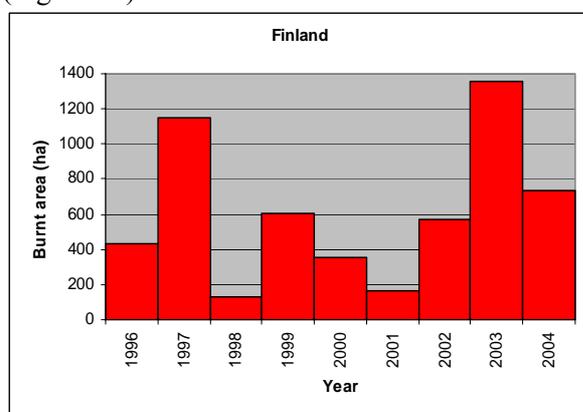
(Source: Ministry of Rural Development and Foods, Directorate General for Development and Protection of Forests and Natural Environment, Greece).

### 3. FIRES AND BURNT AREA IN THE NORTHERN MEMBER STATES

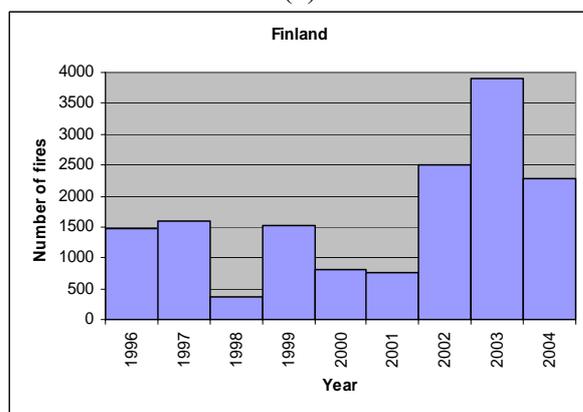
The situation in the Northern Member States of the EU is analysed separately because the figures in terms of numbers of fires and areas burnt differ significantly from those of the Southern States as presented in the previous chapter.

#### 3.1. Finland

In Finland, there were 2 270 fires in 2004, less than in the previous year (3 902) but still above the average for the last 9 years (1 616) for which data for this is area available. The area burnt was 735 ha, roughly half the area of the previous year but still above the average for the last 9 years (Figure 16)



(b)



(a)

Figure 16. Numbers of fires and burnt areas in Finland for the last 9 years.

(Source: Ministry of Interior, Finland)

#### 3.2. Sweden

A summary of the numbers of fires and burnt areas according to land cover type in Sweden for 2004 and the previous 4 years is shown in Table 10. Although statistics are also available by month, they have been aggregated by year to provide annual figures.

The trend in the numbers of fires and burnt areas over the last 5 years is shown in Figure 17. In 2004 both the numbers of fires and the burnt areas were slightly below the average for the last 5 years and significantly lower than in 2003.

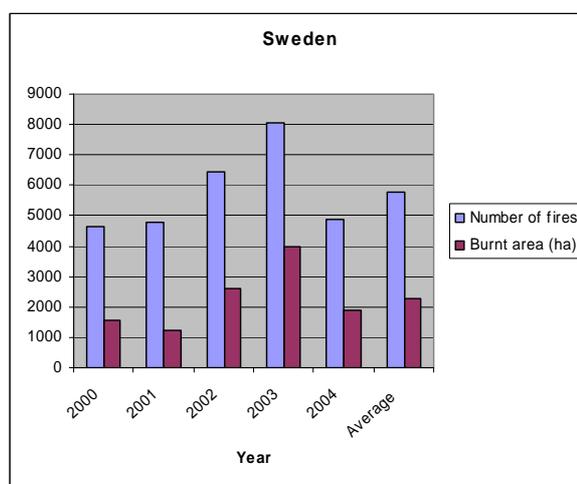


Figure 17. Burnt areas and numbers of fires in the last 5 years in Sweden

Table 10. Numbers of fires and burnt areas in Sweden by land cover type

<i>Number of Fires</i>				
<i>Year</i>	<i>Productive woodland</i>	<i>Other wooded land</i>	<i>Non-wooded land</i>	<i>Total</i>
2000	400	1755	2553	4650
2001	476	1669	2686	4774
2002	922	2637	2931	6421
2003	840	2777	4665	8071
2004	492	1802	2661	4887
<i>Burnt area (ha)</i>				
<i>Year</i>	<i>Productive woodland</i>	<i>Other wooded land</i>	<i>Non-wooded land</i>	<i>Total</i>
2000	784	329	440	1552
2001	412	286	556	1254
2002	877	413	1336	2626
2003	1316	1021	1665	4002
2004	896	550	437	1883

(Source: Swedish Rescue services SRSA, Sweden).

#### 4. FIRE SITUATION IN THE NEW MEMBER STATES.

Since the statistics for the new member states cover a different period to those of the other EU Mediterranean countries and the Northern States, they are presented in this specific chapter.

##### 4.1. Cyprus

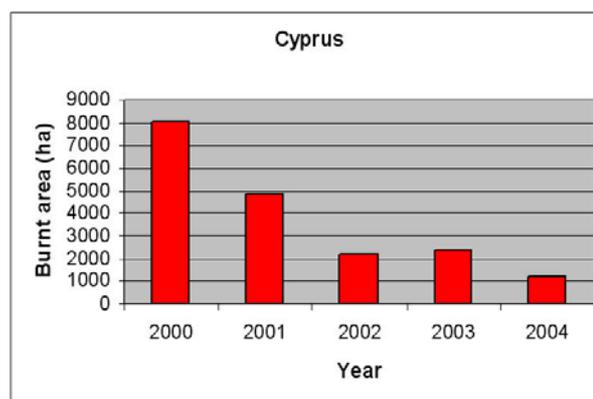
During 2004, a total number of 221 forest fires broke out in Cyprus affecting an area of 1 218 ha of wooded and non-wooded land. Both the number of fires and the total extent of the area burned during 2004 were below the average for the last five years. Compared with the previous year, both the number of fires and the area burned showed a remarkable decrease (Figure 18 and Table 11).

During 2004 no casualties were reported in Cyprus.

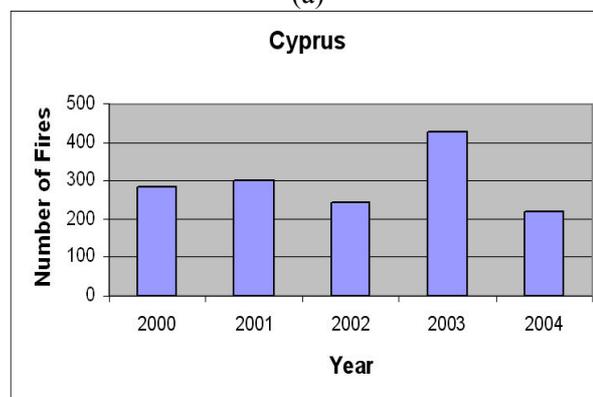
The largest forest fires occurred during the summer months, although a high percentage also occurred during September and October. Most of the fires occurred during July and September.

Cyprus recorded a total number of 6 forest fires where the final area burned was at least 50 ha. This is a similar figure to that of 2003, and represents only 3% of the total number of forest fires in the Country. Of the total number of fires, 90% damaged 5 ha or less.

Most of the fires in Cyprus are caused by accident or negligence – with a relatively small percentage started deliberately. Since most forest fires are of human origin, the Department of Forests of the Ministry of Agriculture is aiming to reduce their number by tackling the causes. For this reason the Government of Cyprus makes every effort to gain the support and co-operation of the public through a well planned and directed publicity and educational programme.



(a)



(b)

Figure 18. Burnt areas and numbers of fires in Cyprus over the last 5 years.

The responsibilities of the Services involved in fire management are determined by the relevant legislation. During 2004, the personnel of the Department of Forests and the Police Fire Service worked together in fighting almost all the fires, and in many cases other Services such as the Police, Army, Game Fund, District Administrations and Civil Defence, were also actively involved in fire fighting.

A large number of fire engines, crawler tractors and agricultural tractors were usually used in fire fighting activities. Two medium 5 tonnes

helicopters were hired in summer 2004. Army and police helicopters could also be used when needed to transport personnel and equipment and for coordination purposes.

The problem of forest fires will always be a permanent threat to the natural forests of Cyprus, so persistent vigilance and the continual upgrading of the forest fire management system, in line with technological progress, are a top priority both for the Department of Forests and the Government of Cyprus.

Table 11. Numbers of forest fires and burnt areas in Cyprus

Year	Number of fires	Total burnt area	Forest and other wooded land burnt area (ha)	Non wooded land burnt area (ha)
2000	285	8034	2552	5482
2001	299	4830	778	4052
2002	243	2196	166	2030
2003	427	2349	921	1428
2004	221	1218	667	551

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

## 4.2. Czech Republic

The average number of forest fires per year in the Czech Republic during the last 10 years is about 1 330. The average burnt area per year during the same period is 648 ha, which results in an average burnt area per fire of about 0.5 ha.

A total number of 873 forest fires were recorded in 2004 and an area of 335 hectares was burnt, with damage costing an estimated 19.1 million CZK (approximately 0.62 million EUR).

Figure 19 shows the yearly trend in burned areas and numbers of fires over the last 10 years.

No one died in forest fires in 2004 but 22 people were injured.

The following forest fires were the most severe during 2004:

- burnt area
  - 14.3.2004 – Malíkovice, 30 ha, short forest and grass, damage: 0.6 mil. CZK (approx. 19355 EUR), cause: arson,

- 30.4.2004 – Milínov, 25 ha, grass and brushwood, damage: 0 CZK, cause: unknown,

- losses

- 13.4.2004 – Blansko, 8 ha, spruce trees, damage: 1.4 mil. CZK (approx. 45160 EUR), cause: burning of brushwood (negligence).

The most common cause in 2004 was negligence (61%); arson was responsible for 6% of forest fires while 26% had unknown causes.

Fires were most frequent in April and during August and September - see Figure 20.

### *Patrol flights and aerial fire fighting in 2004*

#### *- Patrol flights*

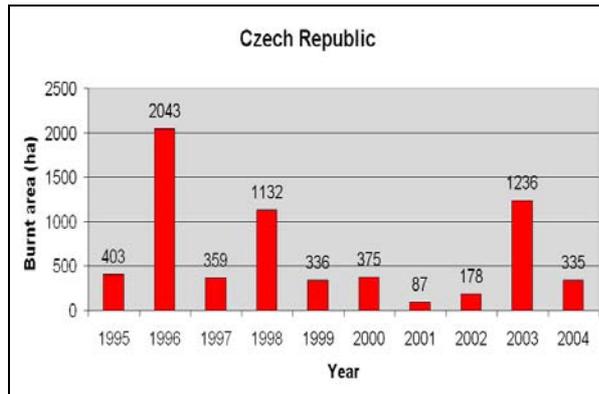
During the year, 221 requested patrol flights (290.19 flying hours) were made by aircraft of private companies and helicopters of the Czech Police. They detected 21 forest fires.

#### *- Aerial fire-fighting*

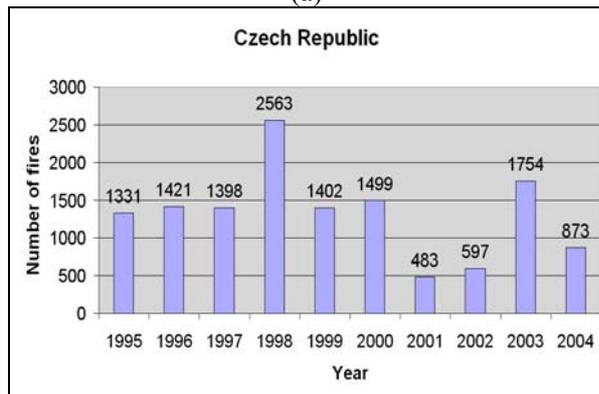
Aircraft successfully supported the fighting of six fires in 2004, with a total of 21.2 flying hours. Table 12 gives a comparison with previous years.

Table 12. Patrol flights and aerial fire fighting efforts in the Czech Republic in the last five years.

	Patrol flights			Aerial fire fighting			
	fires detected	number of flights	hours of flight	number of flights	hours of flight	soaking agent (litres)	number of fires extinguished
2004	21	221	290.19	18	21.2	10	6
2003	31	464	700.61	541	169.2	325	54
2002	8	388	415.11	43	10.92	51	3
2001	4	287	306.18	78	19.3	71	8
2000	70	743	723.64	196	37.91	220	10



(a)



(b)

Figure 19. Burnt areas (a) and numbers of fires (b) in the Czech Republic in the last ten years.

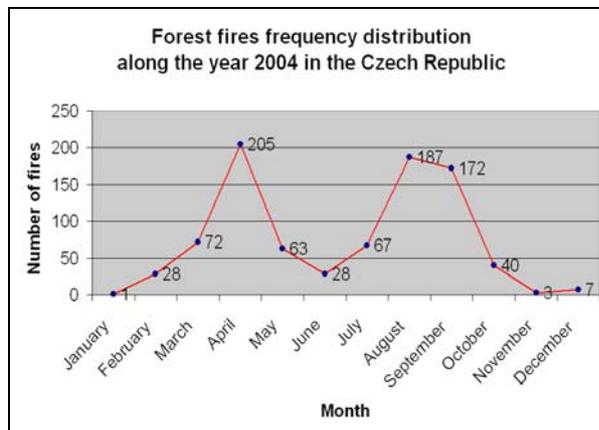


Figure 20. Forest fire frequency in 2004 in the Czech Republic.

(Source: Ministry of Interior of the Czech Republic)

### 4.3. Latvia

In 2004, the Latvian State Forest recorded 647 cases of forest fires, which considering the climatic conditions is an average figure typical for Latvia. The highest number of forest fires was between April and June, the second half of the summer being rainy. After 1 July a total of 67 forest fires were recorded. There were no particularly difficult situations, and only in a few cases did it take more than one day to put the fire out. The largest fire with a total burned area of 41 ha was on 19 April in the Ventspils region in the North- West of Latvia.

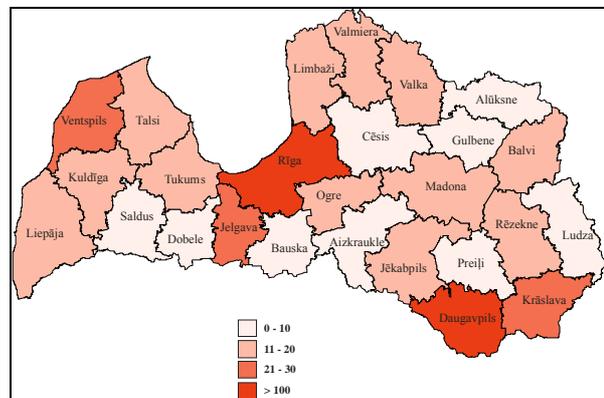


Figure 21. Number of forest fires in Latvia by administrative region.

Latvia's total burned area in 2004 was 428 ha, with an average of 0.66 ha per fire. In more than 80% of cases the forest fire was detected before an area of less than 0.5 ha had been, which shows that the forest fire service functioned efficiently.

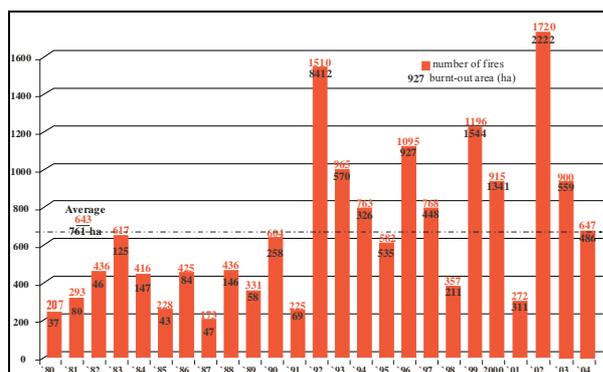


Figure 22. Numbers of forest fires and burned areas in Latvia from 1980 to 2004.

The largest number of forest fires occurred in the vicinity of the two biggest cities – Riga (220 events) and Daugavpils (109 events). This is always the case with these cities since population density is high and there is more recreational use of suburban forests.

There were no victims in forest fires.

Figure 23 shows the distribution of causes.

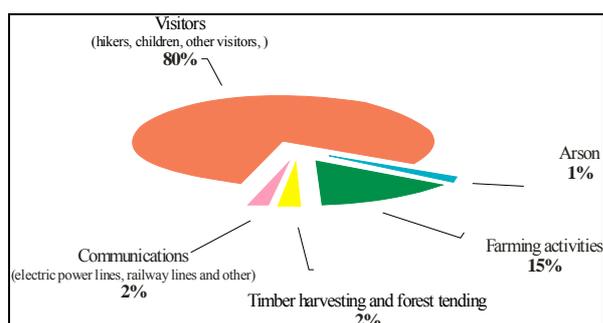


Figure 23. The distribution of causes in Latvia.

This shows that the distribution of causes is very similar to that in other Northern European Countries, which means no extremes for Latvia.

(Source: State Forest Service, Latvia)

#### 4.4. Poland

##### Introduction

The total area of Polish forests is 8.94 million ha. The forest cover index is 28.6%. Poland belongs to the group of countries with a characteristically diverse ownership structure dominated by public forest, accounting for 82.5% of the total area. Within this, 78.4% of the total is under the management of the State Forests National Forest Holding. The proportion of privately owned forest is geographically differentiated: from about 40%

in the Małopolskie Province (south-eastern part of the country) and Mazowieckie Province (central part of Poland) down to some 1-2% in Lubuskie, Zachodniopomorskie and Dolnośląskie Province (along the western border of the country). The recent public administration reform altered the structure of supervision over private and municipal forest. Before the reform the State Forests and National Park authorities supervised as much as 98.7% of the area. Beginning in 2000, the share of local authorities (*starostwa*) supervision increased to the present level of 18%. Considering the average size of 1.3 ha of privately owned forest, fire protection is difficult. This situation and the relative inactivity of forest owners make it almost impossible to carry out effective forest management in these forests. State Forests occupy 28 000 forest complexes, of which 6 000 are smaller than 5 ha.

About 83% of all forest resources of Poland are potentially threatened by fire (the average figure for the whole of Europe is 65%). Thus, with an area of 7.4 million ha at risk the danger is extremely high. The actual scale of the problem is a result of the prevailing abiotic, biotic and anthropogenic pressure over the whole country. The cumulative effects of several unfavourable factors make the forest less vital, so fires start easily and spread easily.

##### Fire Risk Assessment

It is decisive for Forest Districts and National Parks to determine the actual degree of risk on a daily basis so that they are prepared. Two methods of assessment are recognized: (1) the Forest Research Institute method (IBL method), and (2) the Szczygieł method of fire risk determination. The first method is obligatory for all administrative units of the State Forests and is carried out in 34 prognostic zones. The zoning of the forest area is determined by the General Directorate of State Forests on a proposal from the Department of Forest Fire Protection of Forest Research Institute. The zoning takes account of forest danger categories, the spatial distribution of large closed forest areas and natural forest areas, the climatic conditions, the actual site and stand conditions, the frequency and magnitude of past forest fires, the availability of radio-based communication systems, the administrative boundaries of State Forests, and the distribution of large conurbations, industrialized regions and the actual intensity of tourism. The area under the

supervision of a Forest District is the basic organizational unit.

#### *Preventive measures*

The following preventive measures are applied in the fire protection system of Poland:

- legislative activity: creating new legal regulations connected with forest fire protection
- public information and propaganda
- rendering forests accessible so that forest fire protection demands are met
- construction and maintenance of fire breaks and fire belts
- implementation of silvicultural recommendations
- training of staff involved in forest fire management.

#### *Fire situation*

Several fire categories are identified in statistical data collection systems in Poland. Depending on actual type of vegetation cover different wildfire (this term comes from the FAO classification system) categories are identified. Fire-related data are collected by different institutions, depending on the jurisdiction (responsible agency or ministry, ownership, etc.). As a consequence, the data collected have a differentiated structure.

The most precise and complete statistical data on forest fires (definition of forest according to the FAO nomenclature: fires on high forest lands) in public (state-owned) lands under the administration of the State Forests (SF) is collected each year by the General Directorate of State Forests (GDSF). The data collected includes spatial distribution (size of area burned, location down to Forest District level), temporal information (time of occurrence, age of burnt stands), causes, and value of final losses. Moreover, data are available on material means and financial resources spent on fire protection. In the periodic forest fire reports (until 1999) from Poland to the statistical data collection for ECE/FAO only forest areas under the administration of State Forests (78.4% of total country's forest) were included.

Statistical data on forest fires and other fires in post-war Poland show a clearly growing tendency, both in number and in area (Table 13). The yearly mean number of forest fires occurring (in high forests, according to FAO terminology)

doubled in the decade 1981-1990. During the following decade, it became three times larger than in the period 1951-1960 (Table 14). The average yearly size of the burnt area, after a temporary yet clear decrease, rose again in the period 1991-2000. The mean area of a single forest fire in State Forests diminished by more than twice in the same period, taking 10-year intervals, or even more than 5 times, taking 5-year Intervals (Table 14). In the period 1991-2000 the total burnt forest area was 109 146 ha and the total number of fires was 83 061. In the last decade, the number of fires in State Forests was 47 190, and nearly the same level as for the last twenty-year period (1971-1990), i.e. 47 390. The burnt area has diminished by only 12.5% in the last decade as compared with the previous period (the respective figures: 55 868 ha versus 63 960 ha).

An alarming tendency has been observed in recent years: the continuously growing number of forest fires in forest owned by non-state owners, mainly in privately owned forest. The proportion has risen rapidly from 15% in 1991 to 57% in 2000. In the period 1991-2000 the burnt area in State Forests and non state forests was nearly equal (the respective figures are: 55 868 ha versus 53 278 ha), and the average area of a single fire was more than twice larger in the latter.

#### *Causes*

The absolute majority of forest fires were caused by the direct or indirect activity of humans. Many were the result of carelessness (40.17%), but of most concern is the growing number started deliberately, i.e. arson (44.23%). There has also been an increase in the number of fires spreading from non-forest areas, the main causes being the burning of stubble, meadows, roadside ditches or fallow ground. The area of abandoned agricultural ground has significantly increased since the beginning of transition towards the market economy. And this new situation has resulted in a huge number of fires on these lands: from approx. 5 000 a year in 1994 to 53 000 in 2003. Also the size of the burnt area has grown from about 13 000 ha to 95 000 ha (Table 13). The tradition of burning meadows, despite the legal restrictions in place for many years now, continues to be a serious problem every spring. Burning grass endangers forests and farms, often involving fatalities, sometimes the perpetrators themselves. Smoke emissions are a serious danger to drivers by reducing visibility. In the season of meadow

burning the number of forest fires increases rapidly by up to five times. In 1996 most wildfires started from the burning non-forest land (28% of all forest fires in State Forests). A total of nine people died during the burning of meadows and wasteland, including one fireman.

Arson is still an important cause of forest fires, and the number of deliberate fires has been growing regardless of forest ownership. In the period of transformation arson may have been the result of the difficult economic situation of people. Earlier most cases of arson were the result of mental disorders. Sometimes the prospect of getting even a temporary job at the fire site is the only possible job opportunity. This is especially true in regions with high unemployment.

Most forest fires in Poland occur in the period March-September. Depending on the year, forest fires may peak either in early spring before the greening of vegetation or during the summer drought period (July-August). For example, in 2000 the spring fires (April-May) as accounted for as much as 60% of the yearly total, and the number of fires in May 2000 (5 296) was even higher than the previous highest number recorded in April 1996 (equal 5 003).

Table 13. Wildfire database for Poland in the period 1990-2004

Year	Total No. of Fires on High Forest, Other Wooded Land & Other Land	Total Burned Area on High Forest & Other Land [ha]	No. of Fires of Other Land	Burned*) Area of Other Land [ha]	No. of Fires on High Forest (without parks and urban forests)	Burned Area of High Forest (without parks and urban forests) [ha]
1990					5756	7341
1991					3528	2567
1992					11858	43755
1993					8821	8290
1994	15877	28386	5167	19215	10245	9171
1995	13414	18648	5733	13342	7367	5306
1996	19807	58928	11883	44808	7523	14120
1997	19304	48430	12486	41832	6528	6598
1998	21304	30580	11545	26561	5946	4019
1999	25835	35791	16015	27484	9405	8307
2000	28452	31277	16024	24264	11840	7013
2001	20647	31842	16167	28509	4239	3333
2002	32638	31376	22537	26293	9676	5083
2003	70455	117406	53367	95906	16310	21500
2004	30125	36087	22906	31749	7219	4338

\*) Moreover area burned of moor and heathland each year amount: 1989 – 4,039 ha; 1990 – 9,553 ha; 1992 – 31,566 ha.

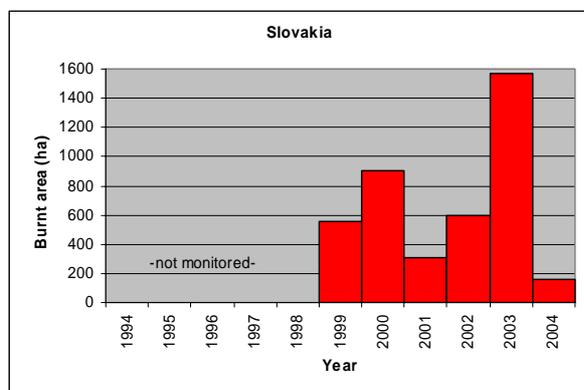
Table 14. Statistical data of fires in high forest in Poland in the period 1951-2004

Period	Annual Averages						
	Number of Fires in High Forest		Burned Area in High Forest [ha]		Average Area of Fire in High Forest [ha]		
	Total	in State Forests	Total	in State Forests	Total	in State Forests	
1951-1955		1609		5069		3.15	
1956-1960		1344		2946		2.19	
1961-1965		1298		2641		2.03	
1966-1970		1569		1822		1.16	
1971-1975		2094		2708		1.29	
1976-1980		1757		2610		1.49	
1981-1985		2627		3871		1.47	
1986-1990		3001		3603		1.20	
1991-1995	8364	5206	13818	8673	1.65	1.67	1.63
1996-2000	8366	4232	8011	2500	0.96	0.59	1.33
2001-2004	9722	4365	8564	1761	0.88	0.40	1.27

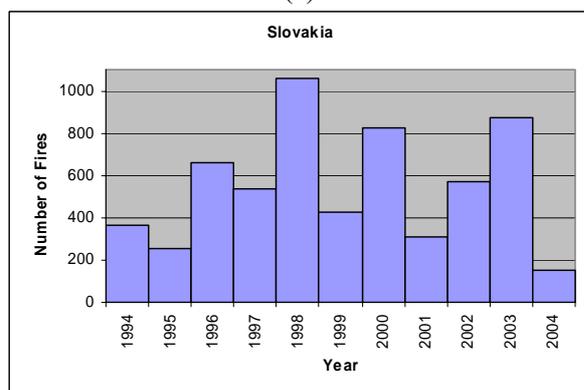
(Source: Forest Research Institute, Independent Forest Fire Prevention Laboratory, Poland)

#### 4.5. Slovakia

In Slovakia 153 forest fires occurred in 2004 burning a total area of 157 hectares. Compared with 2003 the number of fires decreased by 719 while the burned area also decreased from 1 567 ha to 157 ha.



(a)



(b)

Figure 24. Burnt areas and numbers of fires in Slovakia in the last ten years.

Table 15 Forest fires in Slovakia in the last ten years.

Year	Number of fires	Burned area (ha)
1994	366	not monitored
1995	254	not monitored
1996	662	not monitored
1997	535	not monitored
1998	1056	not monitored
1999	426	557
2000	824	904
2001	311	305
2002	570	595
2003	872	1567
2004	153	157

(Source: Ministry of Interior of Slovak Republic Presidium of Fire and Rescue Corps)

#### 4.6. Slovenia

In Slovenia, provisional data updated to 1 September 2004 show that in the first nine months of 2004, there were 986 forest fires burning a total area of 303 hectares. Most of the fires (903 out of 986) burned less than 1 ha, 79 fires burned between 1 ha and 10 ha, while 4 fires burned more than 10 ha. Of the total burned area, 186 ha were woodland and 117 ha non-wooded land.

(Source: Administration for Civil Protection and Disaster Relief, Ministry of Defence, Republic of Slovenia)

### 5. FIRE SITUATION IN EU CANDIDATE COUNTRIES

#### 5.1. Bulgaria

Forest fires have never been a serious problem in Bulgaria during the past, partly thanks to the natural and climatic conditions of the country. However, during the last ten years forest fires have become more and more a problem and in the period 1999-2001 they were a real disaster (see Table 16 for statistics). The basic reasons for this change were identified as follows:

- global warming over the last decade;
- social and economic changes in the country during the transition towards market economy;
- change in the organization of activities in the forestry sector;
- unsuitable tree species (high percentage of coniferous plantations, untimely thinning of plantations and young stands);
- limited and outdated fire-fighting equipment;
- no reliable fire reporting and forecasting system;
- poor legislation (regulatory based) leading to ineffective coordination between the different state and local fire-fighting authorities;
- insufficient participation by public organizations and the public as a whole.

These factors seem to indicate that Bulgaria is becoming similar to the Mediterranean region, with its high forest fire risk. Damages are not only economic, but on a much bigger scale: inestimable damage of plant systems, soil erosion and destruction, changes to the warmth and moisture balance of ecosystems, changes in basic

tree species, flora composition and ecosystem structure, changes in water flow character, poorer health of the neighbouring unburned stands, and a sudden decrease in the CO<sub>2</sub> absorbing capacity of nature.

Most of the fires in coniferous forests affected whole trees and permanently harmed them (68%), requiring artificial reforestation. The burnt deciduous forests are in similar condition (15%).

Harmed forest ecosystem could be regenerated in two ways:

- naturally – over several 20-40 years (and in some cases 100-200 years) depending on the type fire and the nature of the burnt areas;
- through afforestation, which decreases the regeneration period significantly and in some cases is the only possible solution.

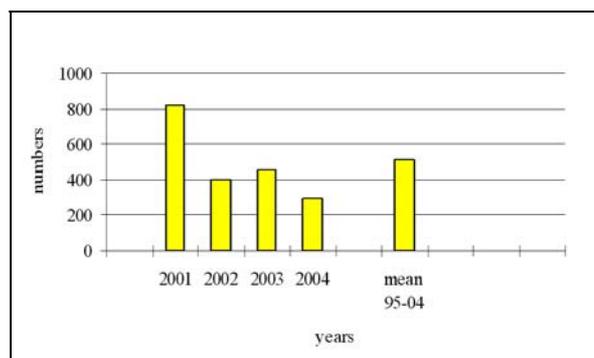
According to the statistics, over the last 14 years there has been an average of about 500 forest fires a year affecting about 9 000 ha of forest areas.

During 2004 there were two clear peaks of fire activity, as is typical for Bulgaria. The first was in March and the second in September. Both were connected mainly with the burning of stubble and plant waste by farmers.

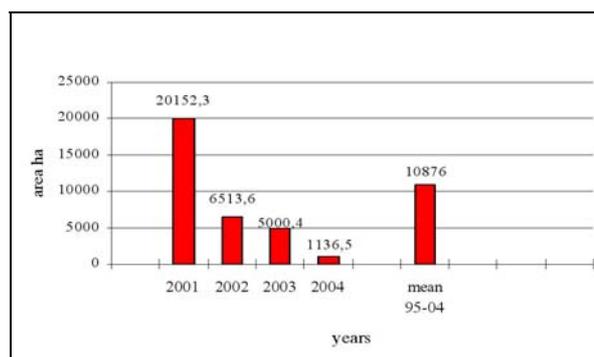
The main reasons for the forest fires during 2004 were as follows (in number of fires):

- carelessness: 155
- arson: 17
- natural: 5
- unknown: 117

Table 16 gives fire statistics for the last ten years and Figure 25 shows the trends in burned areas and fire frequency for the last 4 years as compared with the ten-year averages.



(a)



(b)

Figure 25. Burnt areas (a) and numbers of fires (b) in Bulgaria in the last 4 years.

Almost all forest fire prevention, monitoring, forecasting, and fighting activities are financed by the state. The National Forestry Board within the Ministry of Agriculture and Forests in coordination with the National Fire and Emergency Safety Agency within the Ministry of Interior are the main authorities responsible for fighting forest fires. Through their Regional and Local Units and with the help of the Army, Volunteer Formations and other stakeholders they organize and implement all activities to tackle forest fires.

Table 16. Forest fire statistics for Bulgaria for the period 1995-2004

Year	Number of fires	Burnt area (ha)			Fire causes (number of fires)		
		Total	forest lands	Other territories	human activities	Natural	Unknown
1995	114	550	527	23			
1996	246	2150	1933	217			
1997	200	595	472	123	51	4	145
1998	578	6967	6060	907	147	6	425
1999	320	8291	4198	4093	84	9	227
2000	1710	57406	37431	19975	385	18	1307
2001	825	20152	18463	1689	187	19	619
2002	402	6513	5910	603	150	7	245
2003	452	5000	4284	716	281	9	162
2004	294	1137	881	256	172	5	117
Average	514	10876	8016	2860	182	9.6	405

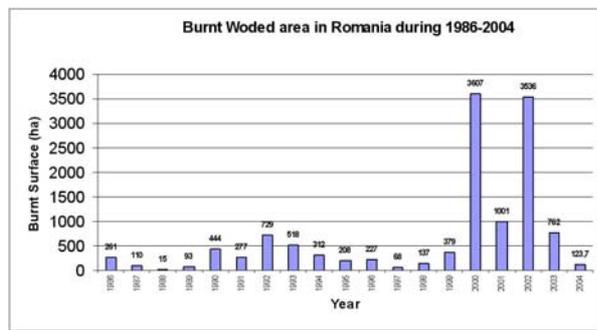
According to the Regulation on Fire Fighting Activities, Implementation of the Forest Fund and Protecting the Forest from Fire, the National Fire and Emergency Agency, through its regional and local units, is in charge of fire fighting operations.

According to the Crisis Management Act (adopted by the Parliament on 1.3.2005) the Governors have the right to declare a crisis situation, and in the case of a very big forest fire. the Council of Ministers can declare a crisis situation in few districts. In certain situations the Minister of Interior, The Minister of Agriculture and Forest or the Minister of Environment and Waters can ask the Head of the General Staff of the Army for help in fighting fires.

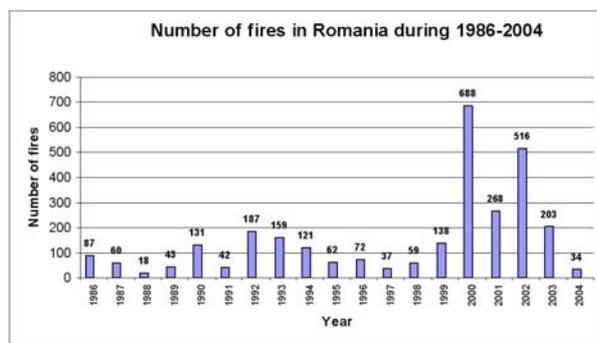
(Source: National Forestry Board, Ministry of Agriculture and Forests, Bulgaria).

**5.2. Romania**

The year 2004 was much rainier than previous years, when there was much less rain and drier soil, so there were fewer fires and less burnt areas in Romania compared with previous years (see Figure 26).



(a)



(b)

Figure 26. Burnt areas (a) and numbers of fires (b) in Romania during 1986-2004.

The National Forests Administration (ROMSILVA) was in charge of fire prevention and fire-fighting, including protecting the forestry areas under its administration against other

damaging activities, such us illegal logging, pasturing or poaching. It also worked with the regional environmental agencies to protect forests and restrict harmful activities.

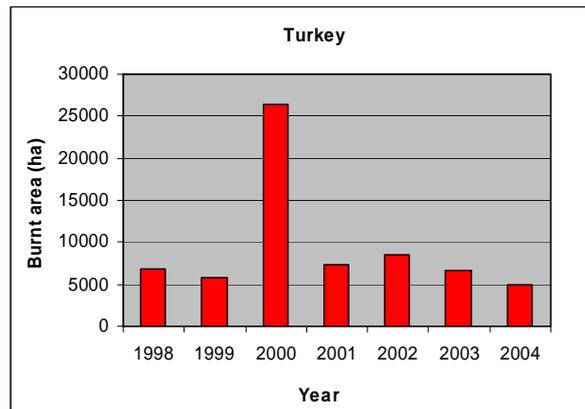
Actual fire-fighting activities were co-ordinated by the forestry personnel in cooperation with the fire fighters, depending on the size and location of the fire.

(Source: Ministry of Agriculture, Forests, Waters and Environment, Romania)

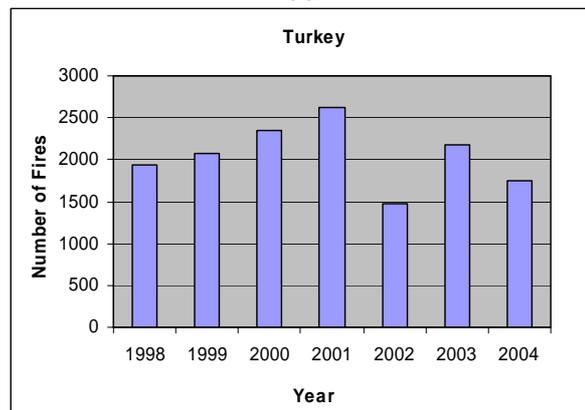
**5.3. Turkey**

In Turkey 1756 forest fires occurred in 2004 burning a total area of 4876 hectares. Compared with the year 2003 both the number of fires and the burnt area decreased.

The trend of the number of fires and burnt area during the last 7 years in Turkey is shown in Figure 27.



(a)



(b)

Figure 27. Burnt area (a) and number of fires (b) in Turkey during the last 7 years.

(Source: General Directorate of Forestry. Forest Protection Department. Ankara, Turkey)

## 6. THE EUROPEAN FOREST FIRE INFORMATION SYSTEM (EFFIS)

In 1997 the European Commission set up a research group to work specifically on the development and implementation of advanced methods for the evaluation of forest fire risk and for the estimation of burnt areas in the European Union. This group is currently working as part of the Institute for Environment and Sustainability of the European Commission Directorate-General Joint Research Centre (JRC).

Since 1998, it has been collaborating with the relevant services in the Member States, under the coordination of DG Environment.

These activities led to the development of the European Forest Fire Information System (EFFIS). Since 2003, EFFIS has been part 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 the national forest fire programmes. A webmapping interface has been set up on the EFFIS website (<http://inforest.jrc.it/effis>) that allows users to access EU wide information about forest fires and other related environmental data.

The EFFIS module for the assessment of forest fire risk is the European Forest Fire Risk Forecasting System (EFFRFS) developed by the JRC. It forecasts forest fire risk in Europe on the basis of a number of meteorological fire risk indices and an integrated fire potential index, allowing a harmonized evaluation of the forest fire risk situation during the year. Since 2002, following a request from the Member States, the risk assessment is performed for an extended period of six months. So in 2004 too EFFIS started to evaluate forest fire risk on 1 May 2004, and ended on 31 October 2004. Forest fire risk maps were computed and broadcast to the relevant services in the Member States and the European Commission.

The JRC evaluates the annual damage caused by forest fires in Europe using the EFFIS module known as European Forest Fire Damage Assessment System (EFFDAS). The evaluation focuses on Southern Europe and is based on the analysis of satellite imagery and geographic

information. Since 2000, maps of areas damaged by fire covering at least 50 ha are produced every year by processing remote sensing data. The areas affected by fires of at least 50 ha correspond, on average, to 75% of the area burnt in Europe each year. In addition to the maps, the JRC produces an analysis of the types of land cover affected.

Other modules, under development within EFFIS, will look into more aspects of forest fires such as vegetation regeneration after fire, estimation of forest fire emissions, and the identification of post-fire risk areas that may be subject to further damage such as soil loss and/or landslides.

In addition a new module for the rapid appraisal of fire damage was introduced during 2003 and continued in 2004. Analysis was performed using satellite imagery with a ground spatial resolution of about 250 metres for all fires of at least 100 ha. The evaluation of damages was performed twice during the season: at the end of July and at the end of September. This is to be continued during 2005.

### 6.1. The Risk Forecasting System: 2004 results

The European Forest Fire Risk Forecasting System (EFFRFS) was developed to support the Commission's Directorate-General for the Environment and the forest fire-fighting services in the EU Member States. As mentioned previously, since 2002, at the request of the Member States, operation of the EFFRFS has been extended to six months starting on 1 May and ending on 31 October. The same time window was maintained in 2004 and the same seven methods were used to compute fire risk as in previous years, including the Fire Potential Index introduced in 2001.

In 2004 summer fires were less problematic than in 2003 when fires were severe. Figure 28 shows the average daily Fire Weather Index (FWI) values for the period from 1 June to 30 September, which is the main summer fire season, for the years 2002, 2003 and 2004. The spatial distribution of the average fire risk according to the FWI is clearly similar in 2004 to 2002, although with relatively higher values in France and Greece. On the other hand, in the Central and Eastern sectors, the fire risk levels estimated by FWI in 2004 were on average lower than for 2003 and 2002.

The maps and graphs below also show seasonal trends in the FWI during 2004 and a comparison with previous years.

Figure 29 plots the monthly average FWI values through the season from May to October, showing clearly that the month of July was the most severe.

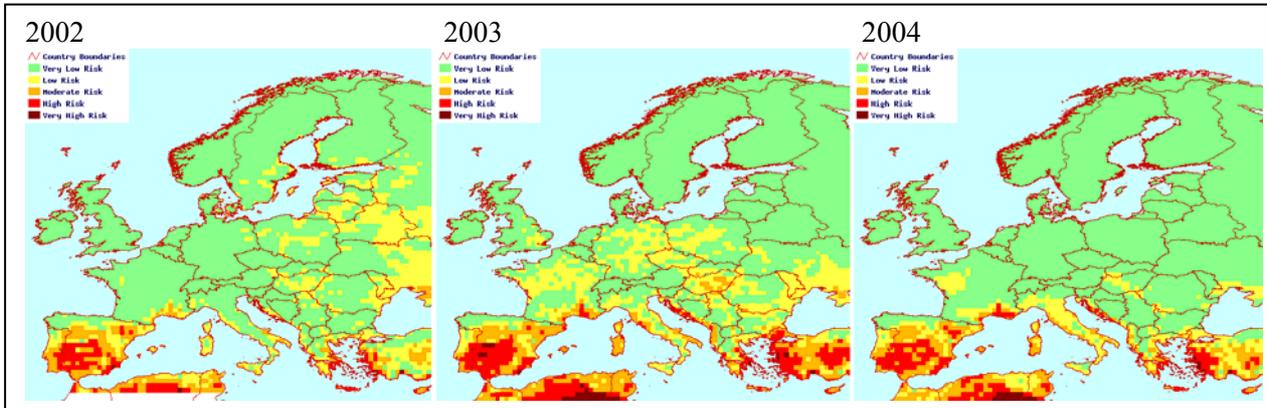


Figure 28. Seasonal averages (from 1 June to 30 September) of forecasted (day+1) Fire Weather Index (FWI) values. Comparison of 2002, 2003 and 2004.

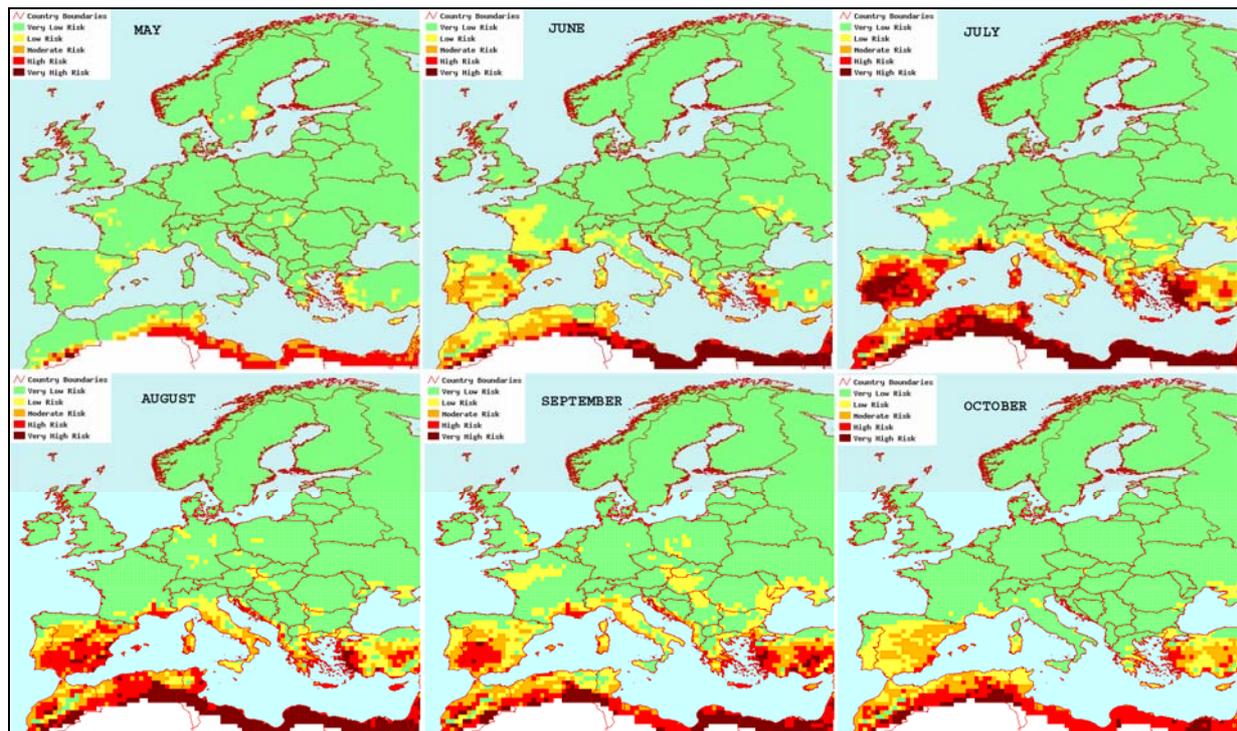


Figure 29. Monthly fire risk levels in 2004: monthly averages of forecasted (day+1) Fire Weather Index (FWI) values.

Figure 30 shows fire risks through 2004 as determined by the average FWI values in the Mediterranean Member States (weekly averages) and compares them with the last two years.

The actual FWI values are shown along the y axes of the graphs, while the risk categories listed in the keys to the EFFIS maps (e.g. those in Figure 28 and Figure 29) and delineated by the horizontal black lines are given on the right.

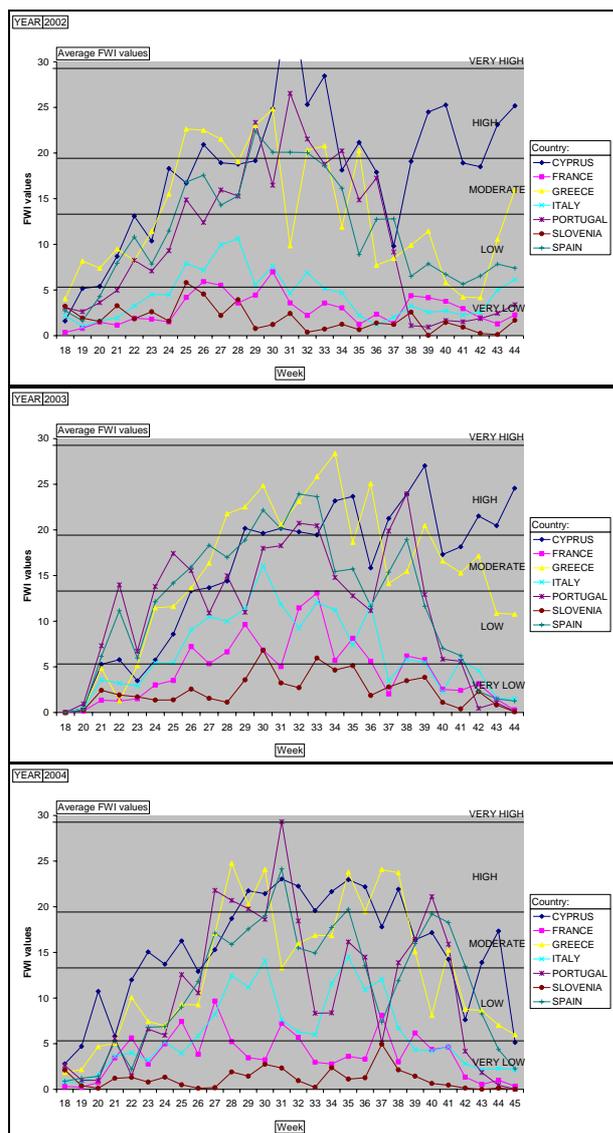


Figure 30. Fire risk trends as determined by the Fire Weather Index (FWI) for the last three years (2002 to 2004) in the EU Mediterranean countries.

Weekly averages for an entire country tend to flatten local fire risk peaks, so they become less evident, especially in those countries such as France or Italy, where there are strong differences in fire risk 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 risk reporting, according to the map showed in Figure 31. 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, will have to be proposed in the future.

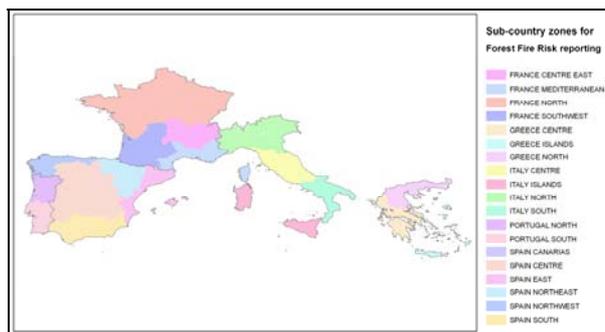


Figure 31. Administrative regions for fire risk reporting at sub-country level.

The following graphs (Figure 32 to Figure 36) show changes in FWI in 2004 (weekly averages) for each country in the sub-regions identified in Figure 31. As expected, there are clear differences between regions within each country. As in the previous graphs, here again the y axes represent the actual FWI values while the risk categories are shown by the horizontal lines.

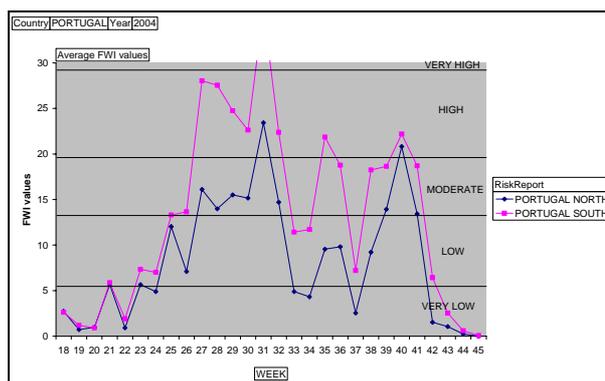


Figure 32. Fire risk trends in 2004 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal

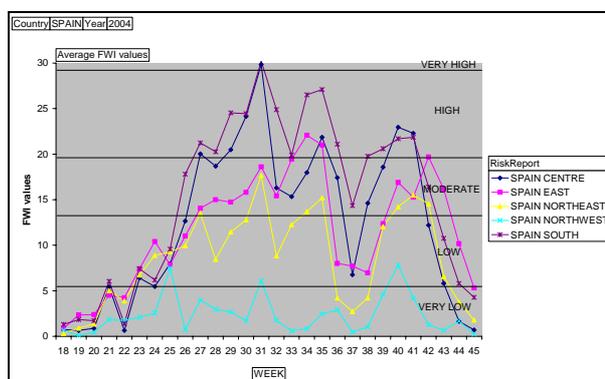


Figure 33. Fire risk trends in 2004 as determined by the Fire Weather Index (FWI) in the regions identified for Spain

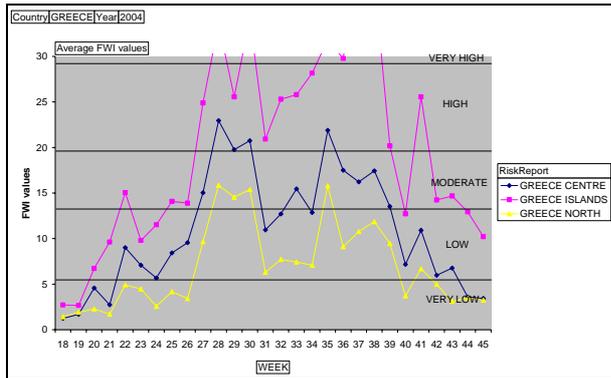


Figure 34. Fire risk trends in 2004 as determined by the Fire Weather Index (FWI) in the regions identified for Greece

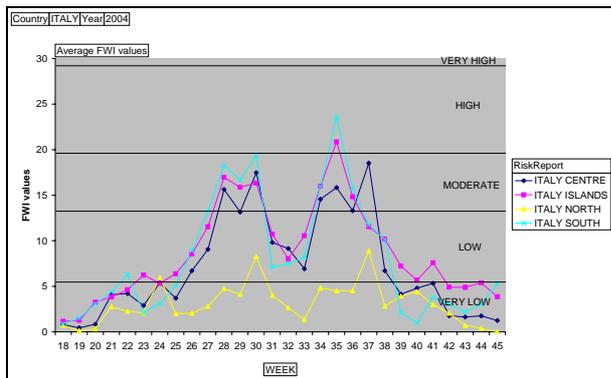


Figure 35. Fire risk trends in 2004 as determined by the Fire Weather Index (FWI) in the regions identified for Italy

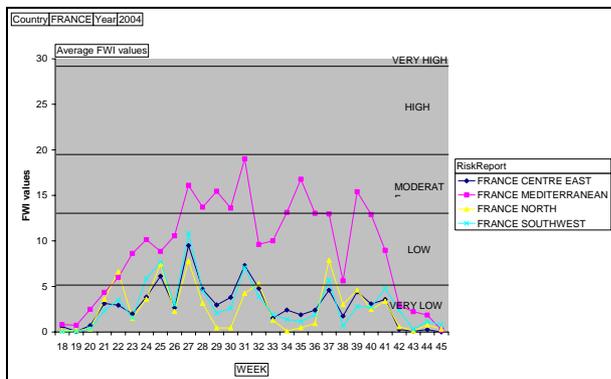


Figure 36. Fire risk trends in 2004 as determined by the Fire Weather Index (FWI) in the regions identified for France.

Figure 37 shows fire risk trends in 2004 as determined by FWI in some non-Mediterranean EU countries, while Figure 38 shows trends for the EU candidate countries. In both cases 2004 is compared with 2002 and 2003. The graphs clearly show the difference between the severe 2003 and 2002 and 2004.

As in previous years, the Member States gave very positive feedback on the risk assessment activity, urging that the EFFRFS should be continued and improved as part of the European Forest Fire Information System. There was even more collaboration with the meteorological services in the Member States to improve the performance of the EFFRFS partly by including additional data sources. 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 Global Monitoring for Environment and Security (GMES) initiative.

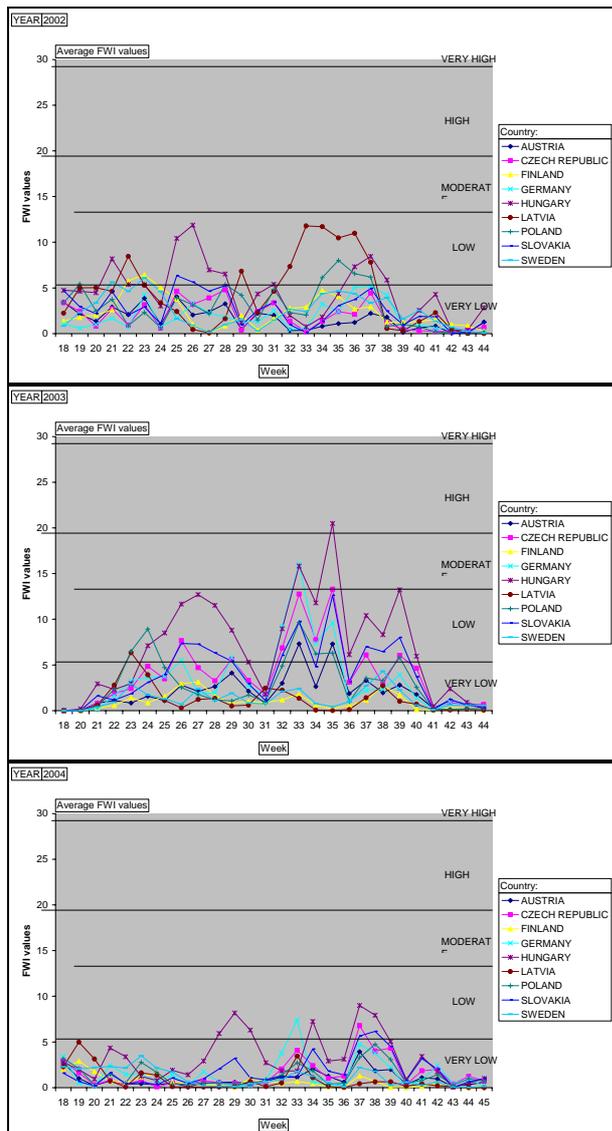


Figure 37. Fire risk trends as determined by the Canadian Fire Weather Index (FWI) in the last three years (2002 to 2004) in some EU non-Mediterranean countries.

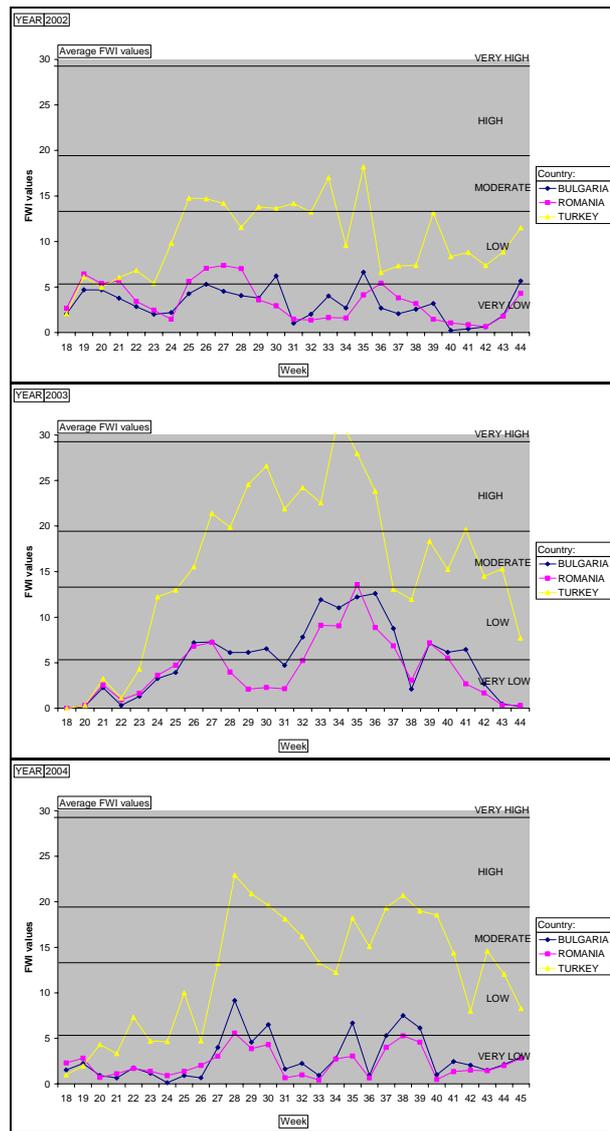


Figure 38. Fire risk trends as determined by the Canadian Fire Weather Index (FWI) in the last 3 years (2002 to 2004) in EU candidate countries.

## 6.2. The Damage Assessment System: 2004 results.

In order to improve the harmonization of burnt area data and statistics, maps of burnt areas have been produced every year from satellite images at the end of the season (usually at the end of September or in October) through EFFDAS. This map is then used in conjunction with the EU-CORINE land cover (CLC) database to estimate the damage to forests and other land cover types. However, because the CLC data is around 15 years old the statistics on the distribution of burnt areas by land cover should be taken as only indicative at this stage. As soon as the CLC 2000 map is ready, all the damage assessment tables starting from 2000 will be updated.

As in previous years, the satellite imagery used is from the Indian Remote Sensing satellite (IRS) through the WiFS instrument. This type of satellite imagery has a ground resolution of 180 metres which allows detailed mapping of fires of at least 50 ha. On average, the area burned by fires of at least 50 ha accounts for about 75 % of the total area burnt every year in the Southern EU. Since 2000 EFFDAS has been producing yearly maps of burnt areas and damage assessment in five Southern EU countries (Portugal, Spain, France, Italy and Greece). The first validation of these maps put their accuracy at around 95%.

In 2004 too, fires of at least 50 ha were mapped. The results for each of the five countries are given in the following paragraphs.

The total area burned in 2004 by fires larger than 50 ha, as shown by analysis of satellite imagery, was 189 765 ha (Table 17). Based on a statistical model constructed from the historical fire data collected by the Member States from 1985 until 2001, the total area burned, including fires smaller than 50 ha, could be estimated as 297 388 ha, bearing in mind the lack of information on winter fires and cloud cover problems.

Table 17. Areas burned by fires of at least 50 ha in 2004.

Country	Burnt area (ha)
Portugal	94280
Spain	74634
France	7868
Italy	10654
Greece	2329
TOTAL	189765

### 6.2.1. Portugal

Analysis of satellite imagery produced an estimate of 94 280 ha burnt by fires larger than 50 hectares in 2004. From a statistical model based on data from 1985 until 2001, the total area burned could be estimated as 121 283 ha. This figure is near the average for the last 10 years, but is much lower than the dramatic summer of 2003.

Combining this map with the CORINE land cover database provided information on the types of land cover damaged. Table 18 gives an assessment, showing that the burnt areas were mostly forest and semi-natural areas, although extensive agricultural areas were also burned.

Table 18. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Portugal in 2004.

CORINE land-cover class	Burnt area (ha)	(%) of total burnt area
Artificial areas	90	0.1
Agricultural areas	27895	29.6
Forests and semi-natural areas	66295	70.3
Total	94280	100.0

Figure 39 shows some of the fires detected by satellite imagery. Burnt areas are coloured red over a colour-composite of the satellite images, and it is easy to see the two very large fires that ravaged the South of Portugal together with a number of smaller fires.

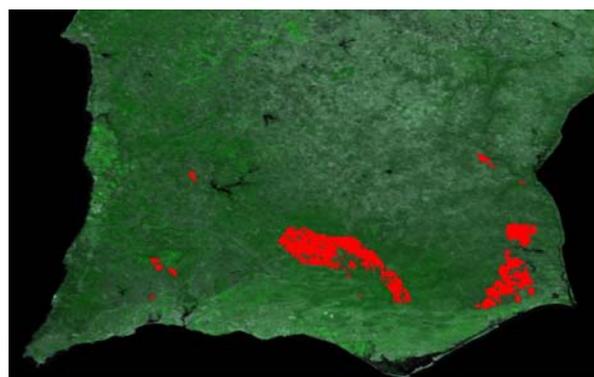


Figure 39. Area burned by forest fires in 2004 in the South of Portugal.

### 6.2.2. Spain

Analysis of satellite imagery indicated that 74 634 ha had been burnt by fires of at least 50 hectares. Considering that these are just the major fires, and applying the statistical model built for

Spain using fire data from 1985 until 2001, the total area burned in Spain was estimated to be 117 293 ha, which is close to the average for the previous ten years but lower than 2003.

Figure 40 shows the largest forest fire of 2004 in Spain in the Province of Huelva, together with other smaller fires.

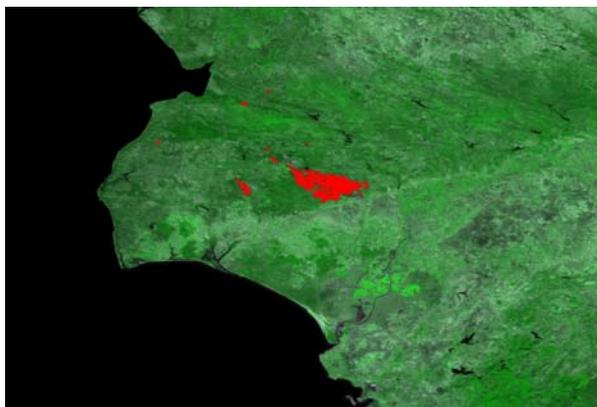


Figure 40. Surface burned by forest fires in the Province of Huelva, Spain in 2004.

By combining this map with the CORINE land cover database it was possible to determine the land cover classes damaged. Table 19 shows that the large majority of the burnt areas were forest and semi-natural areas.

Table 19. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Spain in 2004.

<i>CORINE</i> land-cover class	Burnt area (ha)	(%) of total burnt area
Artificial areas	154	0.2
Agricultural areas	7997	10.7
Forests and semi-natural areas	66483	89.1
Total	74634	100.0

### 6.2.3. France

Analysis of satellite imagery indicated that 7 868 ha had been burnt by fires of at least 50 hectares. Based on the regression model built for France, the total burned area was estimated at 13 707 ha. This value is somewhat below the average for the last ten years for France

Table 20 shows the damage assessment performed using CORINE land cover data. It can be observed that the majority of the burnt area consisted of forest and semi-natural areas.

Table 20. Distribution of burnt areas (fires of at least 50 ha) by land cover class in France in 2004.

<i>CORINE</i> land-cover class	Burnt area (ha)	(%) of total burnt area
Artificial areas	240	3.1
Agricultural areas	1369	17.4
Forests and semi-natural areas	6259	79.6
Total	7868	100.0

The area with the highest number of large forest fires was northern part of Corsica. Figure 41 shows the fires detected by satellite imagery. Burnt areas are shown in red over a colour-composite of the satellite image.

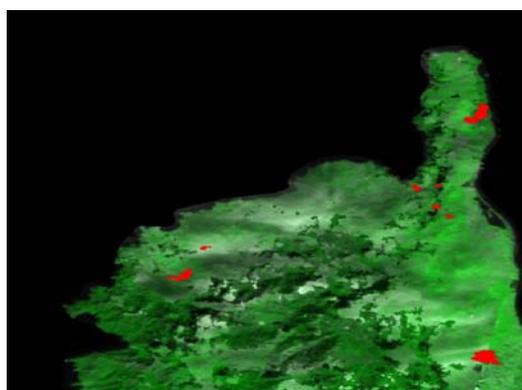


Figure 41. Surface burned by forest fires in northern Corsica in 2004.

### 6.2.4. Italy

Unlike the other Mediterranean countries, the average area burned by fires of at least 50 ha in Italy is only around 52%. Because of this, the lack of good cloud-free images and the quick recovery of vegetation in pasture fires, there was a significant underestimate of the burnt areas detected by satellite imagery, so the analysis gave a burnt area of only 10 654 ha, which is way below the figure of 32 507 ha derived from official Italian fire data. Using the regression model developed for Italy, the total burned area, including fires of less than 50 ha, can be estimated from the satellite imagery at 36 720 ha, which is still a long way below the total figure of 60 176 ha reported by the *Corpo Forestale dello Stato*.

Table 21 shows the damage assessment performed using CORINE land cover data. It shows that the burnt areas mapped by the satellite images were mostly forests and semi-natural areas, but that there was also a significant amount of agricultural land.

Table 21. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Italy in 2004.

<i>CORINE</i> land-cover class	Burnt area (ha)	(%) of total burnt area
Artificial areas	98	0.9
Agricultural areas	5038	47.3
Forests and semi-natural areas	5518	51.8
Total	10654	100.0

A region that suffered a fairly large number of fires in 2004 was northern Sardinia. This is the area shown in Figure 42.



Figure 42. Surface burned by forest fires in northern Sardinia in 2004.

#### 6.2.5. Greece

The area burned by forest fires of at least 50 ha in Greece in 2004 was estimated from satellite imagery as 2 329 ha. Applying the statistical model developed for Greece, this gives a total burned area estimate of 8 385 ha. From these figures it appears that for the fourth consecutive year the burned area in Greece has been significantly lower than in previous years, and is still some way below the ten-year average.

Table 22 shows the damage assessment performed using CORINE land cover data, showing that the majority of burnt area was in forest and semi-natural areas. Figure 43 shows a few large fires in the central part of Greece.

Table 22. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Greece in 2004.

<i>CORINE</i> land-cover class	Burnt area (ha)	(%) of total burnt area
Artificial areas	31	1.3
Agricultural areas	612	26.3
Forests and semi-natural areas	1686	72.4
Total	2329	100.0



Figure 43. Surface burned by forest fires in the central part of Greece in 2004.

## **7. BACKGROUND DOCUMENTATION**

European Communities, 2001, Forest Fires in Southern Europe: Bulletin of the 2000 fire campaign, SPI 01.85, p. 8.

European Communities, 2001, Forest fires in Southern Europe: Report No. 1, July 2001, SPI 01.95, p. 40.

European Communities, 2002, Forest Fires in Europe: 2001 fire campaign, SPI.02.72, p. 27.

European Communities, 2003, Forest Fires in Europe: 2002 fire campaign, SPI.03.83, p. 35.

European Communities, 2004, Forest Fires in Europe: 2003 fire campaign, SPI.04.124, p. 51

## 8. ANNEX

Table 23. Burnt area in the five Southern Member States (period 1980 – 2004)

<i>Year</i>	<i>PORTUGAL</i>	<i>SPAIN</i>	<i>FRANCE</i>	<i>ITALY</i>	<i>GREECE</i>	<i>TOTAL</i>
1980	44260	263017	22176	144302	32965	506720
1981	89798	298288	27711	229850	81417	727064
1982	39557	152903	55145	130239	27372	405216
1983	47812	108100	53729	223728	19613	452982
1984	52713	165119	27202	78326	33655	357015
1985	146255	484476	57368	189898	105450	983447
1986	99522	264887	51860	86240	24514	527023
1987	76268	146662	14108	120697	46315	404050
1988	22435	137734	6701	186405	110501	463776
1989	126235	426693	75566	95161	42363	766018
1990	137252	203032	72625	195319	38594	646822
1991	182486	260306	10130	99860	13046	565840
1992	57012	105277	16607	105695	71410	356001
1993	49963	89331	16695	209314	54049	419288
1994	77323	437635	25872	68828	57908	667566
1995	169612	143468	18118	46466	27202	404882
1996	88867	59814	11210	57986	25310	243198
1997	30535	98503	20500	103015	52373	304926
1998	158369	133643	19282	140432	92901	544627
1999	70613	82217	15906	61989	8289	239014
2000	159604	188586	24078	114648	145033	631949
2001	112158	66075	20642	76427	18221	293523
2002	124411	107472	30169	40768	6013	308833
2003	421835	149224	73000(*)	91803	3517	739379
2004	129652	134171	12500(*)	60176	10267	346766
	<i>PORTUGAL</i>	<i>SPAIN</i>	<i>FRANCE</i>	<i>ITALY</i>	<i>GREECE</i>	<i>TOTAL</i>
Average(1980-1989)	74486	244788	39157	148485	52417	559331
Average(1990-1999)	102203	161323	22695	108890	44108	439219
Average (2000-2004)	189532	129106	32078	76764	36610	464090
Average (1980-2004)	108582	188265	31156	118303	45932	492238
TOTAL	2714547	4706633	778900	2957572	1148298	12305950

Source: European Commission and, for the Member States: Direcção-Geral dos Recursos Florestais, Ministerio da Agricultura, Portugal; Dirección General para la Biodiversidad, Ministerio de Medio Ambiente, Spain; Ministère de l'Agriculture, France; Corpo Forestale dello Stato, Ministero delle Politiche Agricole e Forestali, Italy; Directorate General for Development and Protection of Forests and Natural Environment, Ministry of Rural Development and Foods, Greece.

(\*) Provisional data

**Table 24. Number of forest fires in the five Southern Member States (1980-2004)**

<i>Year</i>	<i>PORTUGAL</i>	<i>SPAIN</i>	<i>FRANCE</i>	<i>ITALY</i>	<i>GREECE</i>	<i>TOTAL</i>
1980	2349	7190	5040	11963	1207	27749
1981	6640	10878	5173	14503	1159	38353
1982	3567	6545	5308	9557	1045	26022
1983	4503	4791	4659	7956	968	22877
1984	6377	7203	5672	8482	1284	29018
1985	7218	12238	6249	18664	1442	45811
1986	4348	7570	4353	9388	1082	26741
1987	6977	8670	3043	11972	1266	31928
1988	5643	9247	2837	13558	1898	33183
1989	20155	20811	6763	9669	1284	58682
1990	10745	12913	5881	14477	1322	45338
1991	14327	13530	3888	11965	858	44568
1992	14954	15955	4008	14641	2582	52140
1993	16101	14253	4765	15380	2406	52905
1994	19983	19263	4633	11588	1763	57230
1995	34116	25828	6545	7378	1438	75305
1996	28626	16771	6400	9093	1508	62398
1997	23497	22319	8000	11612	2273	67701
1998	34676	22445	6289	10155	1842	75407
1999	25477	18237	4960	7235	1486	57395
2000	34109	24312	4603	10629	2581	76234
2001	26942	19631	4309	7134	2535	60551
2002	26488	19929	4097	4594	1141	56249
2003	20864	18628	6000	9697	1452	56641
2004	21891	21394	2028(*)	6428	1748	53489
	<i>PORTUGAL</i>	<i>SPAIN</i>	<i>FRANCE</i>	<i>ITALY</i>	<i>GREECE</i>	<i>TOTAL</i>
Average 1980-1989	6778	9514	4910	11571	1264	34036
Average 1990-1999	22250	18151	5537	11352	1748	59039
Average 2000-2004	26059	20779	4207	7696	1891	60633
Average 1980-2004	16823	15222	5020	10709	1583	49357
TOTAL	420573	380551	125503	267718	39570	1233915

Source: European Commission and, for the Member States: Direcção-Geral dos Recursos Florestais, Ministerio da Agricultura, Portugal; Dirección General para la Biodiversidad, Ministerio de Medio Ambiente, Spain; Ministère de l'Agriculture, France; Corpo Forestale dello Stato, Ministero delle Politiche Agricole e Forestali, Italy; Directorate General for Development and Protection of Forests and Natural Environment, Ministry of Rural Development and Foods, Greece.

(\*) France Région Méditerranéenne



**EUROPEAN COMMISSION**  
FOREST FIRES IN EUROPE 2004  
Official Publication of the European Commission  
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In the framework of the INFOREST action, the Institute for Environment and Sustainability of the Joint Research Centre (JRC) of the European Commission is working to maintain and further develop the European Forest Fire Information System (EFFIS). Together with the relevant services in the Member States and the European Commission's Directorate-General for the Environment, the JRC publishes a yearly report on forest fires. It is not the purpose of the report to make comparisons between the different data sources, but to provide a comprehensive overview of the forest fire situation in Europe.

Further information on EFFIS can be found on the web site: <http://inforest.jrc.it/effis/>