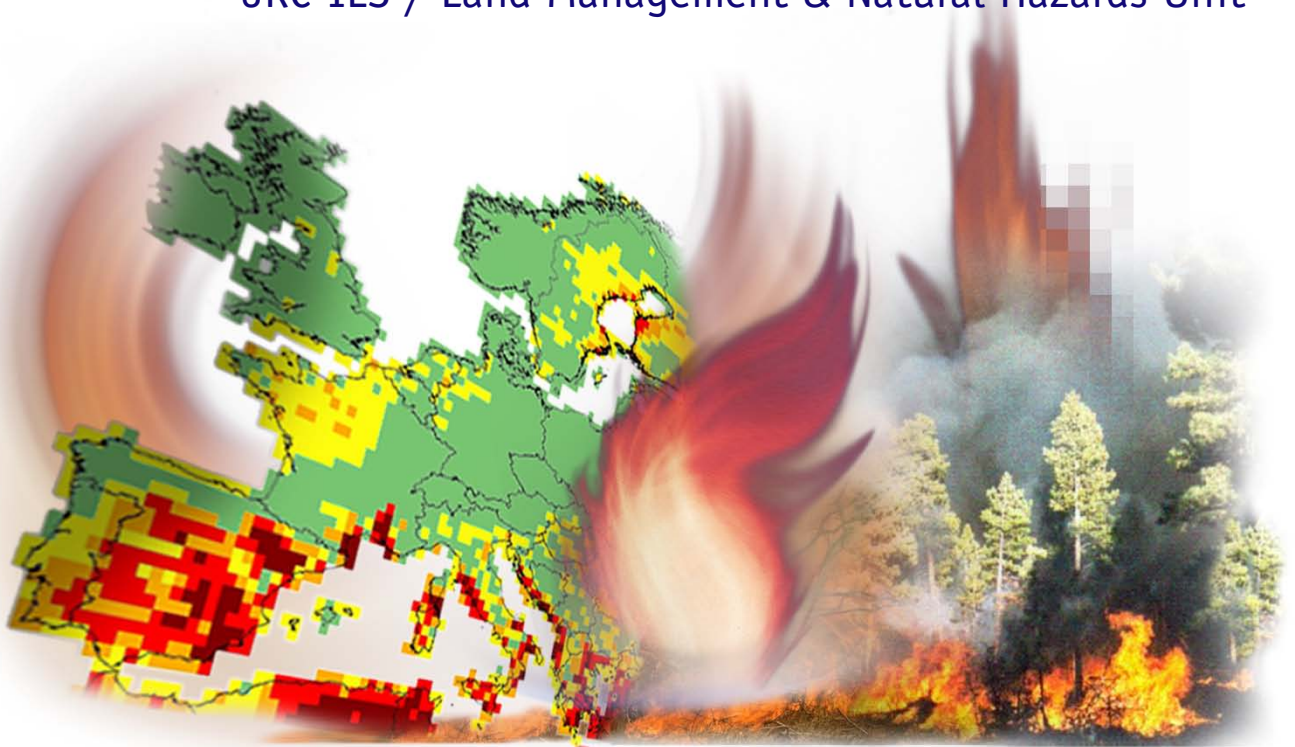




# Forest Fires in Europe

## Report No7 / 2006

JRC-IES / Land Management & Natural Hazards Unit



EUR 22931 EN -2007

# Forest Fires in Europe 2006

## JOINT RESEARCH CENTRE

Institute for Environment and Sustainability  
Land Management and Natural Hazards Unit

Guido Schmuck  
Jesús San-Miguel-Ayanz  
Paulo Barbosa  
Andrea Camia  
Jan Kucera  
Giorgio Libertá  
Giuseppe Amatulli  
Roberto Boca

[Guido.Schmuck@jrc.it](mailto:Guido.Schmuck@jrc.it)  
[Jesus.San-Miguel@jrc.it](mailto:Jesus.San-Miguel@jrc.it)  
[Paulo.Barbosa@jrc.it](mailto:Paulo.Barbosa@jrc.it)  
[Andrea.Camia@jrc.it](mailto:Andrea.Camia@jrc.it)  
[Jan.Kucera@jrc.it](mailto:Jan.Kucera@jrc.it)  
[Giorgio.Liberta@jrc.it](mailto:Giorgio.Liberta@jrc.it)  
[Giuseppe.Amatulli@jrc.it](mailto:Giuseppe.Amatulli@jrc.it)  
[Roberto.Boca@ext.jrc.it](mailto:Roberto.Boca@ext.jrc.it)

## DIRECTORATE-GENERAL ENVIRONMENT

Unit "Agriculture, forests & soil"  
Unit "Civil protection"

[Ernst.schulte@ec.europa.eu](mailto:Ernst.schulte@ec.europa.eu)  
[Hans-helmut.Dierks@ec.europa.eu](mailto:Hans-helmut.Dierks@ec.europa.eu)

## COUNTRIES

Sources of data and comments are given in the text.

The mission of the Institute for Environment and Sustainability is to provide scientific-technical support to the European Union's Policies for the protection and sustainable development of the European and global environment.

European Commission  
Joint Research Centre  
Institute for Environment and Sustainability

**Contact information**

Address: Via Enrico Fermi, Ispra, I-21020, Italy  
E-mail: paulo.barbosa@jrc.it  
Tel.: +39-0332-786334  
Fax: +39-0332-786561

<http://ies.jrc.ec.europa.eu>  
<http://www.jrc.ec.europa.eu>

**Legal Notice**

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server  
<http://europa.eu/>

JRC 37598

EUR 22931 EN  
ISSN 1018-5593

Luxembourg: Office for Official Publications of the European Communities

© European Communities, 2007

Reproduction is authorised provided the source is acknowledged

*Printed in Italy*

## Table of Contents

INTRODUCTION .....	5
1. SUPPORT TO FOREST FIRE PREVENTION ACTIVITIES IN THE EUROPEAN UNION	6
2. FOREST FIRES IN EUROPE .....	7
2.1. Southern most affected Member States (1980 – 2006) .....	7
2.1.1. France .....	10
2.1.2. Greece .....	13
2.1.3. Italy .....	16
2.1.4. Spain .....	19
2.1.5. Portugal .....	23
2.2. Other Member States .....	28
2.2.1. Austria .....	28
2.2.2. Bulgaria .....	28
2.2.3. Cyprus .....	29
2.2.4. Czech Republic .....	31
2.2.5. Finland .....	31
2.2.6. Germany .....	34
2.2.7. Hungary .....	34
2.2.8. Latvia .....	35
2.2.9. Lithuania .....	37
2.2.10. Poland .....	38
2.2.11. Slovenia .....	43
2.2.12. Slovakia .....	43
2.2.13. Sweden .....	45
2.3. Candidate Countries .....	46
2.3.1. Croatia .....	46
2.3.2. Turkey .....	47
2.4. Other European Countries .....	47
2.4.1. Switzerland .....	47
3. THE EUROPEAN FOREST FIRE INFORMATION SYSTEM (EFFIS) .....	48
3.1. EFFIS Danger Forecast: 2006 results .....	48
3.2. EFFIS Rapid Damage Assessment: 2006 results. ....	63
3.2.1. Spain .....	64
3.2.2. Portugal .....	65
3.2.3. Greece .....	66
3.2.4. Italy .....	66
3.2.5. Turkey .....	67
3.2.6. Croatia .....	68
3.2.7. France .....	68
3.2.8. Sweden .....	69
3.2.9. Slovenia .....	70
3.2.10. Cyprus .....	70
3.2.11. Netherlands .....	70
3.3. Assessment of possible damage on Natura 2000 sites in Galicia (Spain) .....	71
BACKGROUND DOCUMENTATION .....	73
ANNEX I .....	74
ANNEX II .....	75



## INTRODUCTION

This is the seventh “Forest Fires in Europe” report published by the European Commission. The report is normally published in summer of the following year in order to allow the different countries to compile official statistics of the fire season regarding the total number of forest fires and burned area. The fire season of 2006 can be defined as a relatively mild season, and if the total number of fires was still relatively high, the total burned area was definitely well below the average. In general there were not many extreme fire events and only the large fires that devastated Galicia (Spain) in the first two weeks of August, were object of great concern. This lead Spain to request assistance through the European Civil Protection Co-operation Mechanism with its Monitoring and Coordination Centre coordinating the offer of help of many European countries that supplied human and aerial fire-fighting means to Galicia.

The “Forest Fires in Europe 2006” report presents a first section that describes the latest developments in terms of support to forest fires fire prevention activities in the European Union.

The second section presents historical statistics in terms of number of fires and burned area, and describes the fire season in each of the contributing countries. This section is divided in four parts corresponding to four groups of countries: “Southern Most Affected Member States”, “Other Member States”, “EU Candidate Countries”, and “Other European Countries”. The long time series of forest fire data only available for the first group (Portugal, Spain, France, Italy, and Greece) justifies a separate analysis as it has been the case since the first report of this series was published. Although the number of fires in the second group of countries is limited if compared to the first group, the damage caused by forest fires in these countries is also of major concern. Finally, candidate and other European countries although not being part of the EU also contribute to this report providing statistics on the fire season in their countries. Apart from the description of the basic statistics for 2006 some countries also provide information on fire prevention, fire fighting, operations of mutual assistance, and public information campaigns.

The third section is dedicated to the application of advanced methods for forest fire danger forecasting and forest fire damage assessment developed at the European Commission (EC) Joint Research Centre (JRC). This information is made available through the European Forest Fire Information System (EFFIS). The first of the two operational modules, EFFIS Danger Forecast, provides daily the 1, 2, and 3 day fire danger forecasts. The second module, EFFIS Rapid Damage Assessment, performs the mapping and evaluation of land cover damages caused by fires of at least 50 ha. Finally, there is a summary of the impact of forest fires in Natura2000 areas in Galicia, Spain, in 2006.

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

As already mentioned in the 2005 report, the European Union has supported the efforts of the EU Member States in the areas of fire prevention, suppression and restoration recognizing the importance of preserving the forests and their functions regarding the well-being of European citizens.

The most recent tool provided by the European Union regarding forest protection was the Council and European Parliament Regulation (EC) N. 2152/2003 of 17 November 2003 on the monitoring of forests and of environmental interactions in the Community (Forest Focus). This regulation was a follow-up of the expired Council Regulations EEC No 2158/92 on the protection of the Community's forests against fire and EEC No 3528/86 on the protection of the Community's forests against atmospheric pollution. Forest Focus, built on these regulations, replaced and integrated them into a new scheme having a broader approach. The new scheme was composed by two main connected pillars: the monitoring of the forest health and the prevention of forest fires.

The Forest Focus regulation expired at the end of 2006, although the implementation of its programmes is still on-going. A comprehensive overview of the different measures and activities financed by Forest Focus in the area of forest fire prevention can be found in the Forest Fires in Europe 2005 report. As regards forest fire prevention, the support for specific measures is continued through several mechanisms. Those are, besides fire prevention related research projects, the prevention and restoration measures co-funded through the new Rural Development Regulation (Regulation (CE) N. 1698/2005 of 20 September 2005), the co-financing funds provided by the new Structural Funds, and the LIFE+ Regulation (EC No. 614/2007 of the European Parliament and the Council) concerning the Financial Instrument for the Environment.

In addition to the above, the European Parliament resolution of September 2006 on forest fires and floods (P6\_TA(2006)0349)<sup>3</sup> called the Commission to enhance EFFIS to correct shortcomings of the existing system such as the investigation of the anthropogenic origins of the fires, and the analysis of socio-economic risks and evaluation of repercussions of forest fires. In response to this request, LIFE+ funding allowed the European Commission DG ENV setting up a "Forest Conservation and Protection" pilot project in the context of future forest fire prevention measures. This project aims at enhancing the EFFIS through the development or improvement of existing modules in the system in order to provide a comprehensive view of the impact of forest fires in Europe. In particular, this project will include the launching of four studies on:

1. Development of forest fire fuel map of Europe, including fuel types and biomass
2. Evaluation of economic and social impacts of forest fires
3. Analysis, identification, and harmonization of forest fire causes
4. Estimation and analysis of the impact of forest fire emissions

These studies will be launched in 2008 and will have duration of 2 years. The results of the project will enhance the European Forest Fire Information System and will provide a solid basis for the assessment of causes and impacts of forest fires in Europe.

Additionally, and following the recommendation of the European Parliament to the Commission to undertake an in-depth analysis of the consequences and repercussions of natural disasters, especially those affecting the Union's forests, including the impact on the Natura2000 Network, the Forest Fires in Europe report will include an analysis of the impact of forest fires in the Natura2000 network. As a start, this year report includes a summary of the impact of forest fires in Natura2000 in Galicia, Spain.

## 2. FOREST FIRES IN EUROPE

### 2.1. SOUTHERN MOST AFFECTED MEMBER STATES (1980 – 2006)

The long time series of forest fire data only available for these 5 southern countries (Portugal, Spain, France, Italy, and Greece) justifies a separate analysis as it has been the case in previous reports. During 2006, fires in these five countries burned a total area of 284 444 hectares, which is well below the average of the last 27 years. Similarly, the number of fires that occurred (47 435) is also below the average of the last 27 years (see Table 1 for details). Figure 1a 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. Although year 2006 was not “disastrous” as year 2003 and 2005 meteorological conditions lead to many periods of high and very high fire danger; however the burnt was kept well below the long term average with significant less damage than in previous years. Figure 1b 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. However, 2006 showed a very significant decrease being the year with less forest fires since 1991.

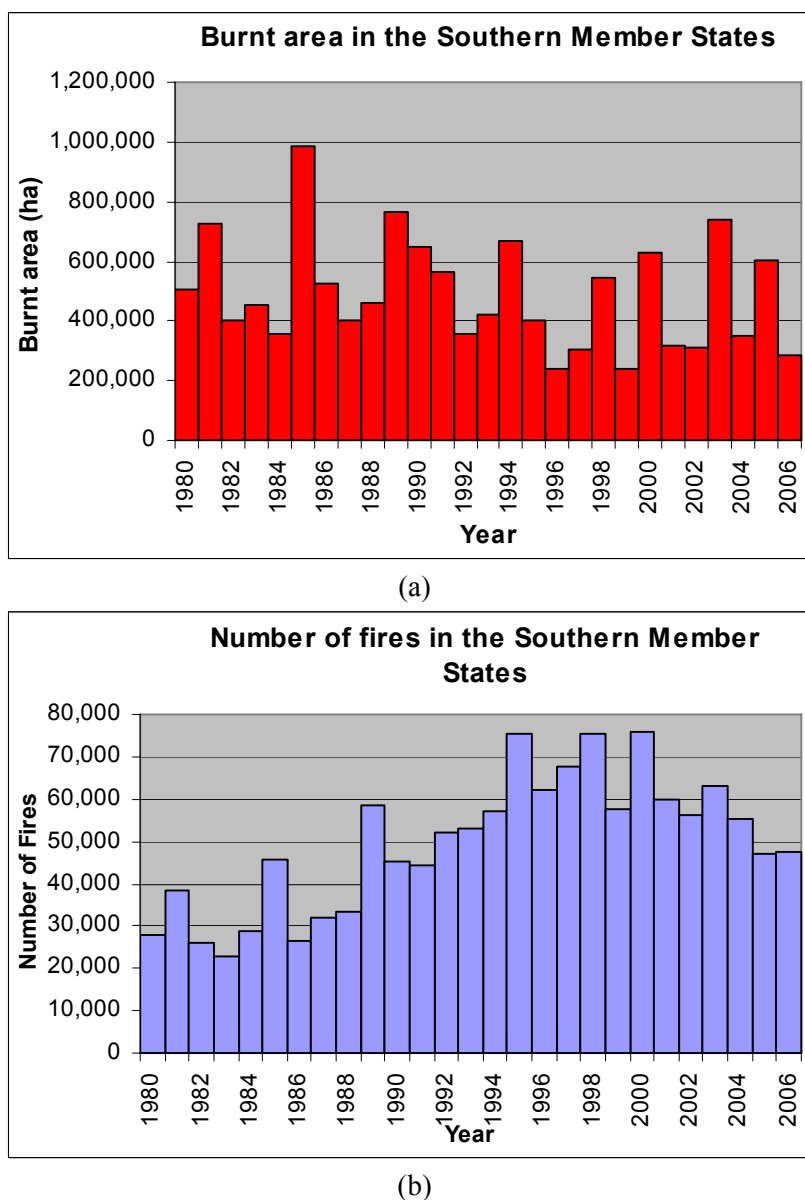
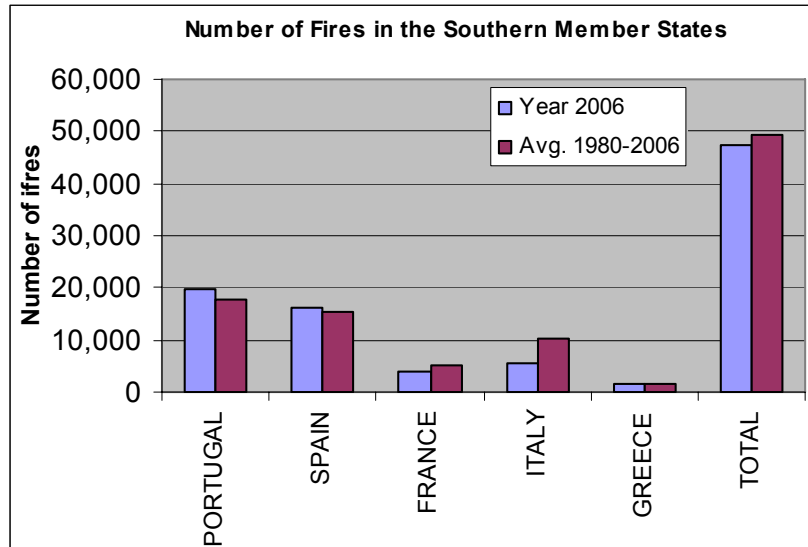


Figure 1. Burnt area (a) and number of fires (b) in the five Southern Member States for the last 27 years.

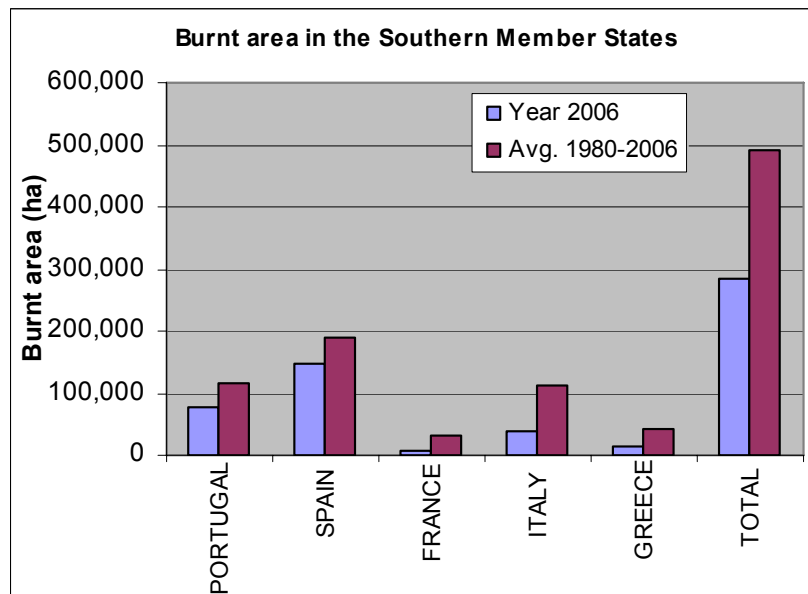


Figure 2a compares the yearly averages for burnt areas for the period 1980 to 2006 with the figures for 2006. It gives a comparison for each Member State and for all the Southern EU Countries, and shows that the burnt area in 2006 was really well below the average for the last 27 years for all the five Member States.

Figure 2b compares the yearly averages for number of fires for the period 1980 to 2006 with the figures for 2006. France, Italy and Greece were below the average for the last 27 years and the overall figure for the five Southern Member States is also below the long-term average.



(a)



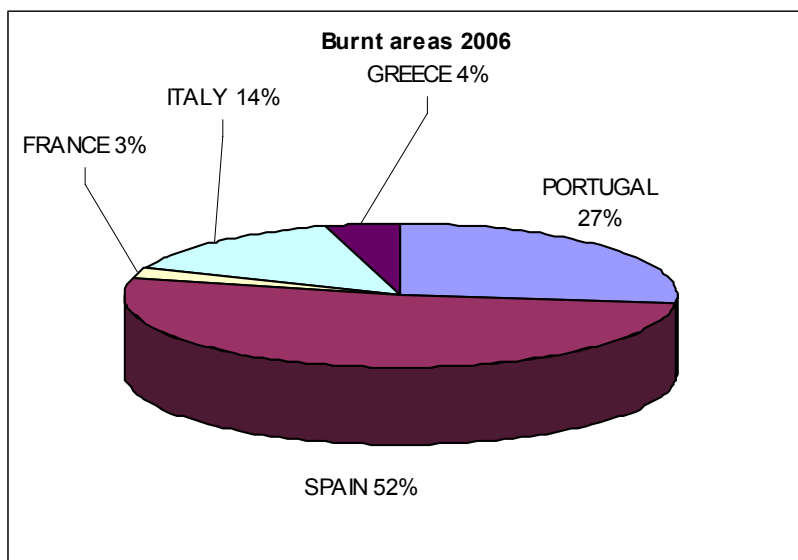
(b)

Figure 2. Burnt areas (a) and number of fires (b) in the five Southern Member States in 2006 compared with average values for the last 27 years.

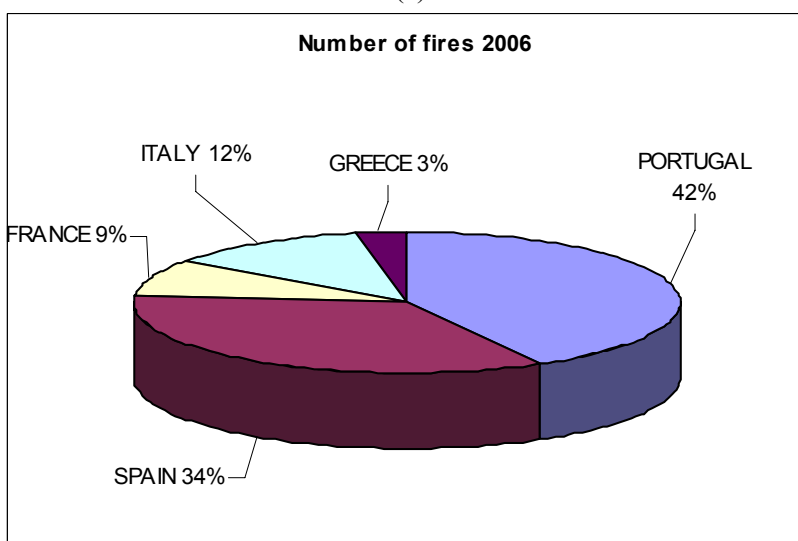
Figure 3 compares the contribution of each Member State in terms of burnt areas and numbers of fires with the overall figures for the five Southern Member States for 2005.

Table 1 gives a summary of the burnt areas and number of fires for the last 27 years, the average for the 1980s and 1990s, and the average for the last seven years, together with the figures for 2006.

As mentioned, a total of 284 444 were burnt in the five Southern Member States in 2006, which is well below the average for the last 27 years (492 551 ha). The number of fires in these countries in 2006 was 47 435, which is also below the average for the last 27 years (50 603).



(a)



(b)

Figure 3. Percentage of the total burnt areas (a) and the total number of fires (b) in each of the Southern Member State for 2006.

During 2006, about 76 % of the fires occurred in Spain and Portugal together, accounting for approximately 79% of the total burnt area in the five Southern Member States. Since the area of each country is different, and the area at risk within each country is also different, these comparisons cannot be regarded in absolute terms.

Over the last six years, the previous tendency of the five Southern Member States towards an increase in the number of fires seems to have stabilized with a significant drop in 2006. This may possibly be due to the public information campaigns carried out in all the countries and to the improvements in the prevention and fire-fighting capacities of these countries.

Table 1. Number of fires and burnt area in the five Southern Member States in the last 27 years.

Number of fires	PORTUGAL	(*) SPAIN	(*) FRANCE	ITALY	(*) GREECE	TOTAL
2006	19 929	16 355	4 100	5 634	1 417	47 435
% of total in 2006	42	34	9	12	3	100
Average 1980-1989	7 381	9 515	4 910	11 575	1 264	34 645
Average 1990-1999	22 250	18 152	5 538	11 164	1 748	58 851
Average 2000-2006	27 260	20 779	4 658	7 149	1 774	61 619
Average 1980-2006	18 042	15 634	5 077	10 275	1 575	50 603
TOTAL (1980-	487 132	422 120	137 078	277 430	42 531	1 366 291

Burnt areas (ha)	PORTUGAL	(*) SPAIN	(*) FRANCE	ITALY	(*) GREECE	TOTAL
2006	75 510	148 827	7 500	39 946	12 661	284 444
% of total in 2006	27	52	3	14	4	100
Average 1980-1989	73 484	244 788	39 157	147 150	52 417	557 034
Average 1990-1999	102 203	161 319	22 735	118 573	44 108	448 938
Average 2000-2006	194 986	144 177	27 358	67 338	28 878	462 737
Average 1980-2006	115 621	187 789	30 015	115 874	43 237	492 551
TOTAL (1980-	3 121 776	5 070 305	810 417	3 128 592	1 167 396	13 298 878

(\*) provisional data for 2006.

### 2.1.1. France

On the whole, 7 500 ha were affected by fires in France in 2006, against 25 000 on annual average. It is necessary to go back to 1988 to find such a low impact.

#### Outside the Mediterranean area

Less than 1 100 ha were burned in the departments of South-west (decennial average: 5 000 ha, 3 500 ha in 2005). The dryness and high temperatures of July resulted only in agricultural fires, except for the fires of Ménez Hom in the Finistere (450 ha in May) and of the forest of Sénart in Essonne (100 ha in July). The national means were only marginally requested (2 interventions of a DASH in Mérignac, and 6 interventions of water bombers in the departments of the South-western zone).

#### Mediterranean area

The assessment of the surfaces affected by fire in the Mediterranean departments in 2006 was provisionally established in 5 400 ha. This surface is lower than that affected in 2005 (17 000 ha), as well as the decennial average which rises to 16 900 ha. It should be noted that 40% of the burned surface was due to the fires occurred before the summer fire season fire-fighting structures were activated (between middle of May and beginning of June). Important fires developed during this period, in the Eastern Pyrenees in Collioure (350 ha on May 31) and in the Rhone delta in Rousset (150 ha on May 30). The surface affected by fire during the summer, 3 200 ha, is one of most reduced on record (average decennial: 14 000 ha). It was only lower in years of very limited fire risk (2002, 1996) which was not the case in 2006. During the summer fire season, the most important fires were:

- between Var and the Rhone delta (Saint-Zacharie – Trets), on July 21, close to 250 ha were burned
- in Herault (Vendémian) where 430 ha were burned by a fire which was propagated in the night of 1st at August 2 and in Nissan-lez-Enserune (159 ha on August 5)
- in Eastern Pyrenees (Opoul-Perillos) on August 10 there were 300 ha burned during the night
- in Aude (Conilhac-Corbieres) on August 9 110 ha burned and in Montolieu on August 13 140 ha burned)
- in Var (Arcs) on August 12 a fire required the evacuation of a thousand tourists burning 135 ha.
- in High-Corsica, in Calenzana, the 30 August

A total of 24 fires of more than 100 ha had been recorded during summer 2005, including 4 of more than 1 000 ha (decennial average: 13 fires of more than 100 ha, including 3 of more than 1 000 ha per summer). Several other fires that developed under conditions of high risk had dramatic consequences even if they did not reach very large surfaces:

- Calenzana (High-Corsican) where a fire which burned 30 hectares on July 22, seriously burned 4 military fire-fighters and intoxicated other 2 firemen
- Peypin (Rhone delta), where a fireman deceased on July 22 due to a cardiac arrest
- Ramatuelle (Var), where 3 volunteer firemen died and a fourth was seriously wounded on August 14 in a road accident after the fire had destroyed around 60 hectares in a sector requiring high protection measures due to the high density of population

### **The weight of Languedoc-Roussillon in the assessment**

Several departments of Languedoc-Roussillon (Aude, Herault, and Eastern Pyrenees) had important fires this summer. This area had thus nearly 60% of the total surfaces affected by fire in Mediterranean zone against 12% on average in the previous years. The department of Herault had the largest area burned and was one of the 2 departments, with the Eastern Pyrenees, where fire affected surfaces exceeded the decennial average. More than 30% of the very severe risks were listed in this area against 20% in average. The increase in risks was thus more marked than elsewhere. Conversely, the fires which have occurred in Provence and Corsica were particularly small accounting respectively for only 20% and 10% of the decennial averages in these departments.

### **The engagement of the national fire-fighting means**

Anticipation was the rule in the use of the national fire-fighting means in order to take account of the fire risk situation:

- During the summer period, the air bombers intervened on nearly 300 fires (including 200 fire re-starts monitored by the air force). The number of flight hours devoted to operational missions was 2 750, including 1560 hours of aerial monitoring. In summer 2005 the total number of flight hours consumed had been 3 650. It should be stressed that the water DASH bombers were largely requested, since they intervened on 75 fires. The actors on the ground particularly appreciated their contribution. It should be noted that at the time of their missions the air bombers used 1850 tons of retardant products that improved their interventions
- the sections of the military formations of civil safety positioned in Corsica took part as from June 26 in the operations on the ground (450 surveillance missions and 85 forest fire interventions) and intervened in ten fires on the continent
- Reinforcement firemen groups were settled on the Southern zone to reinforce the local devices during the potentially most dangerous fire period. Taking into account the incurred risks, reinforcement groups were mobilized on August 1 in the Western and Eastern zones to reinforce the device implemented in the Mediterranean departments until August 13. This mobilization corresponded to a volume of 3 700 person-day.

The Corsican territorial reserve, whose creation was decided by the Minister of State in July 2005, was involved in surveillance measures on the ground but did not have to intervene on fire-fighting actions. On the whole, the means from the Ministry of the Interior and Regional Planning intervened in reinforcement of the local means on 400 of the 1 050 fires recorded since the start of the summer fire-fighting season of 2006 (nearly 40% of the fires, in comparison with an average of 33%) and took a very active part in the device of operational prevention (the GAAR accounting for 55% of the operational activity of the aerial water bombers, the monitoring on the ground representing 80% of the activity of the UIISC, and the prevention fire-fighting teams represented 45% of the reinforcements.

### **Risks**

Until August 15, the water deficit was very marked in the Mediterranean area, particularly in the littoral departments where drying was considered by Meteo-France extreme or important. The analyses led by the ONF confirmed it and highlighted a great vulnerability to fire of plants whose desiccation reached record values in certain sectors of the Aude, of the Rhone delta, of the Gard, and of the Eastern Pyrenees. The early dryness, worsened by the high temperatures of July and the establishment of winds which blew in an exceptional way during the first half of August, explains why the sectors classified as very severe risk amounted to 820 against 520 on average (770 in 2005). This situation is not however comparable to 2003 when the sectors of very severe risk amounted to 1590. The increase in the very severe risks has particularly concerned Alp-of-High-Provence, the Rhone delta, the Var, Gard, Herault,

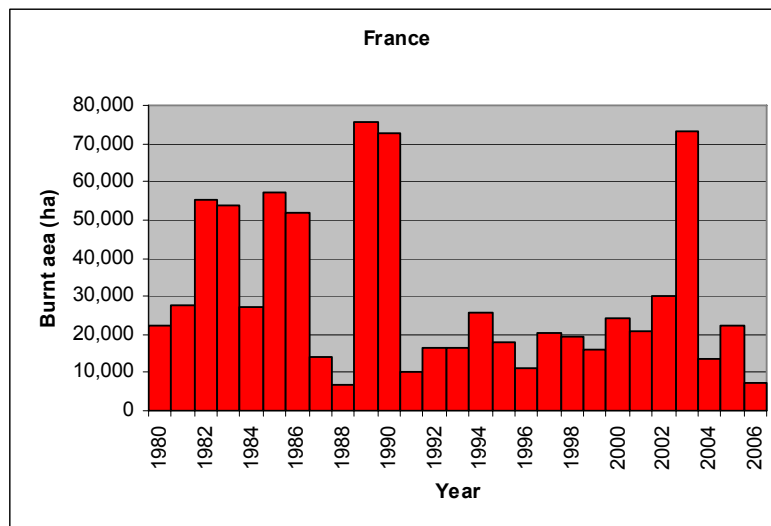
the Aude, and the Eastern Pyrenees. In Corsica, the sectors classified in very severe risk were in conformity with the average, the mountain having received precipitations during the summer, contrary to the littoral sectors, in particular Balagne and the southern point of the island. It is worth to note that the precipitations occurred in mid-August appreciably attenuated the risks on most of the zone. This episode marked the first very significant decrease of fire activity and shortened the period of risk.

### The number of fires

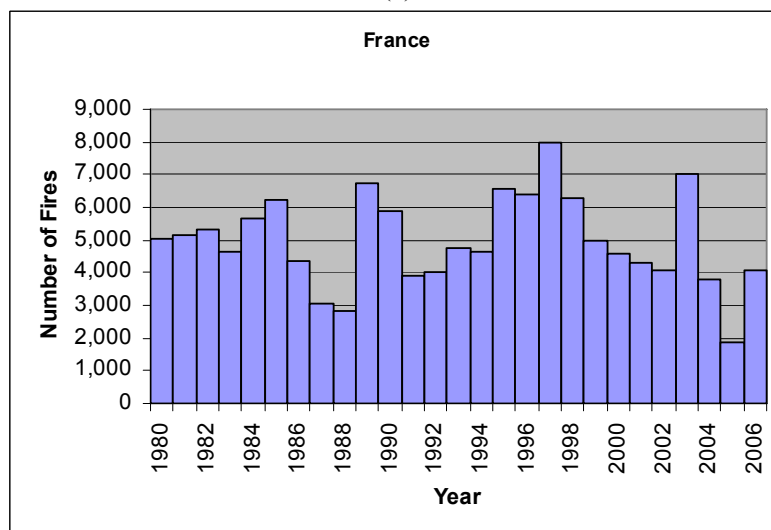
In spite of the high risk conditions fires did not become catastrophic events. This can be explained by:

- The action of the services in charge of the prevention and fighting and of the police force and the gendarmerie, in order to limit the number of fires which was a little more than 1 000 (the average number of fire during this period was 1200 in the 80's and 90's). Although the conditions were favourable to forest fires its number was similar to the last years on the continent. There was however some variability: the number of fires increased in the Rhone Delta, the Var, the Aude, Gard, Herault and the Eastern Pyrenees, while it decreased by 25% in Corsica.
- The speed of the intervention: 82% of the fires had only 1 ha or less burned against 78% on average demonstrating the effectiveness of the deployed fire fighting device. In the departments of Languedoc-Roussillon, this percentage was even more reduced (63% against average 67%).

Figure 4 shows trends in the number of fires and burnt areas in France over the last 27 years.



(a)



(b)

Figure 4. Burnt areas and numbers of fires in France over the last 27 years (provisional values for 2006).

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

### 2.1.2. Greece

The provisional results of the fire campaign of 2006 in Greece, according to data available from the 1st estimation of Fire Brigade and with verification from Forest Service for forest fires data are shown in Table 2, GREECE (1).

Table 2. Provisional forest fire data (1.1.2006 – 31.12.2006)

Fires in Greece (1/1/2006 – 31/12/2006)		GREECE (1)	GREECE (2)	GREECE (1+2)
number of fires	<1 ha	1 092	5 150	6 242
	1 - 5 ha	197	247	444
	5 - 100 ha	117	67	184
	100 - 500 ha	8	0	8
	>500 ha	3	1	4
	TOTAL	1 417	5 465	6 882
BURNT AREAS (ha)	FORESTS	12 182,7	0	12 182,7
	NON FORESTS	478,7	10 327,3	10 806
	TOTAL	12 661,4	10 327,3	22 988,7

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

The number of forest fires as well as the burnt area of 2006 in Greece per region is indicated in Table 3.

Table 3. Total forest fires review in Greece of 2006 by regional forest administration

FOREST ADMINISTRATION AUTHORITIES	TOTAL NUMBER OF FIRES	<1 ha	1-5 ha	5-100 ha	101-500 ha	>500 ha	TOTAL BURNED AREA (ha)	WOODED (ha)	NON WOODED (ha)
REG. EAST MAC. THR.	69	55	7	7	0	0	139,7	111	28,7
REG. CENT. MACEDONIA	75	65	6	3	0	1	5 709,0	5 706,9	2,1
REG. W. MACEDONIA	66	50	13	3	0	0	114,3	80,8	33,4
REG. IPEIROU	190	167	16	7	0	0	185,8	130	55,8
REG. THESSALIAS	66	44	12	10	0	0	221,5	175	46,5
REG. IONIAN ISLANDS	184	124	37	23	0	0	845,3	765,2	80,1
REG. W. GREECE	146	110	20	15	1	0	440,1	404,9	35,2
REG. ST. GREECE	178	135	21	17	5	0	1 208,2	1 164,3	43,9
REG. ATTIKIS	94	70	15	8	100	0	362,1	362,1	0
					1				
REG. PELOPONISOU	216	170	37	7	1	1	2 373,1	2 370,5	2,6
REG. N. AIGAIUO	21	16	1	3	0	1	723,4	633,9	89,5
REG. S. AIGAIUO	27	16	4	7	0	0	162,1	147,7	14,4
REG. KRITIS	85	70	8	7	0	0	176,9	130,4	46,5
TOTAL	1 417	1 092	197	117	8	3	12 661,4	12 182,7	478,7

From the above results, it is indicated that the number of forest fires remained at same levels in comparison to results of previous years, while the burnt area increased but remained low in comparison to annual mean of the last decade. This summer in comparison to previous once was characterized with more extreme weather conditions during the second half of August and the first days of September. Some periods with rainfalls occurred also especially in the North Greece. Under these conditions the

majority of the fires were effectively suppressed except 2 major fires that occurred both the 21st of August in Region of Central Macedonia (Chalkidiki – Kassandra) and Region of Peloponnisos (Lakonia – Mani). In these 2 fires the area burnt is almost half of the total burnt area in Greece in 2006 and included wildland-urban interface areas in which numerous houses and agricultural operations (bee-keepers, cultivations, etc.) were damaged.

Additional fires in non-forest areas are indicated in Table 4 as reported by Fire Brigades.

Table 4. Table of fires in non-forest areas by region.

FOREST ADMINISTRATION AUTHORITIES	TOTAL NUMBER OF FIRES	<1 ha	1-5 ha	5-100 ha	101-500 ha	>500 ha	BURNED AREA OF OTHER LANDS (ha)
REG. EAST MAC. THR.	439	403	30	6	0	0	186,9
REG. CENT. MACEDONIA	1 076	1 036	30	9	0	1	3 357,8
REG. W. MACEDONIA	176	142	25	9	0	0	209
REG. IPEIROU	264	247	14	3	0	0	100,8
REG. THESSALIAS	199	157	32	10	0	0	339,8
REG. IONIAN ISLANDS	414	411	3	0	0	0	48,9
REG. W. GREECE	1 094	1 076	16	2	0	0	432,8
REG. ST. GREECE	225	198	19	8	0	0	202,3
REG. ATTIKIS	70	66	2	2	0	0	62,6
REG. PELOPONNISOU	931	900	28	3	0	0	4 964,3
REG. N. AIGAIUO	39	38	1	0	0	0	3,3
REG. S. AIGAIUO	160	128	21	11	0	0	201
REG. KRITIS	378	348	26	4	0	0	217,8
TOTAL	5 465	5 150	247	67	0	1	10 327,3

The personnel involved in suppression efforts of all above fires was about 15 000 persons from which 9 500 is permanent personnel of the Fire Brigade which deals also with the structural fires and 5 500 is the seasonally hired personnel just for the forest fire suppression activities. Fire Brigade of Greece owns at about 1 560 engines, which are involved in both structural, and forest fire suppression efforts and few more small engines owned by Municipalities of high risk areas were involved occasionally in some incidents. The aerial means used during the campaign are indicated in Table 5.

Table 5. Aerial means participated during the campaign of 2006

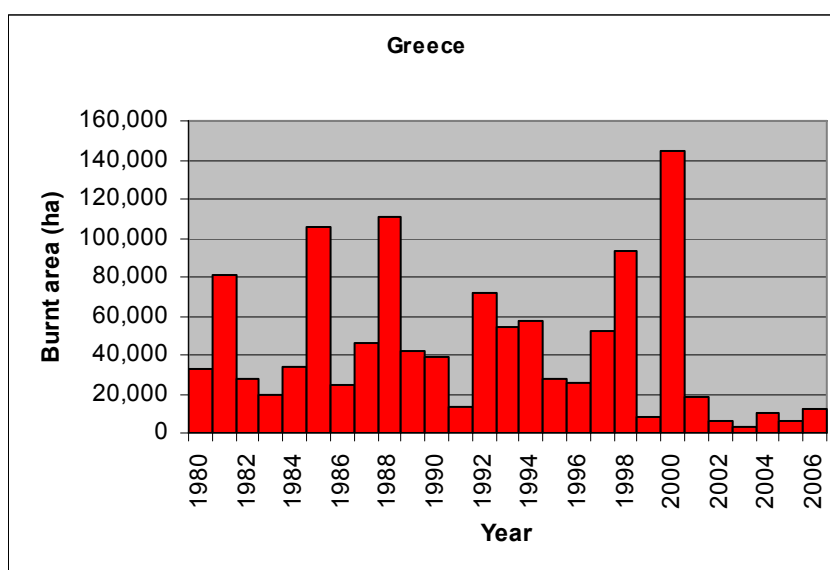
STATE OWNED MEANS			
AIRCRAFTS	LARGE	CL-215	13
		CL-415	9
		C-130 + MAFFS	0
	SMALL	PEZETEL	18
		GRUMMAN	3
HELICOPTERS		H/P PK 117	3
		SUPER PUMA	2
		TOTAL	48
HIRED MEANS			
HELICOPTERS	H/P MI-26		2
	H/P SIKORSKY 64		4
	H/P MI-8-MTV		1
	H/P KA-32		4
	TOTAL		11

During the fire campaign in response to demands of mutual assistance from Spain only for aerial means, due to adverse weather conditions in Greece at the same time were not available aircrafts to send. No deaths were involved with the suppression operations of forest fires during the campaign.

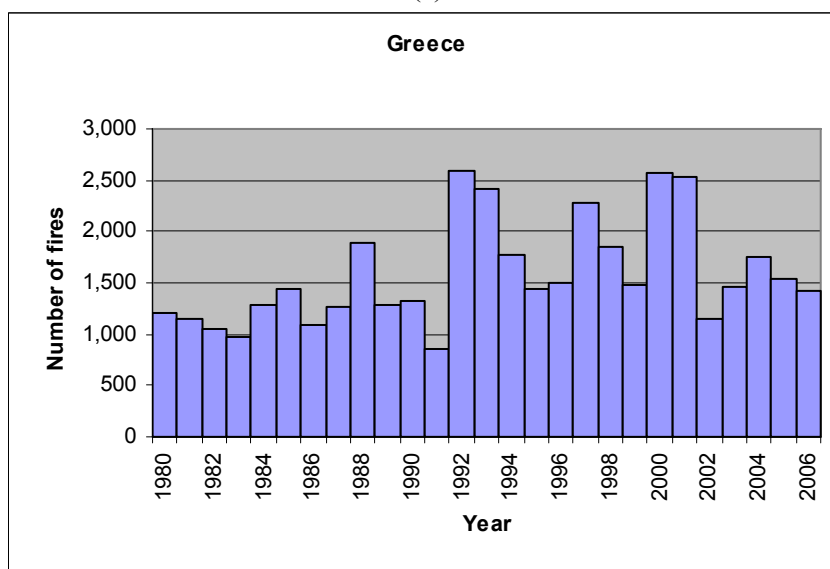
The planning for the 2007 season, because of weather behaviour changes, includes a slight increase in hired aerial means and earlier deployment of the suppression forces. Further education also in all personnel involved in planning and execution of preventive measures has been concluded before the starting of the season.

Note: Referring to all data reported we like you to know that the relative data reported from the Region of Attiki is not complete.

The yearly trends in terms of numbers of fires and burnt areas during the last 27 years in Italy are shown in Figure 5.



(a)



(b)

Figure 5. Burnt areas and numbers of fires in Greece over the last 27 years.

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



### 2.1.3. Italy

Year 2006 has been the year of the records. A total of 5 643 forest fires took covering a surface of 39 946 hectares, of which 16 422 were wooded. This was the lowest number of fires since 1976 except for 2002 that was characterized by a particularly rainy summer. Most relevant is the fact that the wooded surface covered by fire, 16 422 hectares, was the absolute minimum since the statistical survey of forest fires started in 1970. The total burned surface, 39 946 hectares, is the smallest since 1972. Comparing with the previous year of 2005, there were less 1 500 fires, less 5 000 hectares of burned forest and less 7 600 of burned land.

#### Fires in the regions

The regions with the largest number of forest fires have been Calabria, Sicily and Tuscany. Sicily, Calabria and Sardinia were the regions with the most burned wooded surface. Comparing with 2005, there was a worsening of the situation in Sicily with 4 682 hectares of burned wooded forest and 13 470 hectares in total burned land. The number of fires also increased from 690 to 935. Calabria had the highest number of fires (983) with 2 834 hectares of burned forest and 7 955 hectares of total burned land. The situation was also critical also in Sardinia, in which 680 fires have covered 4 412 hectares, of which 1 903 were wooded forest. Damages were also important in Liguria, in Lazio and in Campania, in which the forest areas hit have been respectively 1 148, 1 024 and 1 015 hectares. The smaller damages took place in Trentino Alto Adige where 64 fires have burned 6 hectares of territory, of which 4 were wooded.

#### The average fire size

The fire average size in 2006 was 7.1 hectares that although being higher than in 2005 (6 ha) is however one of the lowest average sizes of the last decade. The largest average fire sizes occurred in Sicily (14 ha), Puglia (10 ha) and Calabria (8 ha). In 2006 41% of fires had an area of less than 1 hectare corresponding to 2% of the total burnt surface. Such result expresses the efficiency of the fire-fighting system in 2 299 fires that burned only 632 hectares. Only 1% of the fire events have burned more than 100 hectares corresponding to 30% of the burnt area. The more damaging effects in terms of total surface were due to fires comprised between 5 and 100 hectares corresponding to 57% of the entire burnt surface in 2006.

#### The fires in the course of the year

In 2006 forest fires have been mostly concentrated in the summer period, starting in June and finishing in October, contrasting with 2005 when there were two clear peaks, one in summer and one in winter. In the period January-March there were 433 fires while in 2005 there were 1 135. In spring, coinciding with an increasing temperature fire conditions became more favourable leading to a total of 1 362 which is in line with what happened in 2005. There was only one real fire season peak in 2006 during the summer with a total of 3 549 fires that were mainly concentrated in the months of July and August (1 300 fires per month). The largest burnt surface occurred during the months of August and June. In August fires destroyed 12 500 hectares of forest land and in June beyond 10 000 ha were burned. In the autumnal period the number of fires decreased radically with normal values for this period.

#### The climate

The monthly fire distribution corresponded in general to the meteorological conditions that have been characterized by a cold winter followed by a dry spring in the entire peninsula. In the second half of June there was a particularly warm period that continued until the end of July showing similarities to the torrid summer of 2003. Precipitation was low, if not rather absent, above all in northern Italy, while in the South and partially in the Centre rain was above the average. However, during August this tendency was inverted due to abundant precipitation country wide except in North-West, Lazio and Sicily. Temperatures were below average, up to 3,5 degrees less in the alpine zones. In the second half of August a short heat wave increased the temperatures in the southern regions, while on the north there were heavy storms.

#### The burnt wooded surface

In 2006 there were 16 422 hectares of burned forest, representing 5 000 hectares less than in 2005. Coppice forest was the most burned (37%), followed by shrubland (37%) and by timber forest (29.2%).

In comparison with 2005 the proportion of burned timber forest increased, the proportion of burned shrubland decreased, while the proportion of burned coppice forest didn't change.

### **The fire duration**

Most of the forest fires in Italy have a duration generally comprised between two and ten hours, depending of course on the prevailing vegetation types and climatic conditions. In 2006 there were 3 600 fires (65% of the total) with a duration comprised between 2 and ten 10, 16% between 1 and 2 hours, while fires with less than 1 hour or more than 10 hours were of little significance. Only 4% of the fires lasted more than 24 hours.

### **Intervention time**

The efficiency of the forest fire fighting system is also expressed in the time that elapsed between the signalling of the fire and the beginning of the extinction. In 60% of the cases it was less than half hour, in 28% of the fires it was less than 1 hour, in 9% of the fires it was comprised between 1 and 2 hours and only in 3% of the events the extinction began after 2 hours. The best efficiency was in Sardinia, where 90% of fires were contained within half an hour, followed by Tuscany (72%) and Sicily (63%).

### **The altitude and the slope**

The distribution of fires by height and slope shows little inter-annual variability independently from the total number of fires. Beyond 64% of fires were comprised between sea level and 500 meters, approximately 31% between 500 and 1000 meters, 3.5% between 1000 and 1500 meters and 1.4% beyond 1500 meters. Medium slope areas, between 20 and 50% slope, had 44.5% of the total number of fires while slopes below 20% had 41.7% of the fires. This is correlated with the greater agricultural and forest activities in medium slope zones while the flat lands due to its larger number of infrastructures have a highest number of fire breaks. Only 13.8% of the fires took place in areas with more than 50% slope, which are areas with lower temperatures and with less population density.

### **Ignition area and recurrence**

In 2006 fires frequently started in wooded areas. This happened in more than 26% of the events which is a percentage higher than in previous years and that can be correlated to arson. In 24% of the fires its origin was in pathways and 23% in uncultivated areas, both due to voluntary or involuntary actions. In 17% of the events the origin was in agricultural fields, shrubs or pastures, showing the correlation of forest fires with agricultural and farming. Fire often returns to the same areas which are more exposed to the fire risk and become more fragile and degraded. Only 27% of fires taking place in 2006 happened in areas never bunt before while 40% of the events happened in areas already burned in the last 5 years, 20% in zones already hit in the last 10 years, and 12% in areas burned more than 10 years ago.

### **The protected areas**

In 2006 fire burned protected areas more than in previous years. Parks and Reservoirs had 12% of the fires, while in 2005 such percentage was only 8.7%. A total of 5 660 hectares were burnt of which 1 957 ha were wooded, corresponding respectively to 12% and 14% of the total surfaces. Sicily had the greatest damages in protected areas (769 ha of forest and 2 306 ha of total surface). Particularly hit was the Riserva dello Zingaro (Palermo), where a single fire destroyed 500 hectares. Remarkable damages happened also in the protected areas in Campania, where 211 fires burned in the national Park of the Cilento, Vesuvio and the regional Park of Paternio. Also in Puglia fires burned beyond 1 100 hectares, mainly in the Park of the Gargano and in the National Park of the Alta Murgia.

### **The causes**

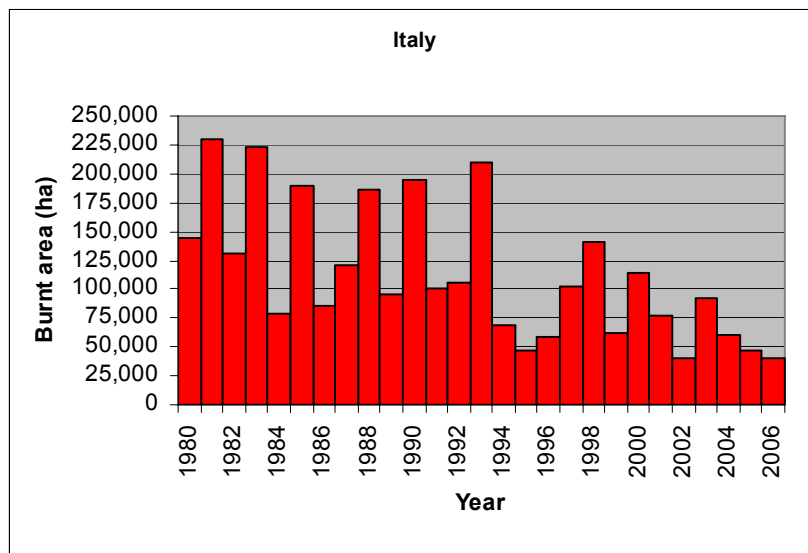
Regarding fire causes there are not, unfortunately, substantial changes: 60% of fires in 2006 were due to arson and 15% unintentional. Although arson is still the main cause there is a slight tendency to reduction comparing with the immediately previous years. Unintentional fires although more variable from year to year have however a non negligible percentage. In reality the identification of the fire cause is extremely complex and, often, it is not possible to be sure about the cause due to lack of elements or proofs. This explains the large number fires with unknown cause that in 2006 represented 21% of the total number of fires. Natural fires represented 3% of the total number of fires and were attributed mostly to lightning. Accidental fires represent only 1% of the total number of fires. Amongst arson fires the prevailing motivation is the search of a profit (beyond 40% of arson causes), which

confirms that the reasons for arson due to resentments, revenge or abnormal behaviour are less important (6%). Regarding unintentional fires, main reasons are inadequate agricultural and forest management (40%) such as use of fire for cleaning and elimination of forest and agricultural residues. Cigarettes and matches abandoned in sensitive areas constitute 31.7% of fires of unintentional origin.

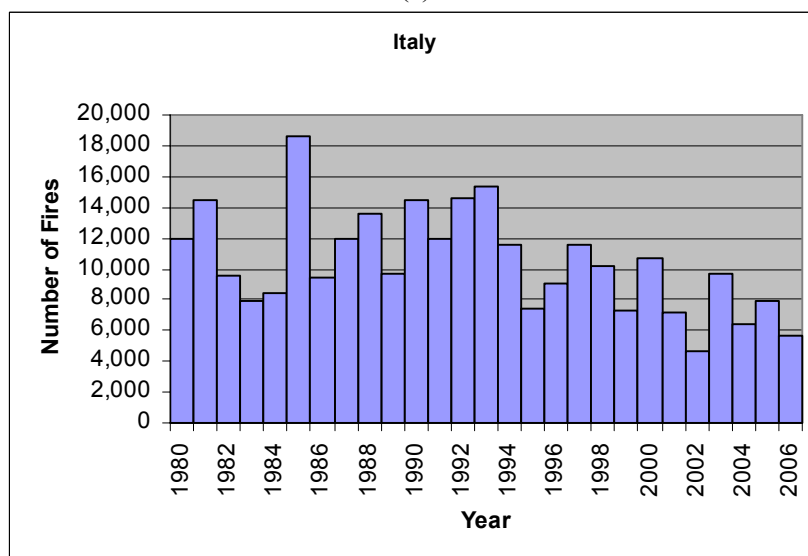
### Forest fire is a crime

Forest fires caused by arson or even involuntarily are a crime against the public and, like such, are criminally pursued. It is mentioned in article 423 bis of the Criminal Code, stating that anyone which causes a forest fire can be punished with confinement from 4 to 10 years. If the fire is involuntary the confinement can be from 1 to 5 years. These punishments are, moreover, increased by half if the fire induced a serious damage, extended and persistent to the environment. The State Forestry Corps is in charge of assessing causes of forest fires and to identify the responsible. In 2006 the State Forestry Corps has processed 353 persons, of which 11 caught in the act of committing a crime or in application of guard measures in case of arson fire. Altogether in the period 2000–2006 a total of 2 495 persons were taken to court of which 97 have been arrested.

The yearly trends in terms of numbers of fires and burnt areas during the last 27 years in Italy are shown in Figure 6.



(a)



(b)

Figure 6. Burnt areas and numbers of fires in Italy over the last 27 years.

(Source: *Corpo Forestale dello Stato, Italy*).

#### 2.1.4. Spain

##### Fire danger, fire occurrence and fire-fighting means of the Ministry of Environment (MMA)

During the first three months of the year fire danger conditions were relatively low due to frequent and more or less abundant precipitations. Although there were some interventions from the fire brigades and from the aerial means, the first large fire of 2006 occurred only on the 13 of March in the municipality of Simat de Valldina (Valencia) in which 7 amphibious airplanes CL-215t collaborated in its extinction together with the fire brigades of Tabuyo de Monte (León) giving support to the means of extinction of the Region of Valencia.

From April to the first half of May there were precipitations that maintained the fire danger relatively low although there were a number of fires where the aerial means had to intervene such as the fire of Vandellós y Hospitalet (Tarragona) between days 10 and 11 of April. A heat wave that started on May 17 lead to the increase of fire danger. During this month the amphibious airplanes of the MMA supported to the Regions in the extinction of 12 fires using more than 75 flight hours.

June continued with dry and high temperatures. However, Spring rains were sufficient to maintain the humidity of the live fuel, so that the occurrence and development of fires was smaller than in previous years. During this month 44 fires needed the intervention of the aerial means of the MMA with more than 250 flight hours. An airplane CL-215 helped in the extinction of a fire in neighbouring Portugal.

July was very dry and warm with some episodes of extreme fire danger in the south of the peninsula motivated by strong east winds. The storms, normally dry, with lightning and little precipitations, caused several natural fires. During this month there were 4 large fires. However, the accumulated results at the end of July were better than in the previous years and the number of fires and burned surface was far below the average of the previous decade. During this month the aerial means of the MMA helped fighting more than 300 fires using more than 1600 flight hours.

August began with a situation of accumulated drought in most of the territory. In spite of the Spring precipitations there was very little accumulated water in the ground causing favourable conditions for fire spread. The situation worsened extraordinarily in the first half of the month when, in addition to the high level of fire risk, three situations of extreme danger took place simultaneously:

a) The first situation happened in the northeast of Spain affecting mainly Catalonia and Aragón. The strong *tramontana* wind generated by a storm in central Europe enhanced fire propagation crossing large distances in few minutes. The fire-fighting devices of the *Generalitat* of Cataluña and *Diputación General* of Aragón tried to minimize fires by means of preventive actions. The means of both communities and those of the MMA acted quickly and obtained the control of most of fires in the initial phase. However a few fires could not be controlled in their initial phase: Cistella and Ventalló in Girona initiated 3 and 4 of august where 3 airplanes CL-215t, 2 airplanes AT-802fb, 2 airplanes AT-802 and the fire brigades of Daroca collaborated in their extinction as well as 4 airplanes CL-415 of the French civil protection. On the 12 of august another large fire initiated in Peralta (Huesca) was attacked by 1 airplane CL-215t, 2 airplanes AT-802fb, 2 airplanes AT-802 and the fire brigades of Daroca.

b) The second situation of extreme danger affected the provinces of Malaga, Cadiz, Huelva, and Seville due to the strong east wind. There were no large fires in this case due to the prevention, monitoring and fast performance of both *Junta* de Andalucía and national means.

c) The third and more serious situation took place in Galicia. Northeast winds that blew since end of July drying the vegetation got worse from the 4 of August onwards. This situation of adverse meteorology was accompanied by episodes of arson with the appearance of hundreds of fires every day. In these conditions, the extinction device was insufficient since by each fire that was controlled or extinguished several new fires arose in other points. On the 6 of August the *Xunta* of Galicia asked for extraordinary aid, not only from the MMA but also from other ministerial departments (Ministry of Interior and Ministry of Defence), from other autonomous communities and from other Countries. The situation began to be controlled by the 10 of august and finalized on day 15 with the arrival of precipitation of an Atlantic front. On the part of the MMA there were 39 airships and 7 fire brigades totalizing, only in these 15 days in Galicia, more than 1 470 flight hours and more than 7 600 drops with a volume of water superior to 24 million liters. In addition there were terrestrial means of national parks and means of the public company TRAGSA. There was a movement of solidarity without

precedents with an important contribution from all the autonomous communities, without exception, still at the cost of debilitating the devices of extinction in their own territories. The Ministry of the Interior moved to Galicia hundreds of effectives of the Civil Guard to monitor and investigate the causes of fires. The Ministry of Defence collaborated with more than thousand effectives supporting civilian personnel, opening fire-breaks with heavy machinery for the defence of houses and populations and monitoring forests. Italy and France contributed with 2 amphibious airplanes CL-415 each. Morocco sent 2 airplanes Hercules C-130 (one water bomber and another for support) and 5 airplanes Thrush Commander. Portugal, in spite of counting with a difficult forest fire situation in the north of the Country, collaborated with several teams of firemen helping in the extinction of fires that threatened houses in a work that was very much appreciated by the local population. The first half of August ended with more than 70 000 hectares burned in Galicia and heavy material damages. Due to the enormous economic damage suffered compensation of expenses has been asked to the Solidarity Fund of the European Union.

In addition to fires of Catalonia, Aragón and Galicia during the first half of August, there were other large fires located in Carrascalejo-Mohedas and La Jara (Cáceres-Toledo) that started on the 12 of August, in Sotillo de Adrada (Avila) on 14 of August and in Quiroga (Lugo) the 31 of August. Overall, the aerial means of the MMA fought more than 450 fires with 2 680 flight hours. Hence, the surface burned in 2006, which was very low until the end of July, became the second largest of the decade with respect to forest surface and the largest in absolute if only referred to the wooded surface. During the first days of September there was an increase of the fire danger in the area of the Estrecho caused by strong East winds. Storms caused several fires by lightning in the central system and in the West of Castilla y Leon. In the Mediterranean area, during the second third of the month, there were strong storms accompanied by abundant precipitations that reduced the forest fire danger until the end of the month. The tropical storm "Gordon" affected the coast of Galicia leaving heavy rains in the West of Spain. During this month 5 large fires took place, three of them in Avila, one in Leon and the largest one was in the island of Hierro where, in addition to autonomic and state means based in the Canary Islands, two airships came from the Niebla base (Huelva). During this month, Spain helped Morocco with 4 amphibious airplanes CL-215T, although not simultaneously, from the 6 to the 11 in a fire in Chefchowen. The number of fires with intervention from the MMA means was over 200 with more than 1 200 flight hours. October was a rainy month in which the forest fire risk has remained low in most of the national territory. November and December were characterized by temperatures somewhat higher than normal and the fire danger remained low. Amphibious airplanes CL-215T of the MMA took part solely in 2 fires located in Salas (Asturias) and Ador (Valencia).

Table 6. Forest fires and burned areas in the last decade (Provisional data of 2006)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average decade	2006 **
<b>Fires &lt;1 ha</b>	10918	14136	14343	11650	14547	12455	12110	11982	13750	16475	13237	10945
<b>Fires <math>\geq</math> 1 ha</b>	5853	8184	8103	6587	9571	7092	7819	6634	7646	9017	7651	5410
<b>Wooded Shrubland (ha)</b>	10531 42508	21326 72881	42959 83123	24034 52962	46138 124394	19363 56347	25197 63811	53673 70468	51732 56606	69397 106227	36435 72933	69340 70635
<b>Herbaceous (ha)</b>	6774	4296	7560	5221	18053	17587	18456	24032	25854	13074	14091	8853
<b>Forest (ha)</b>	59814	98503	133643	82217	188586	93297	107464	148172	134193	188697	123459	148827
<b>forest area (%)</b>	0,229	0,378	0,512	0,315	0,723	0,358	0,412	0,568	0,515	0,724	0,473	0,571
<b>N° large fires (&gt;500 ha)</b>	10	7	25	15	49	16	18	44	21	48	25	54

\* definitive data of 2006 for the provinces of Huelva, Jaén, Cuenca and Las Palmas

\*\* without data of herbaceous surface of Andalucía

\*\*\* The number of large fires in Galicia was obtained through analysis of MODIS satellite images. In these cases large fires can result from the union of 2 or more fires.

### **Number of fires and affected Surfaces**

The numbers of year 2006 according to the provisional data provided by the Autonomous Communities are provisional except for the provinces of Huelva, Jaén, Cuenca and Palma de Gran Canaria. Andalucía does not include yet the data of herbaceous surface crossed by the fire.

Table 6 shows the statistics for 2006 and their comparison with the years of decade 1996-2005. The total number of fires in 2006 is lower than the last years and the average of the decade. On the contrary the forest land burned is the third highest of the last decade after 2000 and 2005. The burned wooded forest is the second highest of this period after 2005.

Table 7 shows the distribution of fires and burned areas by provinces and Autonomous Communities. All the Autonomous Communities, except Galicia and Ceuta, had results more favourable than the average of decade 1996-2005. In Galicia, the two provinces with the most unfavourable numbers are A Coruña and Pontevedra..

### **Information campaigns**

The following mass media campaigns were done:

- general campaign: made through television networks by means of spots in which the preventive messages to the population in general remember.
- rural campaign: made through traveling theater representations made in the towns that transmitted to the population messages on the prevention and seriousness of forest fires.
- scholastic campaign: initiate in the month of September coinciding with the beginning of the course. It was made in schools and institutes of all Spain.

In addition, information can be found on the following web pages:

[www.mma.es](http://www.mma.es) with respect to forest fires <http://www.cortafuegos.com> as support to the educational personnel for the preparation of activities with the students

<http://www.incendiosforestales.org> in agreement with the School of Forestry, with wide information and statistics for the public in general.

### **International cooperation**

The XXI Latin-American course on protection against forest fires was held in September in collaboration with the Spanish agency of international cooperation (AECI) in Valsaín (Segovia). Part of the participants completed their formation remaining during 7 days in a BRIF fire brigade.

The implementation of the agreement with Portugal has improved and similar protocols with France and Morocco are being studied. The Spanish-Portuguese bilateral commission on prevention and extinction of forest fires was created.

Table 7. Forest fires and burned by Province and Region (Provisional data of 2006).

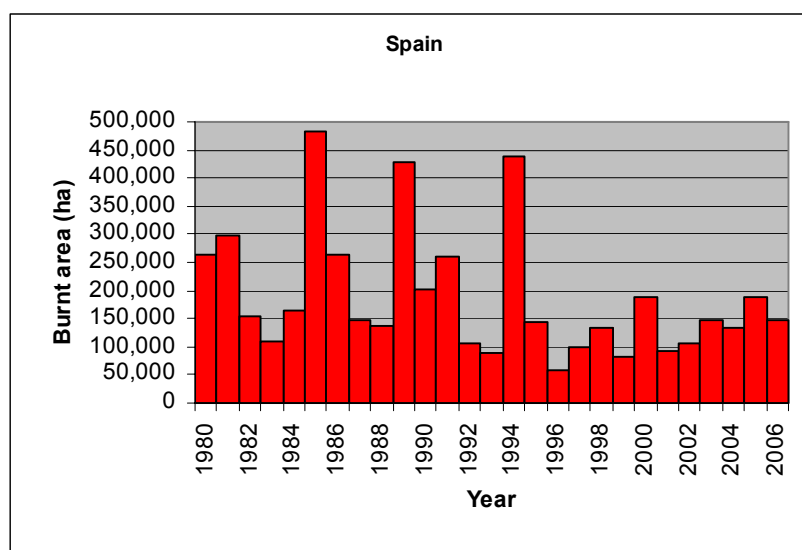
Province/Region	Number of fires		Forest Burned Area				% of burned area in relation to existing area	
	< 1 ha	≥1 ha	Forest Wooded			Forest Herbaceous	Trees (%)	Forest (%)
			Trees	Shrubland	Total			
Alava	32	6	9,18	12,36	21,54	3,07	0,007	0,014
Guipúzcoa (*)	21	5	11,24	6,87	18,11	0,00	0,010	0,013
Vizcaya	38	18	89,25	49,48	138,73	0,98	0,074	0,093
<b>PAIS VASCO</b>	<b>91</b>	<b>29</b>	<b>109,67</b>	<b>68,71</b>	<b>178,38</b>	<b>4,05</b>	<b>0,031</b>	<b>0,039</b>
Barcelona	226	26	105,07	47,60	152,76	2,76	0,027	0,033
Girona	140	20	1.049,80	354,42	1.404,22	4,93	0,338	0,364
Lleida	90	28	215,78	39,56	255,34	11,18	0,055	0,037
Tarragona	87	17	403,32	1.113,90	1.517,22	30,71	0,243	0,565
<b>CATALUÑA</b>	<b>543</b>	<b>91</b>	<b>1.773,97</b>	<b>1.555,57</b>	<b>3.329,54</b>	<b>49,59</b>	<b>0,140</b>	<b>0,182</b>
A Coruña	1.518	869	21.446,28	14.274,21	35.720,49	0,00	5,312	7,012
Lugo	644	254	1.475,50	4.652,47	6.127,97	0,00	0,311	0,918
Ourense	1.044	569	4.118,12	8.044,06	12.162,18	0,00	1,267	2,092
Pontevedra	1.685	414	27.065,72	11.519,28	38.585,00	0,00	12,257	12,766
<b>GALICIA (*)</b>	<b>4.891</b>	<b>2.106</b>	<b>54.105,62</b>	<b>38.490,02</b>	<b>92.595,64</b>	<b>0,00</b>	<b>3,798</b>	<b>4,494</b>
Almería	50	13	3,90	86,50	90,40		0,004	0,016
Cádiz	59	35	361,10	433,50	794,60		0,292	0,201
Córdoba	118	15	48,70	84,50	133,20		0,020	0,022
Granada	73	17	20,20	207,60	227,80		0,011	0,038
Huelva	100	47	252,11	394,51	646,62	193,23	0,054	0,084
Jaén	106	48	72,25	66,70	138,95	719,87	0,030	0,022
Málaga	53	25	185,10	696,50	881,60		0,201	0,292
Sevilla	99	32	118,00	173,50	291,50		0,061	0,062
<b>ANDALUCIA (**)</b>	<b>658</b>	<b>232</b>	<b>1.061,36</b>	<b>2.143,31</b>	<b>3.204,67</b>	<b>913,10</b>	<b>0,064</b>	<b>0,095</b>
<b>ASTURIAS</b>	<b>860</b>	<b>918</b>	<b>2.612,10</b>	<b>6.340,23</b>	<b>8.952,33</b>	<b>0,00</b>	<b>0,802</b>	<b>1,342</b>
<b>CANTABRIA</b>	<b>49</b>	<b>223</b>	<b>643,71</b>	<b>1.320,52</b>	<b>1.964,23</b>	<b>51,10</b>	<b>0,411</b>	<b>0,623</b>
<b>LA RIOJA (*)</b>	<b>58</b>	<b>17</b>	<b>7,86</b>	<b>61,72</b>	<b>69,58</b>	<b>0,00</b>	<b>0,007</b>	<b>0,024</b>
<b>MURCIA (*)</b>	<b>79</b>	<b>12</b>	<b>23,23</b>	<b>47,77</b>	<b>71,00</b>	<b>0,00</b>	<b>0,012</b>	<b>0,014</b>
Alicante	97	21	186,89	468,20	655,18	97,63	0,304	0,304
Castellón	96	13	25,37	60,93	86,30	1,20	0,017	0,022
Valencia	213	42	430,62	1.924,74	2.355,36	69,61	0,152	0,427
<b>COM. VALENCIANA</b>	<b>406</b>	<b>76</b>	<b>642,88</b>	<b>2.453,96</b>	<b>3.096,84</b>	<b>168,44</b>	<b>0,130</b>	<b>0,269</b>
Huesca	90	30	1.360,38	350,59	1.710,97	0,00	0,349	0,198
Teruel	100	9	49,76	29,13	78,89	0,00	0,012	0,009
Zaragoza	143	40	134,54	241,65	376,19	0,00	0,068	0,053
<b>ARAGÓN (*)</b>	<b>333</b>	<b>79</b>	<b>1.544,68</b>	<b>621,37</b>	<b>2.166,05</b>	<b>0,00</b>	<b>0,156</b>	<b>0,087</b>
Albacete	65	15	48,46	22,13	70,59	9,45	0,022	0,013
Ciudad Real	76	65	42,32	1.223,36	1.265,68	511,46	0,041	0,214
Cuenca	132	19	140,08	15,98	156,06	22,38	0,030	0,021
Guadalajara	131	45	38,20	75,11	113,31	28,05	0,013	0,019
Toledo	101	105	752,09	1.129,72	1.881,81	609,49	1,398	0,585
<b>CASTILLA LA MANCHA</b>	<b>505</b>	<b>249</b>	<b>1.021,15</b>	<b>2.466,30</b>	<b>3.487,45</b>	<b>1.180,83</b>	<b>0,090</b>	<b>0,134</b>
Las Palmas de Gran Canaria	52	17	3,78	42,64	46,42	38,24	0,024	0,035
S.C. de Tenerife	60	11	1.068,17	472,12	1.540,29	16,02	1,338	0,637
<b>CANARIAS</b>	<b>112</b>	<b>28</b>	<b>1.071,95</b>	<b>514,76</b>	<b>1.586,71</b>	<b>54,26</b>	<b>1,123</b>	<b>0,338</b>
<b>NAVARRA</b>	<b>369</b>	<b>103</b>	<b>285,19</b>	<b>458,10</b>	<b>743,29</b>	<b>65,48</b>	<b>0,083</b>	<b>0,153</b>
Badajoz	295	143	154,83	498,16	652,99	642,61	0,066	0,131
Cáceres	370	238	1.177,70	2.819,70	3.997,40	1.660,52	0,233	0,439
<b>EXTREMADURA</b>	<b>665</b>	<b>381</b>	<b>1.332,53</b>	<b>3.317,86</b>	<b>4.650,39</b>	<b>2.303,13</b>	<b>0,180</b>	<b>0,305</b>
<b>ILLES BALEARS</b>	<b>114</b>	<b>10</b>	<b>54,97</b>	<b>106,53</b>	<b>161,50</b>	<b>8,89</b>	<b>0,051</b>	<b>0,084</b>
<b>MADRID</b>	<b>195</b>	<b>76</b>	<b>29,04</b>	<b>235,45</b>	<b>264,49</b>	<b>837,26</b>	<b>0,019</b>	<b>0,280</b>
Ávila	159	54	675,32	1.928,99	2.604,31	2.043,05	0,521	0,544
Burgos	97	26	144,18	84,59	228,77	33,77	0,040	0,032
León	249	405	989,96	5.861,40	6.851,36	402,82	0,592	0,797
Palencia	45	32	99,69	45,67	145,36	12,30	0,138	0,059
Salamanca	210	71	49,53	281,51	331,04	203,29	0,036	0,051
Segovia	57	12	21,54	7,36	28,90	19,51	0,013	0,009
Soñía	55	16	18,68	10,78	29,46	43,39	0,006	0,005
Valladolid	29	17	28,92	24,46	53,38	90,92	0,028	0,035
Zamora	116	146	991,96	2.182,63	3.174,59	367,42	0,817	0,692
<b>CASTILLA Y LEON</b>	<b>1017</b>	<b>779</b>	<b>3.019,78</b>	<b>10.427,39</b>	<b>13.447,17</b>	<b>3.216,47</b>	<b>0,190</b>	<b>0,369</b>
<b>CEUTA</b>	<b>0</b>	<b>1</b>	<b>0,00</b>	<b>5,00</b>	<b>5,00</b>	<b>0,00</b>	<b>0,000</b>	<b>0,375</b>
<b>MELILLA</b>	<b>0</b>	<b>0</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,000</b>	<b>0,000</b>
<b>TOTAL</b>	<b>10.945</b>	<b>5.410</b>	<b>69.339,70</b>	<b>70.634,56</b>	<b>139.974,26</b>	<b>8.852,60</b>	<b>0,623</b>	<b>0,571</b>

(\*) without differentiation between herbaceous and wooded surface

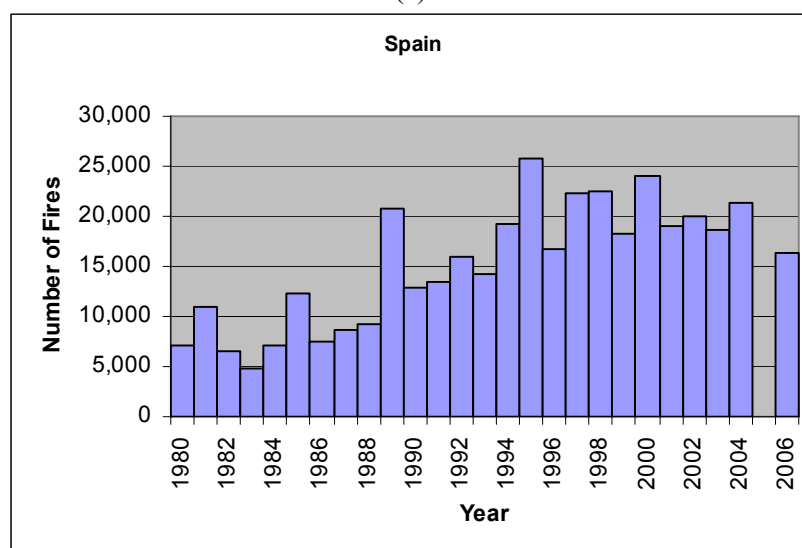
(\*\*) without data of herbaceous surface in 2006

Definitive statistics for: Huelva, Jaén, Cuenca and Las Palmas

Figure 7 shows yearly trends in the number of fires and burnt areas in Spain over the last 27 years.



(a)



(b)

Figure 7. Burnt area and number of fires in Spain over the last 27 years.

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

### 2.1.5. Portugal

After the 2005 season some new planning and coordination actions were established in order to organize the Portuguese National Fire Forest Defence System. It was stated the implementation of the National Forest Fire Plan, with very clear actions at different levels and objectives. It was also approved a new Forest National Strategy as well as the improvement of the legislation of the National Forest Fire Defence System, reinforced after the 2003 fire season.

The year of 2006, had a different meteorological pattern when compared with the previous years. Analysing the risk trend through the Daily Severity Rating (DSR) calculated based on the daily value of the Canadian Fire Weather Index (FWI) of the Portuguese Meteorological Institute, for the 2000 – 2006 period, it was possible to confirm a decrease of fire risk for the 2006 fire season, when compared with



2005 and 2004 (Figure 8). Nevertheless the values of 2006 were higher than the values verified in the 2000 – 2002 period.

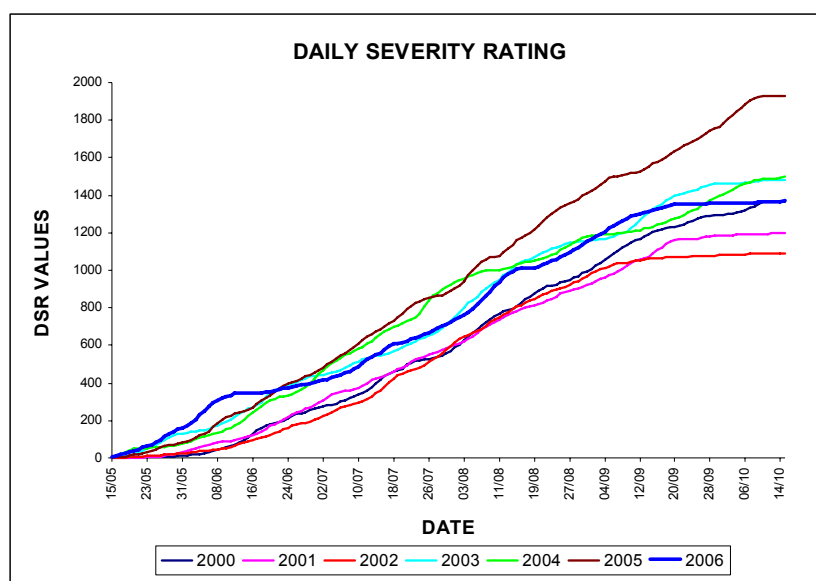


Figure 8. Evolution of the Daily severity rating calculated based on the daily FWI value (2000 –2006 period).

These conditions contribute to a decrease on the number of fire ignitions and a very strong decrease of the burnt area values. There were 19 929 fires (16 466 smaller than 1 ha) that burned 75 510 ha of forestland, 36 323 ha of those on wooded land. These figures represent a strong decrease when compared with the 2005 and with the ten year average values.

The monthly evolution of the burnt area and number of fires in year 2006 followed a different pattern from previous years. For the period of January-May the values of burnt area and number of fires were much lower than the ten year averages (Table 8). This situation was due to the occurrence of long periods of rain that contributed to a low fire risk, in this period.

Table 8. Forest Fires in Portugal by Month.

District	Number of Fires	Burned Area (ha)		
		Shrubs	Wooded Land	Total
January	145	39	34	73
February	594	592	87	680
March	247	128	27	155
April	491	188	105	293
May	1742	650	996	1646
June	2572	2491	3650	6140
July	4109	3953	6927	10880
August	6726	26719	22635	49354
September	2761	4305	1813	6119
October	395	96	47	143
November	51	5	1	6
December	96	21	2	22
<b>TOTAL</b>	<b>19929</b>	<b>39187</b>	<b>3.323</b>	<b>75510</b>

With the increase of the fire risk in the first week of June, an increase of fire ignitions and burnt area was verified. In this period there were 6 fires larger than 100 ha and the fire of Fragoso - Barcelos that occurred on the 4<sup>th</sup> of June in the district of Braga was the first big fire verified with 2 537 ha.

As in previous years and due to a high period of fire risk in the two first weeks, the month of August was responsible for the highest percentage of burnt area and number of fires. In this month 61 %

(49 354 ha) of the total burned area took place. The biggest fire of 2006 took place on the 6<sup>th</sup> August, and started in the municipality of Arcos de Valdevez (district of Viana do Castelo). This fire affected severely the Gêres National Park, burning a total of 5 590 ha mostly on shrub lands. In September and October the meteorological conditions were alternated between periods with high temperatures and periods with local precipitation.

The most affected regions were located in the Northwest Region of Portugal (Table 9 and Table 10). The largest burnt area occurred in the district of Viana do Castelo (21 % of 2006 total), in the border with Galicia region, also severely affected by fires. The districts of Braga, Porto and Évora were also affected. The lowest burnt area took place in the southern districts, with Faro registering the lowest values.

Table 9. Number of Forest Fires by District

DISTRICT	Number of Fires		
	$\geq 1$ ha	$> 1$ ha	Total
Aveiro	106	1 352	1 458
Beja	42	27	69
Braga	580	2 257	2 837
Bragança	148	274	422
C. Branco	99	370	469
Coimbra	100	527	627
Évora	49	72	121
Faro	64	658	722
Guarda	220	493	713
Leiria	72	513	585
Lisboa	225	1 593	1 818
Portalegre	38	47	85
Porto	506	4 062	4 568
Santarém	119	575	694
Setúbal	89	912	1 001
V. Castelo	362	661	1 023
Vila Real	370	809	1 179
Viseu	274	1 264	1 538
<b>TOTAL</b>	<b>3 463</b>	<b>16 466</b>	<b>19 929</b>

Table 10. Burnt Area by District

DISTRICT	Burnt Area (ha)		
	Forest	Shrubland	Total
Aveiro	2 127	252	2 379
Beja	1 436	346	1 782
Braga	4 995	5 270	10 265
Bragança	1 218	1 247	2 464
C. Branco	1 907	860	2 767
Coimbra	548	390	938
Évora	5 241	780	6 021
Faro	6	173	179
Guarda	1 025	4 590	5 615
Leiria	1 121	3 243	4 365
Lisboa	89	579	668
Portalegre	1 270	68	1 338
Porto	4 554	2 460	7 014
Santarém	1 532	1 334	2 865
Setúbal	625	152	776
V. Castelo	3 800	11 908	15 708
Vila Real	1 377	2 532	3 909
Viseu	3 452	3 007	6 458
<b>TOTAL</b>	<b>36 323</b>	<b>39 187</b>	<b>75 510</b>

The higher number of fires took place, like in previous years, in the districts of Porto and Braga, in the Northwest Region of Portugal and in the district of Lisboa in the South. These regions are characterised by a large density of population who lives near forest land associated to a small dimension of the forest property.

The distribution of the burnt area can be observed in the figure below. This distribution updated uses sets of images from the MODIS instrument on board the TERRA and AQUA satellites, and was done periodically, during the fire season.

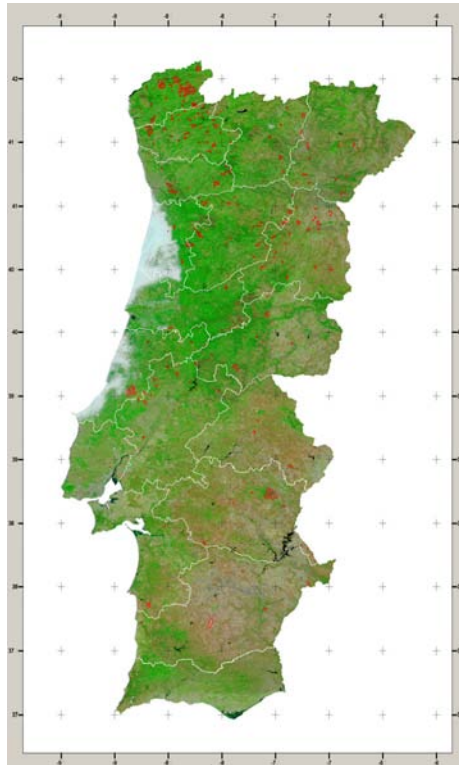


Figure 9. Satellite MODIS AQUA from the end of 26<sup>th</sup> September. In red is the burnt area identification. Source: NASA – Rapid Response System and ISA.

Due to the spatial resolution of this images (250 m) this evaluation can only be accurate for fires larger than 50 ha. The last update was made at the end of September, and the total area burnt (forest and non-forest for fires larger than 50 ha) mapped was 69 753 ha.

#### **Loss of Human Lives during 2006 Fire Season**

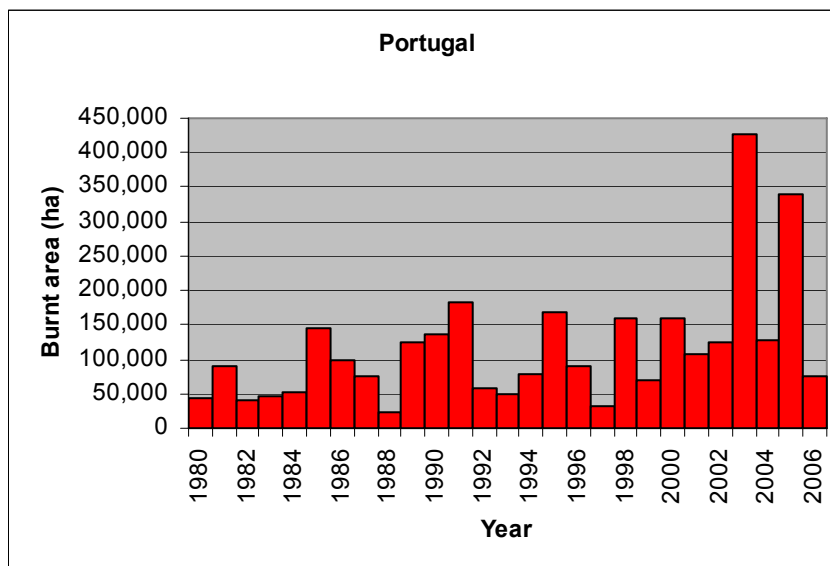
Forest fires in Portugal caused, during 2006, the death of 11 people (nine fire-fighters and two civilians). The majority of deaths among fire-fighters resulted from fire-fighting operations. In fact, in a large fire in July, six fire-fighters (five of them from Chile) were caught by fire and died in result of burn injuries. There are also reports of casualties caused by traffic accidents while coming to or leaving from a fire scene. On the other hand, the two victims among civilians were caught by fire when trying to protect their properties. In spite of some accidents occurred with aerial means, this year there was no report of deaths among pilots. During the critical season, more than 400 people needed medical assistance due to smoke intoxications, burn injuries and different kind of wounds, as result of a direct or indirect contact with fire.

#### **Operations on mutual assistance during 2006 fire season**

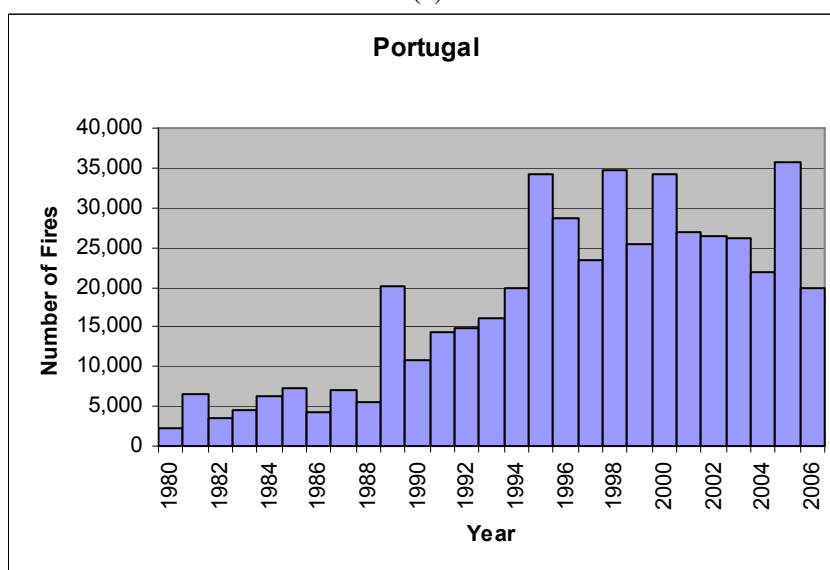
Unlike previous years, Portugal did not require assistance trough the EU Mechanism for Civil Protection in 2006. However, during the season (especially in the beginning) the bilateral agreement with Spain for reinforcement of aerial fire-fighting inside and outside the border area was activated. On the other hand, Portugal sent to Spain, one Relief Task Force, based on 20 vehicles and 65 forest fire fighters, in reply to the request of assistance made by Spain through the Mechanism, after the blaze of

several forest fires in the region of Galicia. The Portuguese team cooperated with Spanish Authorities during one week in August.

The yearly trends in terms of numbers of fires and burnt areas during the last 27 years in Portugal are shown in Figure 10.



(a)



(b)

Figure 10. Burnt area and number of fires in Portugal over the last 27 years

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

## 2.2. OTHER MEMBER STATES

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

### 2.2.1. Austria

Fire season 2006 (Table 11) had less wildland and forest fires than 2005 probably due to a very wet spring season.

Table 11. Number of fires and burned area in Austria in 2006.

Fire type	No. of Fires	Burned area(ha)
Wildland fires	1620	99
Forest fires	912	75
<b>TOTAL</b>	<b>2532</b>	<b>174</b>

The area of Austria is 83.858 sq km. Austria is divided in 9 provinces, 15 towns with separate status, 84 administration districts, and 2.350 municipalities. There are 4.567 voluntary fire brigades and 6 professional fire brigades (Vienna, Graz, Linz, Salzburg, Innsbruck, Klagenfurt). In average there are 2 fire brigades per municipality. In total there are approximately 290 000 fire-fighters. Fire-fighters can follow special courses for forest fire fighting, in particular for actions in the mountain areas, and some of them are specialized for working with helicopters and airplanes. The response time by fire is between 10 and 15 minutes (except for mountain areas) leading to a very small burned area per fire (e.g.: ~1.000 m<sup>2</sup>). The largest ever recorded burned area was about 50 ha.

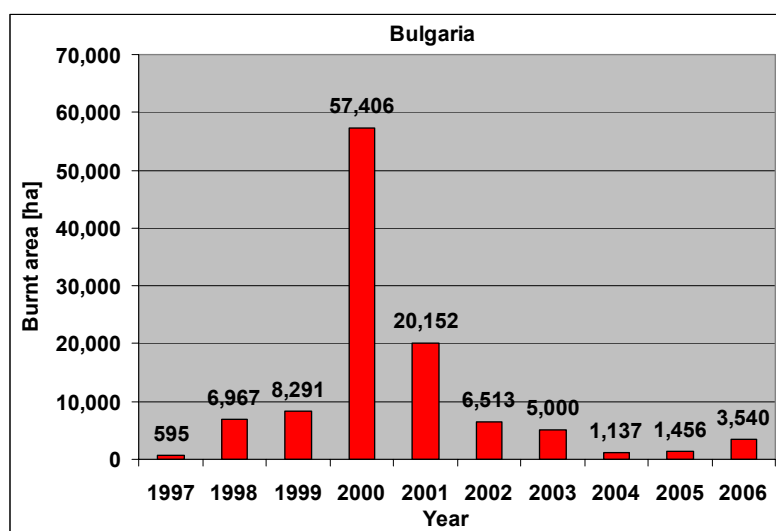
(Source: Federal Fire Brigade Federation, Austria)

### 2.2.2. Bulgaria

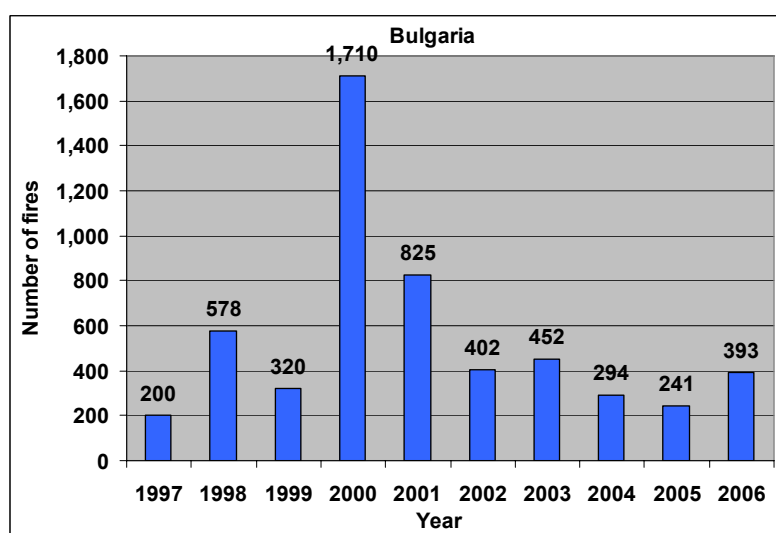
The forest lands in Bulgaria comprise 4 089 762 hectares (ha) corresponding to 37 % of the territory. Wooded areas (3 691 868 ha) represent 89 % of the forest land. Forest fires became a real problem in Bulgaria in the period 1999-2003. Due to global climate warming Bulgaria's forest fire risk is becoming more similar to the Mediterranean regions with traditionally high forest fire risk in the summer. In accordance with the last 10 years statistics, there are in average around 540 fires that affect a surface of about 11 000 ha (Figure 11). During 2006 there were clear typical peaks in the number of fires. The first of them was in March and the second during August and September. Both of them are mainly connected with burning of stubbles and vegetable residuals by the farmers. The main reasons for the forest fires during 2006 are presented in Table 12. In 2006 from the 190 fires that were caused by human activities 26 of them were deliberate or arson. The forest fire economical damage for 2006 was estimated in 270 000 Euro, although the average economic damage in the last 10 years was about 7 000 000 Euro per year.

Table 12. Forest fire statistics for Bulgaria for the period 1997-2006.

Year	Number of fires	Total burnt area (ha)	Burnt forest lands (ha)	Other territories (ha)	Fire Causes (number of fires)		
					Human	Natural	Unknown
1997	200	595	472	123	51	4	145
1998	578	6 967	6 060	907	147	6	425
1999	320	8 291	4 198	4 093	84	9	227
2000	1 710	57 406	37 431	19 975	385	18	1 307
2001	825	20 152	18 463	1 689	187	19	619
2002	402	6 513	5 910	603	150	7	245
2003	452	5 000	4 284	716	281	9	162
2004	294	1 137	881	256	172	5	117
2005	241	1 456	1 456	-	125	7	109
2006	393	3 540	3 540	-	190	9	194
<b>Average</b>	<b>542</b>	<b>11 106</b>	<b>8 270</b>	<b>2 836</b>	<b>178</b>	<b>9.2</b>	<b>355</b>



(a)



(b)

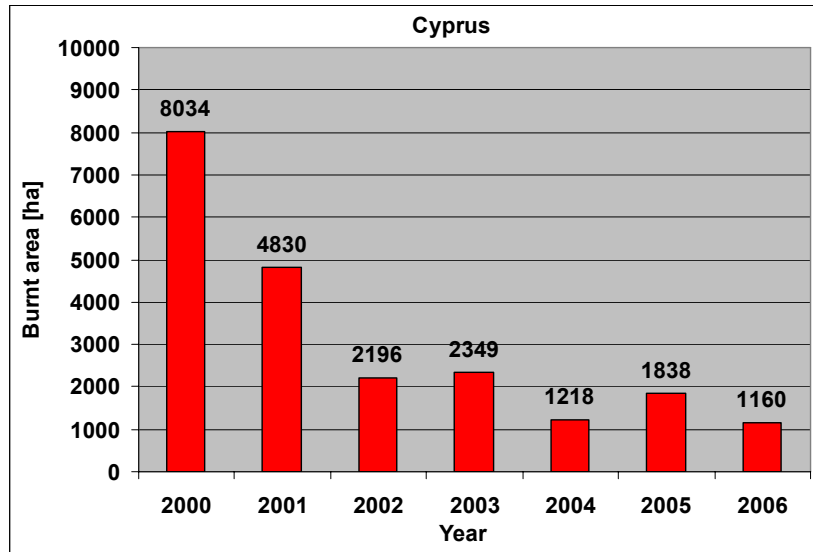
Figure 11. Burnt areas and numbers of fires in Bulgaria over the last 10 years.

### 2.2.3. Cyprus

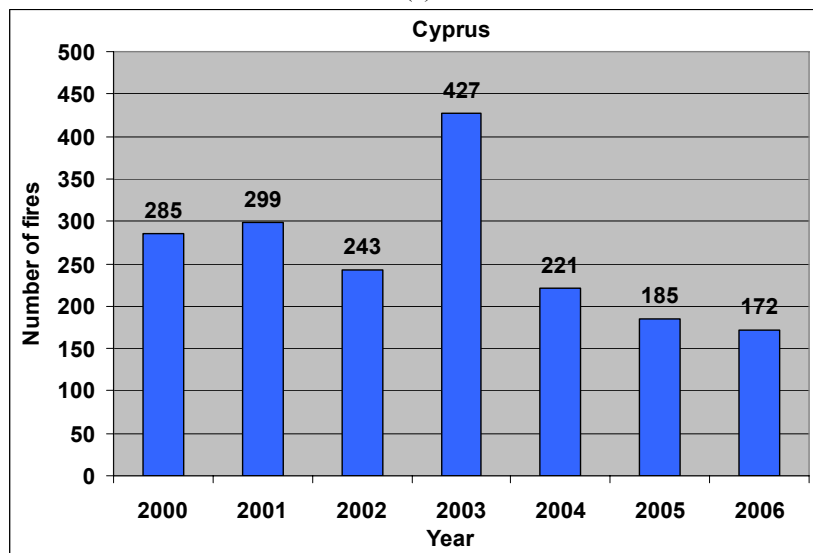
During the year 2006, a total number of 172 forest fires broke out in Cyprus affecting an area of 1160 ha of wooded and non-wooded land. The trends regarding both the number of fires and burnt areas over the last 7 years (2000-2006) are shown in Table 13 and Figure 12. The total number of forest fires in Cyprus during this period was 1832 fires and the total burnt area was 21625 ha.

Table 13. Number of forest fires and burnt areas in Cyprus

Year	Number of fires	Total burnt area (ha)	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
2005	185	1838	962	876
2006	172	1160	888	272



(a)



(b)

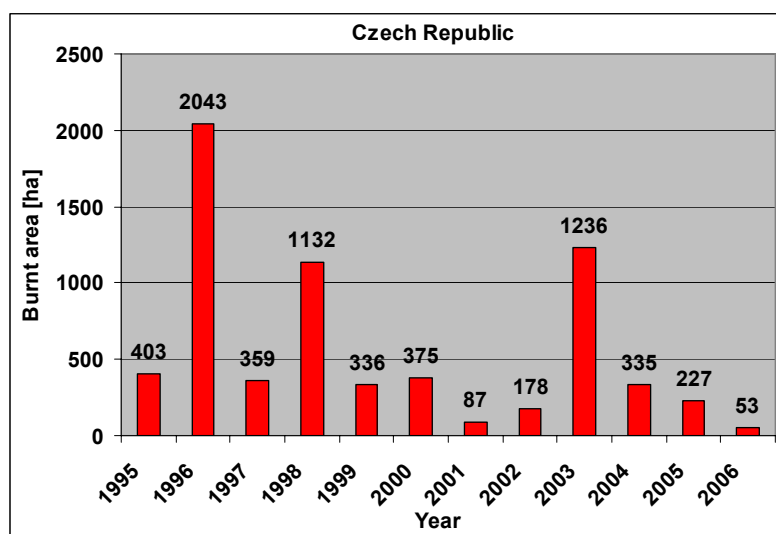
Figure 12. Burnt areas and numbers of fires in Cyprus over the last 7 years.

A number of 5 forest fires with burnt area size equal or greater than 50 ha, were recorded. In Cyprus, there were 3 injuries and 1 death during 2006 fire season. A campaign aiming to inform the public about forest fire prevention practices, changing attitudes and behaviour and creating awareness on fire prevention was undertaken during the whole year and especially during the summer period. Through this campaign, students and other civil groups were informed about the importance of forests and how to protect them from fires. For the detection and report of forest fires a network of 13 permanent and 14 temporal lookout stations have been operated. A number of fires were also detected by forest officers on patrol as well as by citizens living nearby or passing through forested areas. A large number of fire engines, crawler tractors and agricultural tractors were used in fire fighting activities during the summer 2006. Additionally one fire fighting aeroplane and two medium 5 tonnes helicopters were used for this reason. In some cases, Army and Police helicopters were also involved in the fire fighting operations. In the case of a fire outbreak, great concern is given to intervene to the area of the fire as quickly as possible and suppress any outbreak at its first stage. The effectiveness of the above integrated forest fire management system is well illustrated by the analysis of the forest fire statistics. The average response time over the last seven years (2000 – 2006) was found to be 12 minutes and the burnt area for 80 percent of the total number of fires, did not exceed the size of one hectare.

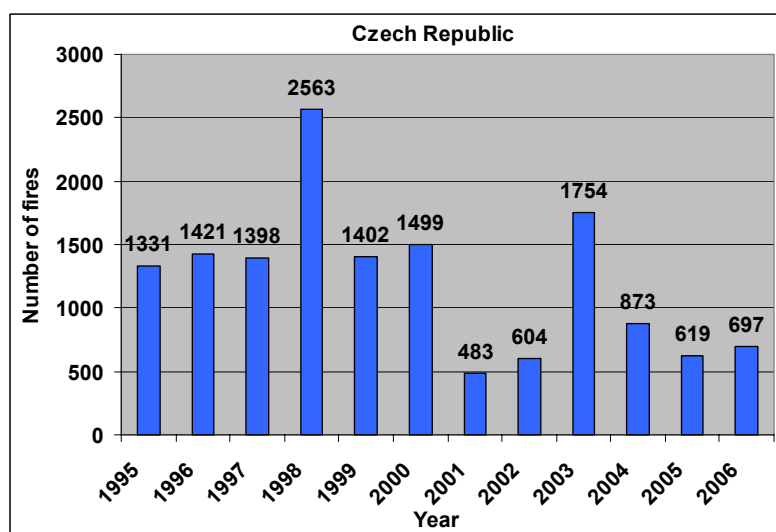
(Source: Ministry of Agriculture, Natural Resources and Environment, Department of Forests, Cyprus).

### 2.2.4. Czech Republic

In 2006 there was a total of 697 forest fires that burned 53 ha. The statistics for the period 1995-2006 are presented in Figure 13.



(a)



(b)

Figure 13. Burnt areas and numbers of fires in Czech over the last 12 years

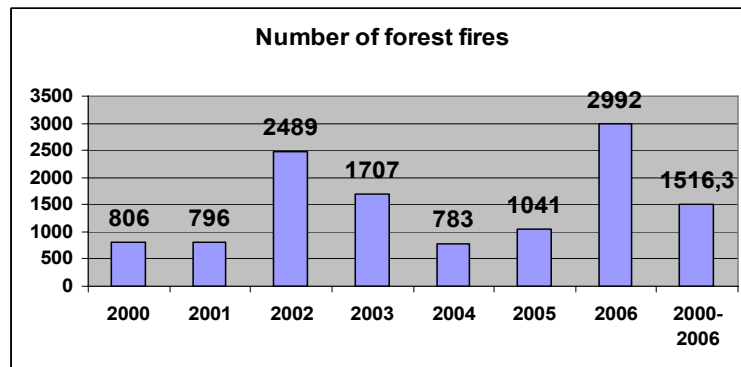
Source: Ministry of Interior of the Czech Republic

### 2.2.5. Finland

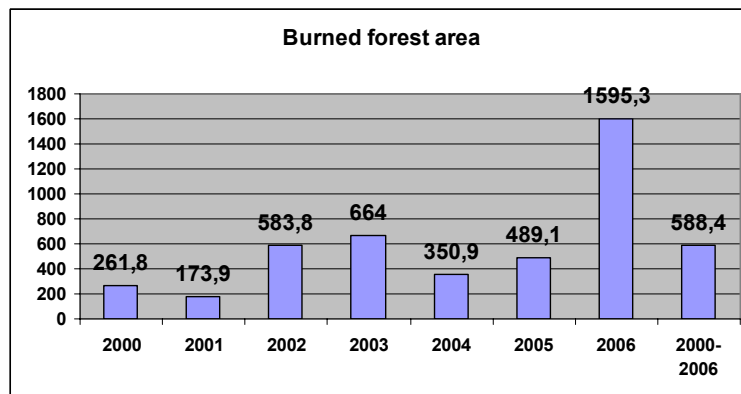
In Finland the summer 2006 was exceptionally dry and warm. This caused a relatively high number of wildfires in Finland compared to the normal summer. In a usual summer in Finland there are around 2000 wildfires a year but in 2006 there were 6288 wildfires. The average burned area per fire remained less than half a hectare which is as much as usually. The exact statistics from 2000 to 2006 are presented in Figure 14. Altogether we can say that the ground fire prevention system as well as response system is working very effectively in Finland. The ground fires did not cause any injuries or deaths to the people or damage to the buildings. The only damage was the burned area i.e. only minor economic loss. The most common reason for wildfire is related to a human action i.e. about 60 % of the fires were caused by humans and in most cases the fires are not caused deliberately. In Finland only a



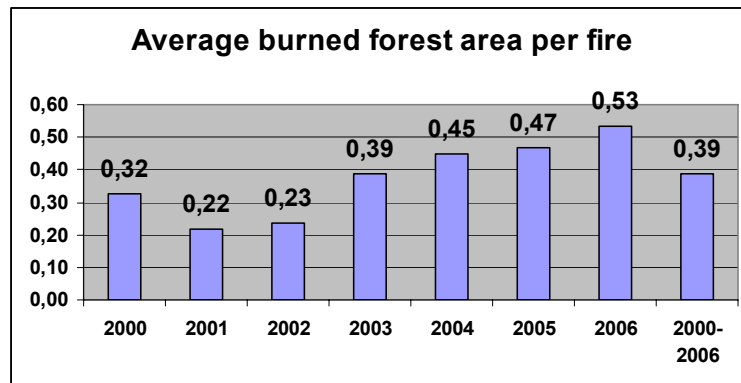
very small number of these are arsons. The weather conditions such as thunder storms caused 12 % of the fires. However, the reason for fire could not be found in 19 % of the cases.



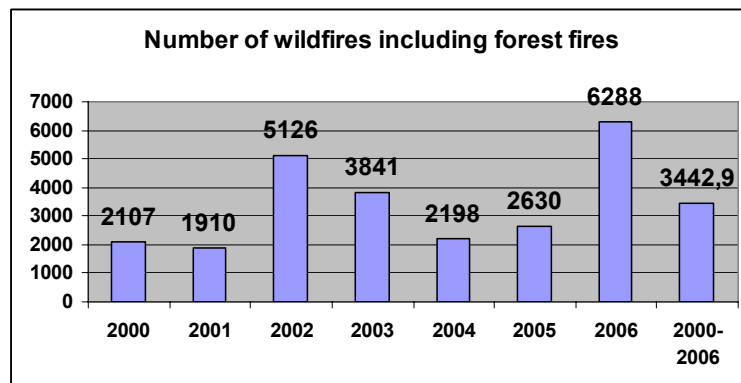
(a)



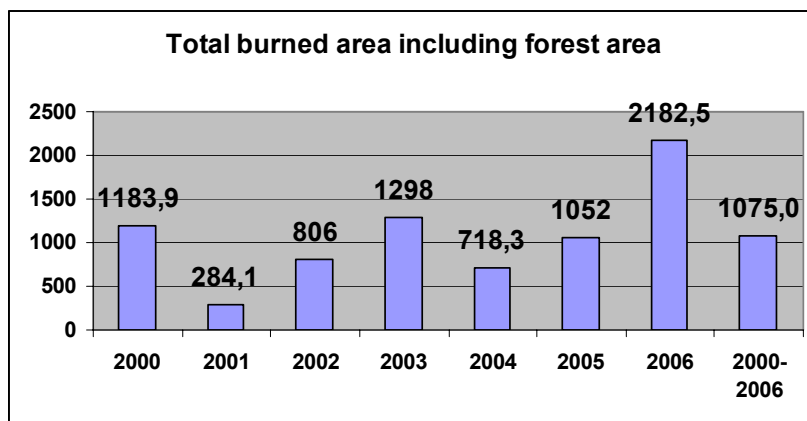
(b)



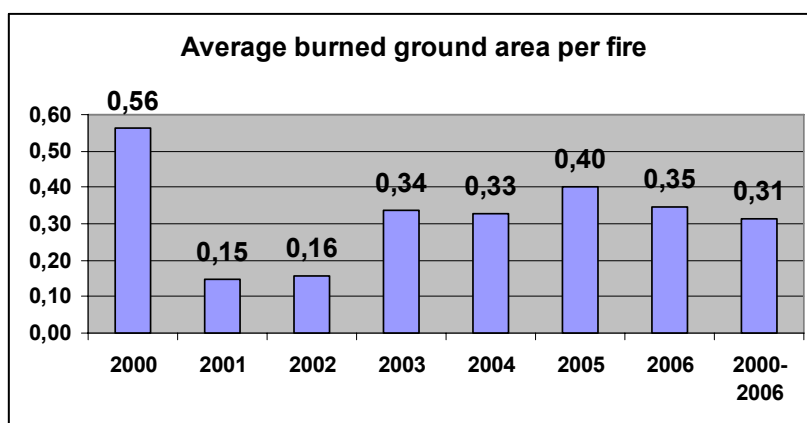
(c)



(d)



(e)



(f)

Figure 14. Forest fires and wildland fire statistics for Finland from 2000 to 2006 and average 2000-2006..

(Source: Ministry of Interior, Finland)

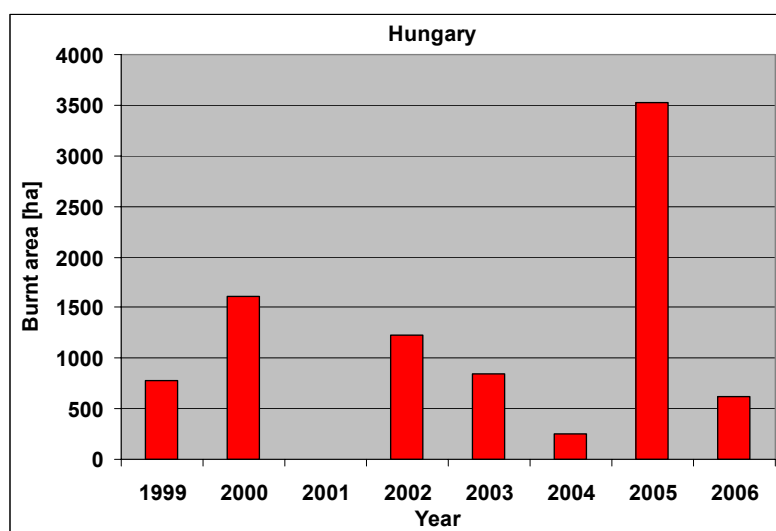
### 2.2.6. Germany

There was a total of 930 forest fires in the Federal Republic of Germany in 2006 with a total damage surface of 482,1 hectares. The forest fires burned 409.6 hectares of coniferous forest and 72.5 hectares of hardwood. Within the Federal Republic of Germany the Land of Brandenburg registered the highest number of forest fires (394) followed by the Bundesländern of the Federal Republic of Saxonia (158), Bavaria (60) and Saxonia-Anhalt (56). The Bundesländer of Bremen and Hamburg did not have forest fires in the 2006. Within the Federal Republic of Germany the Land of Brandenburg had the largest burned area (325.7 ha) followed by the Lands of Saxonia (30.5 ha), Bavaria (20.7 ha) and Berlin (19.1 ha). Regarding the number of forest fires according to the type of property (federal forest, national forest, Körperschaftswald and private forest) the private forest had 478 fires, followed by the national forests with 275 fires, the Körperschaftswald with 117 fires and the federal forest with 60 fires. Regarding the forest fire causes negligence was the main known cause (216 fires) followed by arson (154 fires) natural causes (76 fires), and other causes (42 fires). For 442 fires it was not possible to determine the causes. Regarding the time of the year it can be stated that most forest fires occurred in the months of May, June and July (761 fires in total). In addition, the months of April (26 fires), August (50 fires), September (61 fires) and October (22 fires) had also a relatively high fire occurrence. During the months of January, February, November and December there was a total of 5 forest fires. In terms of damaged areas it can be stated that the month of July, with 367.6 hectares burned, was the most affected in 2006, followed at distance by the months of June (40.6 ha), May (33,9 ha), August (17.5 ha) and September (12,7 ha). The expenditures for the protection of forest against fires in 2006 within the Federal Republic of Germany, regarding both forest administration and other owners of forest (public and private) was 9.630.000 million Euro. The Land of Brandenburg had the largest expenditures (7.130.000 millions Euro). Analysing the forest fire statistics since 1991, it can be stated that 2006 with its 930 forest fires and a total damaged area of 482 ha was one of the mildest years far from the extreme years of 1992 (3012 forest fires) or 2003 (2524 forest fires). Only 2005 (496 forest fires), 2002 (513 forest fires), 2001 (587 forest fires) and 2004 (626 forest fires) exhibited a smaller number of fires.

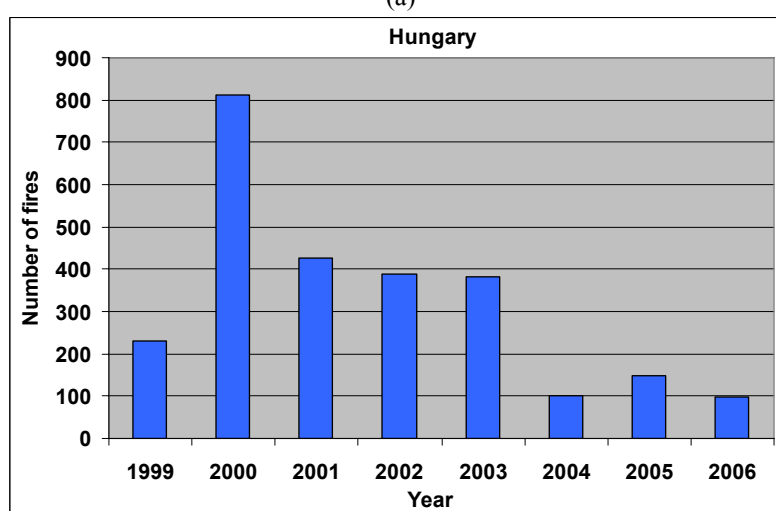
*(Sources: Federal Agency for Agriculture and Food, Germany; Landesschule und Technische Einrichtung für den Brand- und Katastrophenschutz des Landes Brandenburg)*

### 2.2.7. Hungary

In 2006 Hungary had 97 forest fires summing up a total of 625 ha of burned forest area. Compared with the previous year the number as well as the area of the fires decreased significantly. This is mainly due to the rainy spring and higher precipitation rate in the second half of the year when the majority of forest fire happened in the previous years. In 2006 50% of the fires occurred in the early period of the year between January and May. The frequency of the fires in summer months was moderate. The share of burnt area classified as wooded land was 44%. For the most cases fires occurred on other lands (66%). The average size of burnt area was 6.4 ha for total affected area and 2.2 ha in forestland. Most forest fires occurred in the northern and central region of the country. However, the largest fire of 200 ha was registered in the eastern region. The causing agent in most of cases is unknown (60%) natural causes in 5%, negligence in 35% were reported. Arson fires were not detected in 2006. The figures for burnt area and number of fires for the period of 1999-2006 are shown in Figure 15.



(a)



(b)

Figure 15. Burnt areas (a) and numbers of fires (b) in Hungary from 1999 to 2006.

(Source: State Forest Service, Hungary)

### 2.2.8. Latvia

With a total of 1 929 forest fires compared to 365 in 2005, for Latvia the year 2006 was the worst ever recorded (Figure 16). The total burned area is 3 790 ha, compared to 120 ha in 2005. In forest-covered lands the burned area is 3 387 ha, of which 564 ha are young stands. The situation developed like this because of prolonged drought in late April and early May, and again in June and July.

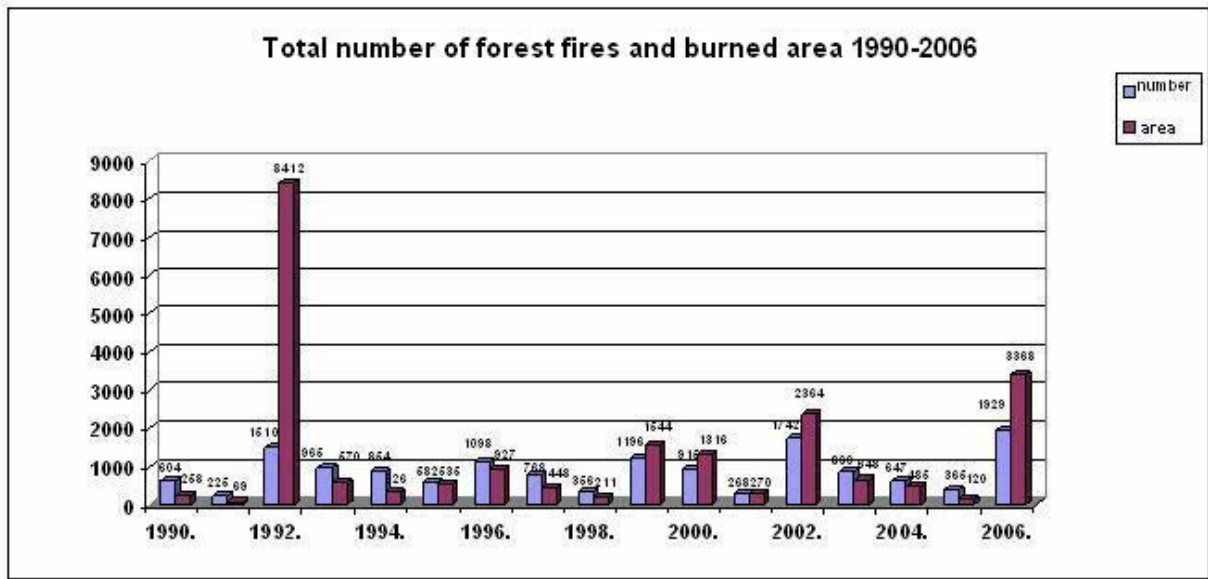


Figure 16. Total number of fires and burned area in Latvia from 1990 to 2006.

As usually, the highest number of forest fires (577 cases) falls onto the densely populated areas around the city of Riga, followed by the area around Daugavpils (379 cases), which is one of the biggest cities in eastern Latvia.

In 2006, the average burned area per forest fire is 1.96 ha, which is the highest figure for the past ten years (Figure 17).

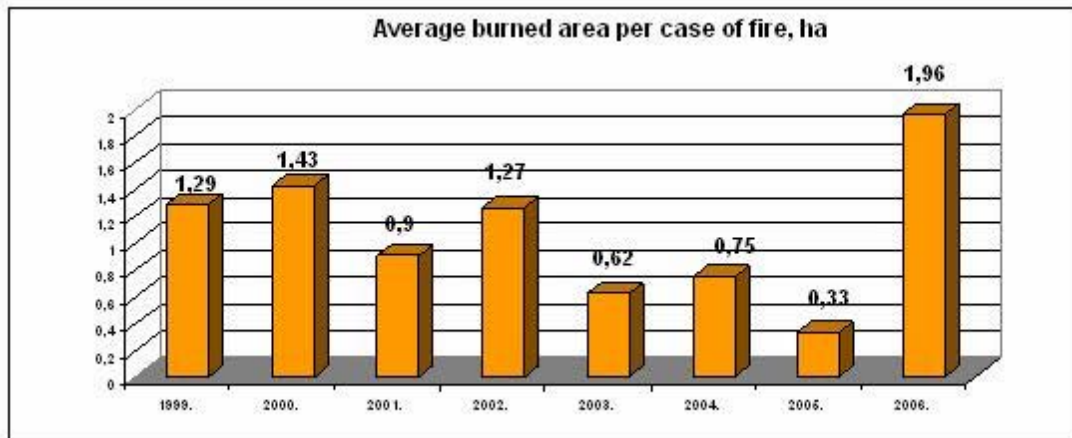


Figure 17. Average burned area size in Latvia from 1999 to 2006.

Regardless of the difficult fire season, in 76% of cases the SFS staff managed to put the fire out before the burned area had reached 1 ha. Normally this index is 85 – 90%. In putting the biggest fires under control involved were also the State Fire and Rescue Service of the Ministry of Interior and the National Armed Forces with MI-8 helicopter equipped with 2.5 t Bambi Bucket. The helicopter has also participated in fire suppressing activities in Lithuania and Estonia.

To improve the system of fire detection and renovate the fire engine fleet, in 2006 the SFS, by using the European Agricultural Guidance and Guarantee Fund, built 10 fire look-out towers and procured 58 4x4 drive Ford Ranger pick-up trucks equipped with 400 l water tanks and 50l/min/40bar high pressure pumps.



(Source: State Forest Service, Latvia)

### 2.2.9. Lithuania

The 2006 fire season was extremely hard due to hot dry weather in the early spring and drought in the summer.

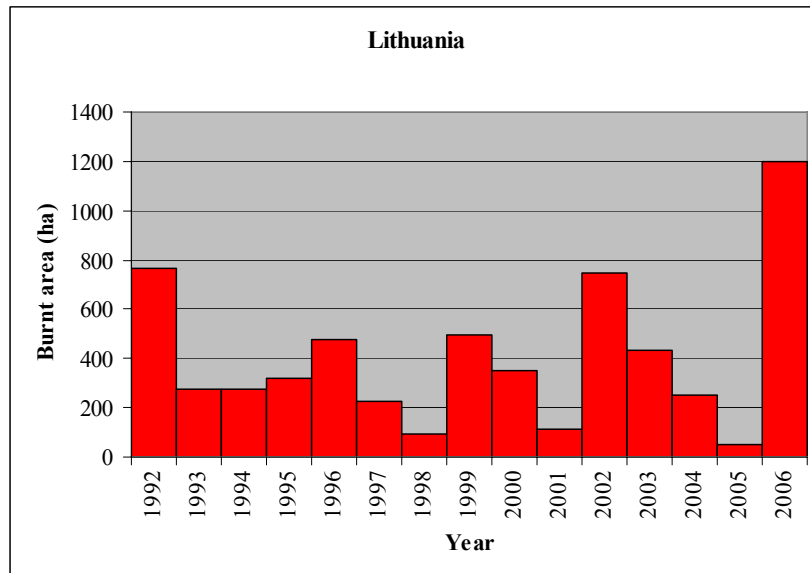
In 2006, according to the data of the Directorate General of State Forests, 1 545 forest fires occurred and damaged 1 199 ha of forest (Figure 18). The number of fires is more than double and burnt area is more than three times higher than the previous years' annual average. The total damage was estimated to be 530 000 Euro. Average burnt area was approx 0.78 ha. The burned forest land area in 2006 is the largest during the last 15 years and the number of fires was higher only in 2002. The yearly trends in terms of number of fires and burnt area during the last 15 years in Lithuania are shown in the Figure below.

Most of the fires (72 %) occurred during the April-May when burned 78 % of all burned forest area. The dominating cause of fires in April (74 %) was thoughtless grass burning. Because of the grass burning on the outskirts of the forest, 51 fires broke out with burnt area of size equal or greater than 1 ha.

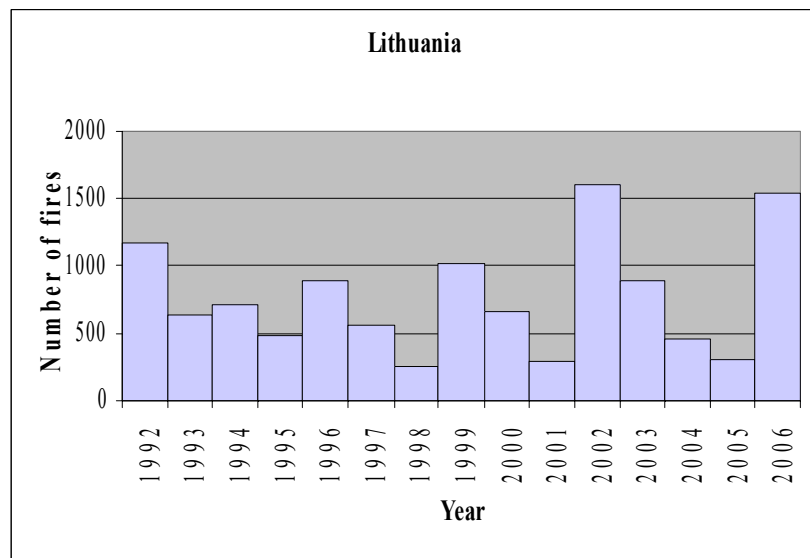
The largest forest fire has occurred in the Curonian Spit, the area protected by UNESCO. There fire destroyed 236 ha of the forest in the course of 5 days. The fire broke out on the 4th of May, when in time of few hours 150 hectares of *Pinus mugo* forest were already in flames. More than 200 fire-fighters with 19 water tanks, servicemen and local residents were involved in fire extinguishing efforts. Two Lithuanian Air Force helicopters Mi-8 with special water tanks were also involved in the fire-fighting. The Latvian State Fire and Rescue Service sent one more helicopter with a water tank to suppress the fire. That was the largest fire in Lithuania during the recent years. A decade ago, 60 hectares of forest burned during a fire in the Curonian Spit.

The analysis of forest fires causes shows, that camping caused fires dominates with number of 726 and 379 ha burnt area (50.3 %). The second most important cause was grass burning – 560 forest fires with 387 ha burned area (38.7 %). Other causes, i.e. forest practices, power lines and other caused 11 % of forest fires.

No casualties were reported in Lithuania during the fire season of 2006.



(a)



(b)

Figure 18. Historical development of forest fires in Lithuania.

(Source: Forests department, Ministry of Environment, Lithuania)

### 2.2.10. Poland

#### The occurrence of forest fires in Poland in the period 2005-2006

Fire situation in the period 2005-2006 was developed primarily under effects of meteorological conditions which caused that 12 803 forest fires occurred in Poland in 2005, and 12 484 in 2006. In 2005 the number of forest fires accounted for 177% of the forest fires total of the previous year 2004 (i.e. almost by 6 thousand more according to modernized data) and almost threefold as much as in 2001 when a small number of fires occurred. Their number presented the highest value after 2003 (17 088), exceeding for the fourth time the number of 11 thousand, and for the sixth time that of 10 thousand, and by 62% the 1990 mean (7 908), and by 25% that in the five-year period (2000-2004). In 2006, the number of fires (11 207) was close to that in 2000, and 2005, thus exceeding 10 thousand for the seventh time (previously in 1992, 1994, 2000, 2002, 2003 and 2005).

The largest number of forest fires (Figure 19) occurred in the Mazovian Province (NUTS•=2) in both 2005 (3 694, i.e. 29%), and 2006 (2 975, i.e. 24%) with more than twofold increase when compared to

the preceding year. About 1.4 thousand fires occurred in 2006 in Lubuskie (NUTS=8) (11%) and 1.2 thousand fires in 2005 in Łódzkie Provinces (NUTS=10) (9%). Moreover, each of about 700-900 fires occurred in 2005 in the Lubuskie (NUTS=8), Kujawy-Pomeranian (NUTS=4), Silesian (NUTS=24), Świętokrzyskie (NUTS=26) (7% each), and Wielkopolskie (NUTS=30) (6%), and in 2006 in Łódzkie (NUTS=10), Świętokrzyskie (NUTS=26) (7%), Wielkopolskie (NUTS=30), Lubelskie (NUTS=6), and Lower-Silesian (NUTS=2) (6%) Provinces. The smallest number of fires (1%) occurred in 2006 in the Opolskie (NUTS=16) (191) and Małopolskie (NUTS=12) Provinces (219), and in 2005, in the Opolskie (NUTS=16), Małopolskie (NUTS=12) and Warmian-Masurian (NUTS=28) Provinces (261, 279 and 282).

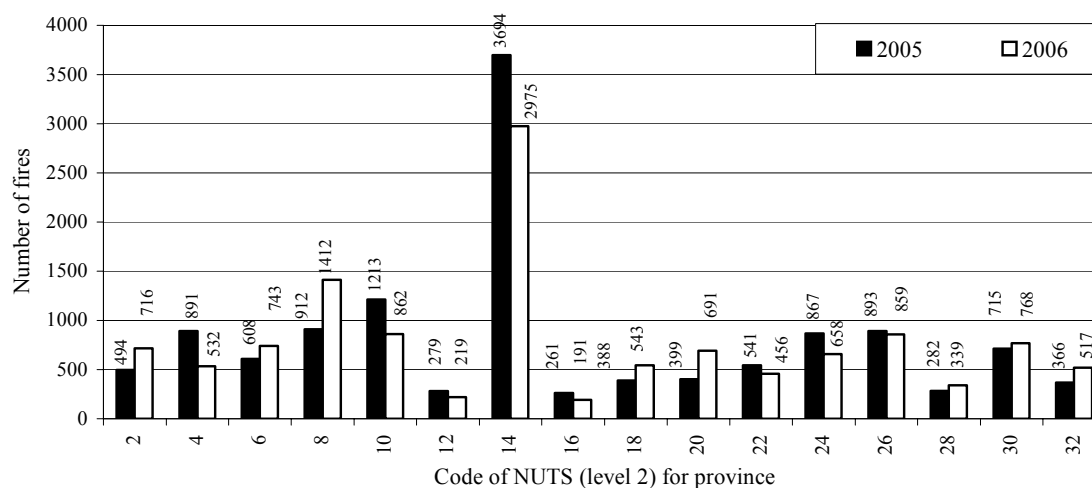


Figure 19. Distribution of number of forest fires by province (code of NUTS on level 2) in 2005 and 2006 in Poland.

Figure 20 illustrates distribution of the forest fires occurrences throughout the national territory by Province and months of the forest fire hazard season (1 April – 30 September). In 2005, the central and western regions of Poland were the most "firing" areas during that period, including the Mazovian (NUTS=14) (26%), Łódzkie (NUTS=10) (10.5%), Lubuskie (NUTS=8) (8%), and Kujawy-Pomeranian (NUTS=4) (7.6%) and Silesian (NUTS=24) (7.2%) Provinces. In 2006, more than 21% of the total number of fires occurred in that season in the Mazovian (NUTS=14) Province, including also large numbers in the Lubuskie (NUTS=8) (11.5%), Świętokrzyskie (NUTS=26) (7.7%), and Łódzkie (11%) Provinces. In most Provinces, the peaks of the forest fires occurrences appeared in April and July 2005. In 2006, such peaks appeared in May, in the Małopolskie (NUTS=14) and Warmian-Masurian (NUTS=28) Provinces.

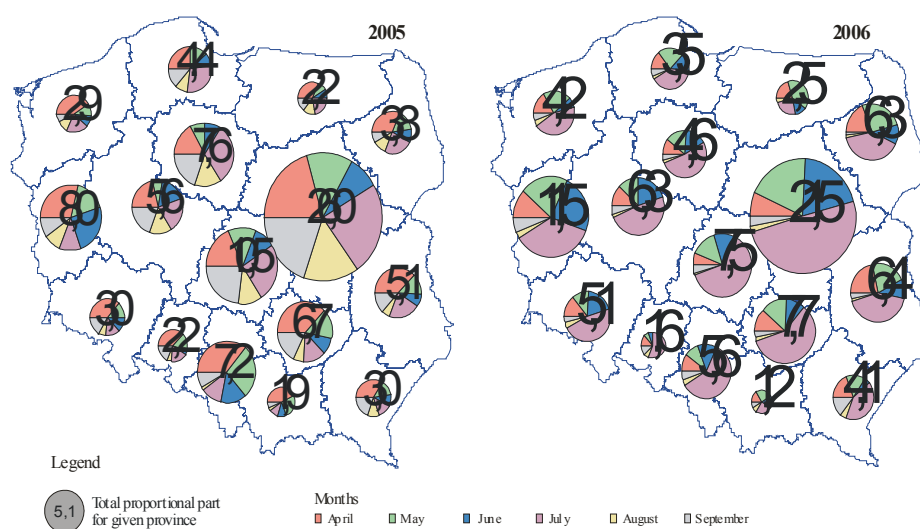


Figure 20. Proportional distribution of forest fires by province and month 1 April – 30 September) in Poland.



When summed-up throughout Poland, the distribution of the forest fires occurrences in particular months (Figure 21) showed their maximum in July 2006 (5 780, i.e. 46% of total fires per annum). In July, more fires occurred than in the period between April and the end of June (5 405). The daily number of fires reached 200 in that time. April 2005 ranked as the second month with the largest number of forest fires (3 311, i.e. 26%), and the subsequent ones in line were July 2005 (2 375, i.e. 19%) and May 2006 (2 142, i.e. 17%). In 2006, a considerable number of fires occurred also in June (14%, i.e. 1 728) and in September 2005 - (14%, i.e. 1 842). The smallest number of fires during the fire season occurred in August 2006 (2%), and too in August 2005 (7%), whereas in January-February 2006 – the lowest as for the whole year (0.1%).

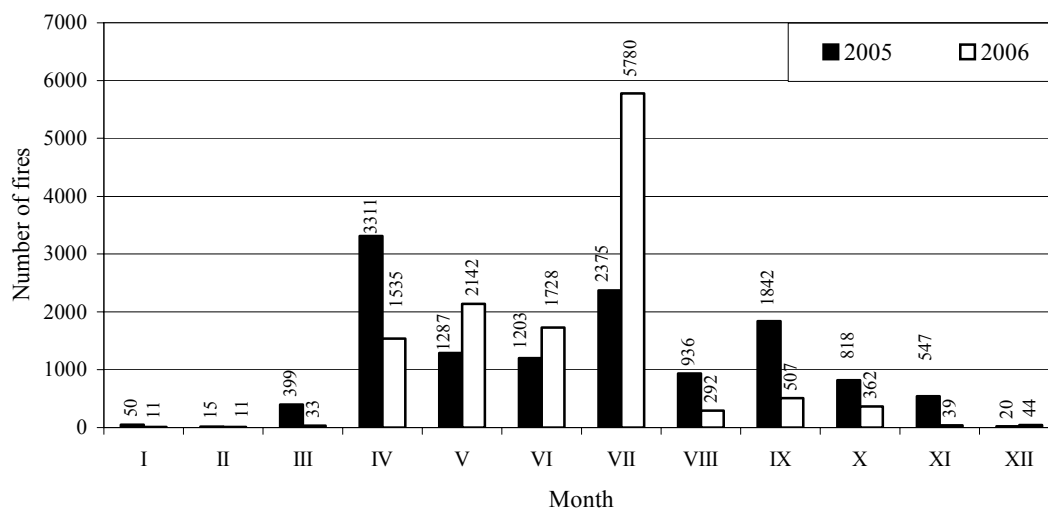


Figure 21. Distribution of number of forest fires by months in 2005 and 2006 in Poland

In the period 1994-2006 (Table 14), between about 4.5 thousand and more than 17 thousand forest fires occurred annually. The mean values for the recent 5-year periods (Table 15) speak for their increasing trend.

Table 14. Forest Fire database for Poland in the period 1994-2006

Year	Number of Forest Fires	Burned Area [ha]	Forest Fires Average Area [ha]
1994	10 710	9 171	0.86
1995	7 681	5 306	0.69
1996	7 924	14 120	1.78
1997	6 818	6 598	0.97
1998	6 166	4 019	0.65
1999	9 820	8 307	0.85
2000	12 428	7 013	0.56
2001	4 480	3 429	0.77
2002	10 101	5 593	0.55
2003	17 088	28 554	1.67
2004	7 219	4 338	0.60
2005	12 803	7 387	0.58
2006	12 484	7 867	0.63
Year Average			
1996-2000	8 631	8 011	0.93
2001-2005	10 338	9 860	0.95

The numbers of forest fires in the areas managed by the State Forests (4 501) in 2005 and (4 726) in 2006 were closed to that in 1996 and 1999 (4 546 and 4 533), and to the 5-year (2000-2004) mean (4720). Their share in the total national number of fires accounted for 35% (likewise in 2002 – 37%), and in 2006 for 38%.

Table 15. Statistical data of fires in high forest in Poland in the period 1981-2006.

Period	Average						State Forest Fires (% of Total)	
	No. of Forest Fires		Burned Area [ha]		Fire size [ha]		No. of Fires	Burned Area
	Total	SF	Total	SF	Total	SF		
The Five-Year-Periods								
1981-1985	2 799	2 627	4 469	3 871	1.60	1.47	94	87
1986-1990	3 419	3 001	4 389	3 603	1.28	1.20	88	82
1991-1995	8 520	5 206	13 818	8 673	1.65	1.67	61	63
1996-2000	8 631	4 232	8 011	2 500	0.93	0.59	49	31
The Last Five-Year-Periods								
1997-2001	7 942	3 732	5 873	1 574	0.74	0.42	47	27
1998-2002	8 599	3 759	5 672	1 376	0.66	0.37	44	24
1999-2003	10 783	4 720	10 579	1 923	0.98	0.41	44	18
2000-2004	10 263	4 502	9 785	1 762	0.95	0.39	44	18
2001-2005	10 338	4 392	9 860	1 648	0.95	0.38	42	17
2002-2006	11 939	4 928	10 748	1 761	0.90	0.36	41	16
The Ten-Year-Periods								
1981-1990	3 109	2 814	4 429	3 737	1.42	1.33	91	84
1989-1998	7 279	4 584	10 616	6 242	1.46	1.36	63	59
1990-1999	7 908	4 628	10 947	5 913	1.38	1.28	59	54
1991-2000	8 575	4 719	10 915	5 587	1.27	1.18	55	51
The Last Ten-Year-Periods								
1992-2001	8 671	4 623	11 001	5 444	1.27	1.18	53	49
1993-2002	8 495	4 068	7 185	2 229	0.85	0.55	48	31
1994-2003	9 322	4 447	9 211	2 279	0.99	0.51	48	25
1995-2004	8 973	4 276	8 728	2 129	0.97	0.50	48	24
1996-2005	9 485	4 312	8 936	2 074	0.94	0.48	45	23
1997-2006	9 941	4 330	8 611	1 668	0.84	0.39	44	20

The fires, which break out in non-State owned forest areas, have been still prevailing. In 2005, their number amounted to 8 302 that accounts for 94% of fires in 2003. That number was about twofold as much as the multi-year mean, thus accounting for 188% of the 1996-2000 mean (4 399), and 160% of the 1996-2005 mean (5 173). In 2006, the number of fires amounted to 7 758 e.g. little more as in 2000, and twofold as the multi-year mean 1991-2000 (3 856).

The total forest area burnt (in the period 1994-2006) amounted from 3.4 thousand ha up-to 28.5 thousand ha, whereas the annual mean was about 8 thousand ha (Table 14). During the recent four 5-year periods (1999-2003, 2000-2004, 2001-2005 and 2002-2006 – Table 15), the fires burned out 10 thousand ha area (whereas in the earlier periods it was 6 thousand ha), on average. In 2005, forests were burned out in the area total smaller by 25-31% of the aforementioned multi-year means (7 387 ha), including 1 197 ha in the State Forests (29% of that in 2003). In 2006, 7 687 ha forest area was burned out, including 1 250 ha in the State Forests.

The distribution of the fires occurrence by the magnitude of the area burnt is presented in Figure 22 showing that small fires were prevailing, i.e. smaller than 1 ha. Small forest fires accounted for 89% in 2005, and 90% in 2006. Medium fires (1-10 ha) occurred in 11% in 2005 and 10% in 2006. Large size fires were 26 and 58, respectively, i.e. below 1%. Only one fire considered very large occurred (> 100 ha).

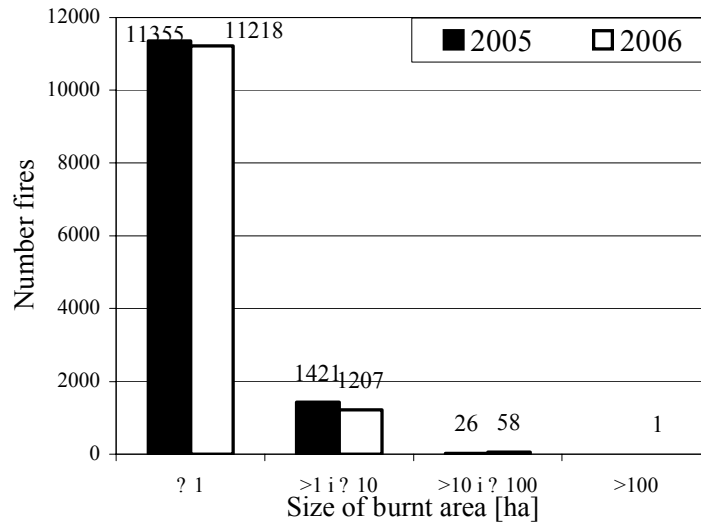


Figure 22. Distribution of number of forest fires by size of burnt area in year 2005 and 2006 in Poland.

Comparison of the mean values for the recent two 5-year periods (1996-2000 and 2001-2005) as regards forest fires (Table 14) indicates an increase in terms of both their number (for their total by 20%) and area burnt (by 23%). The numbers of forest fires, in both 2005 and 2006 was larger than those in the recent two 5-year periods. They increased by 77% (2005) and 73% (2006) when compared to that of 2004. The area burnt by forest fires in 2005 and 2006 (7 387 and 7 867 ha) was close to that of 1990 value (7 341 ha) and slightly lower than the recent two periods (8 011 and 9 749 ha, respectively). The shares of forest areas affected in 2005 and 2006 by fires in those managed by the State Forests, amongst the total areas burnt domestically, dropped to 16% (the minimum amounted so far to 15% in 2003). The mean area of single fire in forests, by all ownership types, diminished almost twofold in 2005 (to 0.55 ha) and in 2006 (to 0.67 ha) when compared to that of 2003 and was similar to that in 2000 and 2001 (0.59 and 0.74 ha, respectively), and in the 5-year period 1998-2002 (0.66 ha). In the State Forests, it reached value 0.27 ha in 2005 and 2006, and was the lowest one ever noted being close to that in 2004 (0.29 ha). In non-State owned forests it amounted to 0.75 ha in 2005 (while ranking as third among the lowest values noted from 1991), and it amounted to 0.94 ha in 2006. In 2005-2006, intentional arsons were the predominating cause for forest fires (Figure 23) amounting to more than 53 and 47%. Either type of anthropogenic negligence (carelessness) ranked as the second as the cause for fires, in terms of their magnitude, that contributed to forest fires in 39% (2005) and 43% (2006). Carelessness in open fire use was the most significant among such incidents (33-35%). Natural causes, i.e. atmospheric discharges were the cause for forest fires in only 0.3-0.5% of the incidents. Non-identified causes accounted for the level of 7-8%.

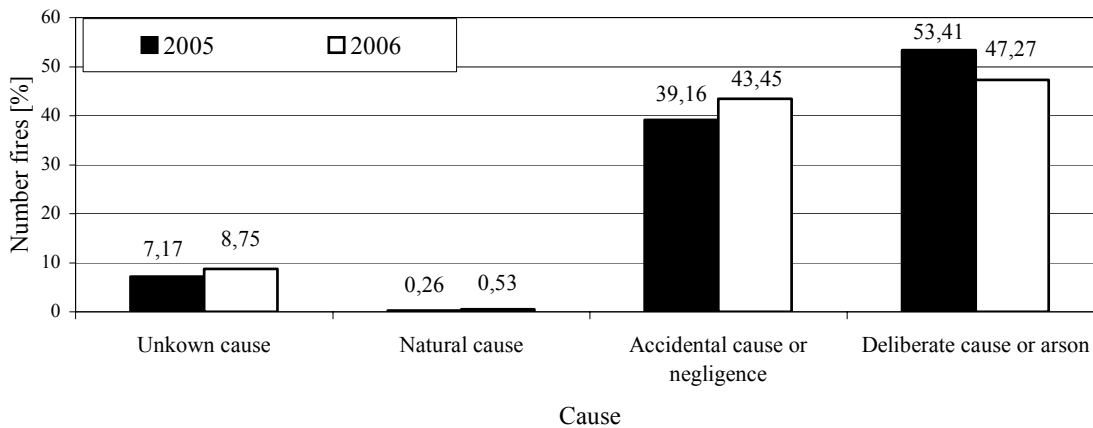


Figure 23. Distribution of number of forest fires by causes in 2005 and 2006 in Poland.

### Losses and Damage Caused by Fires

The magnitude of losses caused by fires in particular in the 1994–2006 period is shown in Table 16. The total losses presented there amount to about 138 million € during the period under analysis. These losses are clearly differentiated and they range between 11.8 million € in 2001 and 51 million € in 2003. The losses in 2005 were larger than their multi-year means and amounted to 27.2 million €, and in 2006 were below their multi-year mean - 24.1 million €. In case of forest fires, the losses include the value of the stands burned out, whereas those in wasteland are referred to soil.

Table 16. Losses caused by forest fires in the period 1994-2006 in thousand €.

Year / Period	Losses Caused by Forest Fires [thousand €*]
1994	9 776
1995	7 409
1996	15 079
1997	9 138
1998	5 949
1999	12 584
2000	8 893
2001	3 797
2002	5 432
2003	27 962
2004	3 467
2005	13 694
2006	14 786
1994-2006	138 006
1996-2000	51 683
2001-2005	54 351
Year Average	
1996-2000	10 337
2001-2005	10 870

The average value of one ha forest area as calculated in Poland is 8 202 €. The original values of (high) forests only in the area affected by fires in 2005 and 2006 were 61 million € and 62 million €, respectively. The values of direct losses in those forests are estimated at 13.7 million € and 14.8 million €, that accounted for 23% and 24% of their original values, respectively.

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

#### **2.2.11. Slovenia**

In 2006, there were 112 forest fires resulting in 1420 ha of burned area. From these fires only 36 were larger than 1 ha and 1 fire was larger than 500 ha.

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

#### **2.2.12. Slovakia**

There were 237 forest fires in 2006, with the total burned area of 280 ha. The detailed fire event summary for last 5 years is given in Table 17. The fire causes are summarized in Table 18. The burned area and the number of fires for years 1994 – 2006 is provided in Figure 24 and Figure 25.

Table 17. Summary of forest fire events for years 2002-2006 in Slovak Republic.

Year	2002	2003	2004	2005	2006
A. Number of fires	570	852	155	286	237
B. Area burned by type of land (ha)					
1. Forest and other wooded land	595	1567	157	503	281
1.1. High forest					
Mixed	213,59	782,98	34,7	302,44	128,17
(a) Coniferous	227,4	420,4	76,29	121,93	95,67
(b) Non-coniferous	130	350,5	41,58	66,5	29,07
1.2. Coppice and coppice with standards					
1.3. Other wooded land	24,01	13,12	4,23	12,1	27,09
2. Other land (agriculture, pasture land, heathland, etc.)					

Table 18. Summary of forest fire causes for years 2002-2006 in Slovak Republic.

Causes	Number					Area (ha)				
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
A. Basic information:										
Total fires	570	852	155	286	237	595	1567	157	503	280
1. Known causes, of which:										
1.1. Human causes										
(a) Arson	18	31	8	7	8	19,94	96,36	1,18	0,71	0,41
(b) Negligence	525	780	138	261	201	561,5	1414	154,2	49,5	252,06
(see also B. below)										
1.2. Natural causes (lightning)	4	3	1	2	3	0,04	0,13	0,08	0,02	0,06
2. Unknown causes	23	38	8	16	25	13,5	56,68	1,56	7,27	27,54
B. Supplementary information:										
(line A.1.1. (b) above)										
1. Agricultural operations	239	280	38	91	26	328,7	754,8	92,61	140,8	43,38
2. Logging and forest operations	4	2	2		14		33,1	3	0,1	8
3. Other industrial activities	17	12		1	3	4,82	51,18		0,03	7
4. Communications (railways, electricity lines, etc)	2	3	1		2	0,2	0,4	0,5		1,5
5. General public (campers, other visitors, children)	263	475	96	163	191	221,7	552,3	58,07	353,9	220,14
6. Other (military, etc.)	4	6	1	4	1	6,06	22,11	1	0,15	0,05

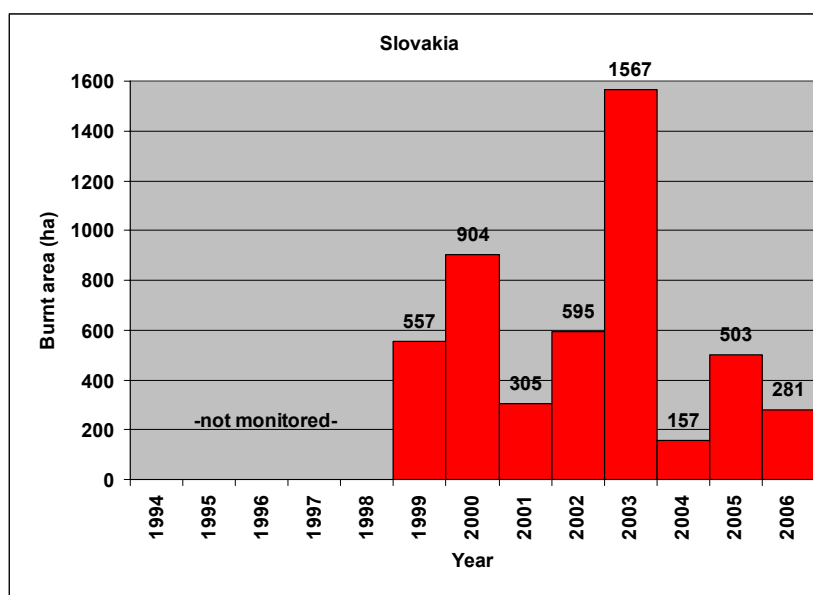


Figure 24. Burnt area from forest fires in Slovakia from 1999 to 2006

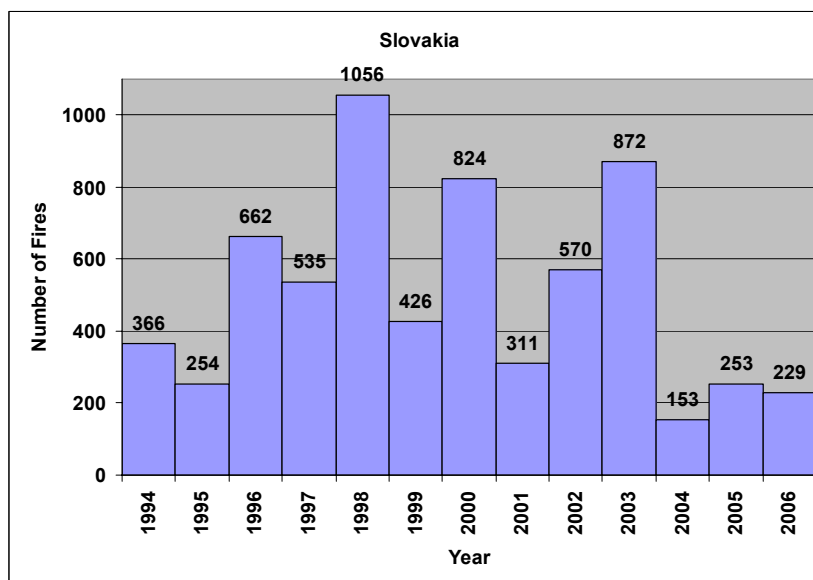


Figure 25. Number of forest fires in Slovakia from 1994 to 2006

Source: Fire Technical and Expertise Institute, Ministry of the Interior of the SR, Bratislava

### 2.2.13. Sweden

The 2006 fire season was very hot and some regions were also very dry. During some months the average temperature was 5° C above the average with only 50- 75% of normal precipitation. There were also long periods with no precipitation.

The forest fires statistics for 2006 are still provisional with some major fires missing (Table 19).

Table 19. Number of fires and burned area by vegetation type (preliminary data).

Vegetation type	No. of Fires	Burned area(ha)
Productive forest (incl. felled area)	762	2 306
Sparse forest	1 755	495
Open terrain	2 197	480
<b>TOTAL</b>	<b>4 617</b>	<b>3 281</b>

The total burned area will probably be around 5600 ha. The following fires are probably not included in the statistics:

Boden – 1500-1900 ha

Älvdalen -probably 300 ha

Jokkmokk - 450 ha (free fire in a national park)

Robertsfors - 150 ha

The biggest fire of the season occurred on the 11 August at Boden and went on for several weeks. Around 1900 ha were affected by this fire or managed firebreaks. There were also a few other big fires (>100 ha) in the north of Sweden. The total area of major fires is estimated to be more than 2500 ha and this is an unusually large proportion of the total area.

(Source: Swedish Rescue services SRSA, Sweden).

## 2.3. Candidate Countries

### 2.3.1. Croatia

In Croatia 3571 forest fires occurred in 2006 burning a total area of 18782 ha. The distribution of fires and burned areas on wooded and non wooded land during each month of 2006 is shown in Table 20. Looking at the fire statistics since year 2000 this was the third lowest year in terms of number of fires and the second lowest year in terms of burned area (Table 21). In terms of fire causes, 12 fires were due to arson, 203 were due to negligence, and 37 are of unknown cause.

Table 20. Distribution of fires and burned areas on wooded and non wooded land

	Month	Number of Fires	Burned Area (ha)
NON WOODDED LAND	I	164	72
	II	312	823
	III	483	7,077
	IV	260	2,684
	V	110	17
	VI	225	353
	VII	747	4,569
	VIII	199	172
	IX	157	61
	X	237	544
	XI	192	375
	XII	233	341
	<b>TOTAL</b>		<b>3,319</b>
WOODED LAND	I	6	3
	II	19	56
	III	53	363
	IV	18	295
	V	3	1
	VI	6	1
	VII	79	706
	VIII	8	32
	IX	6	5
	X	13	17
	XI	17	114
	XII	24	101
	<b>TOTAL</b>		<b>252</b>

Table 21. Forest fires and burned area statistics in Croatia.

	No. Fires	Burned Area/ha
2000	7.797	129.883
2001	4.024	27.251
2002	4.692	74.945
2003	6.923	77.359
2004	2.853	8.988
2005	3.368	21.407
2006	3.571	18.782

Source: National Protection and Rescue Directorate, Croatia

### 2.3.2. Turkey

In Turkey 2227 forest fires occurred in 2006 burning a total area of 7762 ha. From these fires 497 were larger than 1 ha, 10 were larger than 100 ha, and 1 was larger than 500 ha. The area burned in wooded land was 5691 ha against 2071 ha in non wooded land. Compared with the year 2005 both numbers of fires and the burned area have increased. The historical records of burned areas from 1996 to 2006 are given in Table 22.

Table 22. Burned areas from 1996 to 2006 in Turkey.

Year	Burned area (ha)
1996	14992
1997	6316
1998	6764
1999	5804
2000	26353
2001	7394
2002	8523
2003	6644
2004	4876
2005	2821
2006	7762

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

## 2.4. Other European Countries

### 2.4.1. Switzerland

Systematic forest fires data concerning Switzerland are available for four cantons only (Grisons, Uri, Valais and Ticino) covering the greatest part of the Alps and the southern slope of the Alps, where most of fires occur.

The provisional data of 2006 indicate that both the number of fires (45) and the burnt area (96.6 ha) are by far under the long-term (1980-2006) average of 97.6 (number of fires) and 447 (burnt hectares).

As in the few previous years, the trend towards an increase in summer fires (especially July and August) holds on. The percentage of lightning-induced fires in the Alps rose accordingly up to 35% in 2006 (data not shown). Thanks to the good fire fighting organization, the average burnt area per fire is low (2.14 ha). In the last 20 years the average burned area per fire raised over the threshold of 10 ha only in case of special winter-drought years such as 1990, 1997 and partially 2002.

Source: Swiss Federal Institute for Forest, Snow and Landscape Research, Bellinzona



### 3. 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 web mapping interface has been set up on the EFFIS website (<http://effis.jrc.it/Home>) that allows users to access EU wide information about forest fires and other related environmental data through its web mapping interface.

The EFFIS module for the assessment of meteorological forest fire risk is the EFFIS Danger Forecast developed by the JRC (formerly referred to as the European Forest Fire Risk Forecasting System EFFRFS). The module forecasts forest fire danger in Europe on the basis of the Canadian Fire Weather Index (FWI), allowing a harmonized evaluation of the forest fire danger situation during the year. Since 2002 the danger assessment is performed for an extended period of six months and since 2005 for a period of 9 months. Therefore, also in 2006, EFFIS Danger Forecast started to evaluate forest fire danger on 1 February 2006, and ended on 31 October 2006. Forest fire danger 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 Rapid Damage Assessment module. The evaluation focuses mainly on Southern Europe and is based on the analysis of satellite imagery and geographic information. Since 2000 cartography of all the burned areas larger than 50 ha is produced every year through the processing of satellite imagery. The areas affected by fires of at least 50 ha correspond, on average, to 75% of the area burnt in Europe each year. Further to the mapping of burnt areas, the analysis of which types of land cover classes were affected by fires is performed. All the information is stored in a module referred to as the EFFIS Rapid Damage Assessment that replaced the old EFFIS Damage Assessment from 2004 onwards. This module uses MODIS satellite imagery with a ground spatial resolution of about 250 meters. Although initially it was meant to map fires of at least 100 ha it was realized that even fires of 50 ha could be mapped with this system. For this reason EFFIS Damage Assessment was replaced by EFFIS Rapid Damage Assessment since 2005. With this system the evaluation of damages is performed weekly, newsletters are published at least twice during the fire campaign and the final results are included in the yearly report.

Other modules, under development within EFFIS, are looking into other aspects of forest fires such as vegetation regeneration after the fires, estimation of forest fire emissions, and the identification of post-fire risk areas that may be subject to further damages such as soil loss and/or landslides. The results from the estimation of atmospheric emissions is already available in the EFFIS web mapping interface (<http://effis.jrc.it>).

#### 3.1. EFFIS DANGER FORECAST: 2006 RESULTS

The EFFIS Danger Forecast (formerly referred to as 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. Since 2002, at the request of the Member States, operation of the EFFIS Danger Forecast has been extended to six months starting on 1 May and ending on 31 October and in 2006 to nine months, from 1 February to 31 October.

In this chapter the fire danger trends assessed by EFFIS in the different countries during the fire season 2006 are presented, comparing them with previous years.

In the Mediterranean regions, after the anticipated high danger conditions during the month of May in southern France and in southern Spain, further extended towards the end of May / beginning of June to Portugal and western France the build up of the fire season in the western Mediterranean regions stopped along the month of June, decreasing the fire danger level to a normal level for the fire season in the area.

In July the fire danger conditions went on worsening but still following an average trend for the Mediterranean area, with some local peaks, for example in Italy.

During the first half of August extreme conditions were met in the area of Galicia (northwestern Spain) and northern Portugal, with remarkable peaks of fire activity.

The dramatic situation returned under average risk condition for the area towards the end of the month, when some high risk conditions were then met in eastern Greece and Cyprus, conditions that were extended until the first half of September. During the second half of September the risk was recorded as generally low in the Mediterranean region and in October it reached very low values.

In central and northern regions after an unusual increase of the risk level during the first half of May in Northern Europe, fire risk was again reaching alert levels in Finland and the Baltic area in August.

In September the fire weather conditions lowered the risk down to acceptable levels in these areas, while increasing the risk level in central Europe, namely in Slovakia, Hungary, Czech Republic and during the second half of September in Germany and Poland. A similar trend was observed also in October, although with general lower level.

In what follows the graphs of the fire risk trend during 2006 are shown by country. The FWI is used as fire risk indicator. The graphs show the weekly averages of FWI over entire countries, therefore local peaks might have been flattened, especially in those countries such as France or Italy, where there are strong differences in fire risk level with changing latitudes; nevertheless the general trend is depicted providing relevant information about the current year situation.

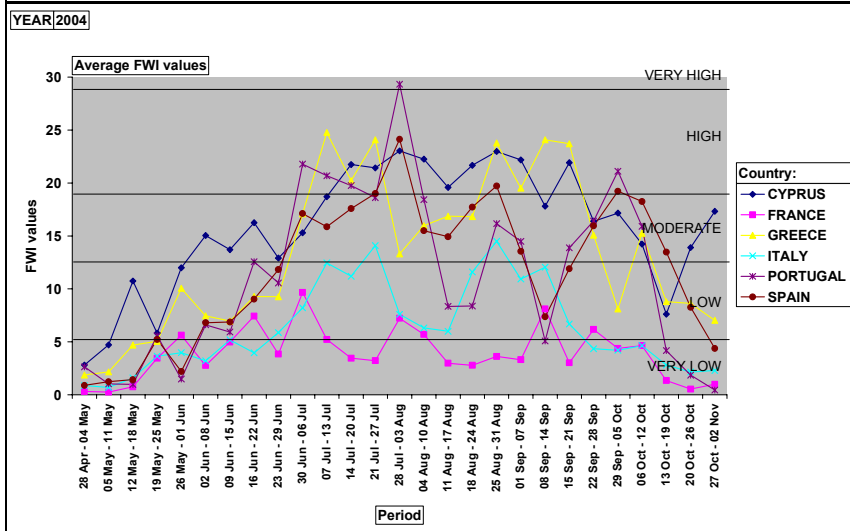
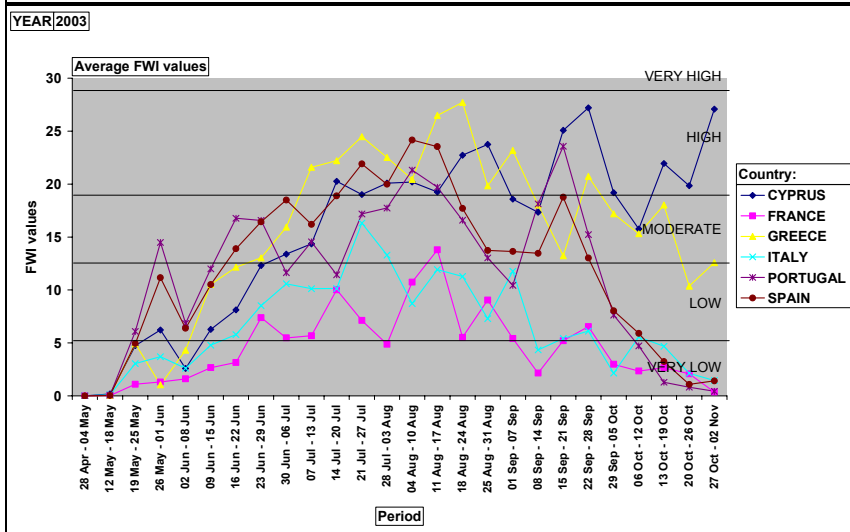
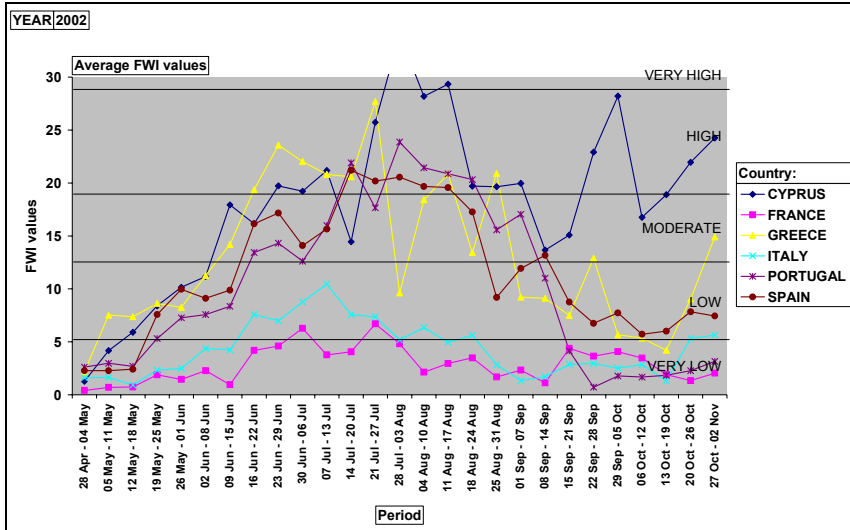
The countries analyzed are those participating to the EFFIS network. For facilitating the reading, they are in separate graphs grouped by (mostly) Mediterranean, Temperate and Boreal Member States. The final graphs are for new EU Member States (Bulgaria and Romania) and EU candidate countries (Croatia and Turkey).

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 and delineated by the horizontal black lines are given on the right.

Figure 26 shows fire danger through 2006 as determined by the average FWI values in the Mediterranean Member States and compares them with the previous four years.

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 27. 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.



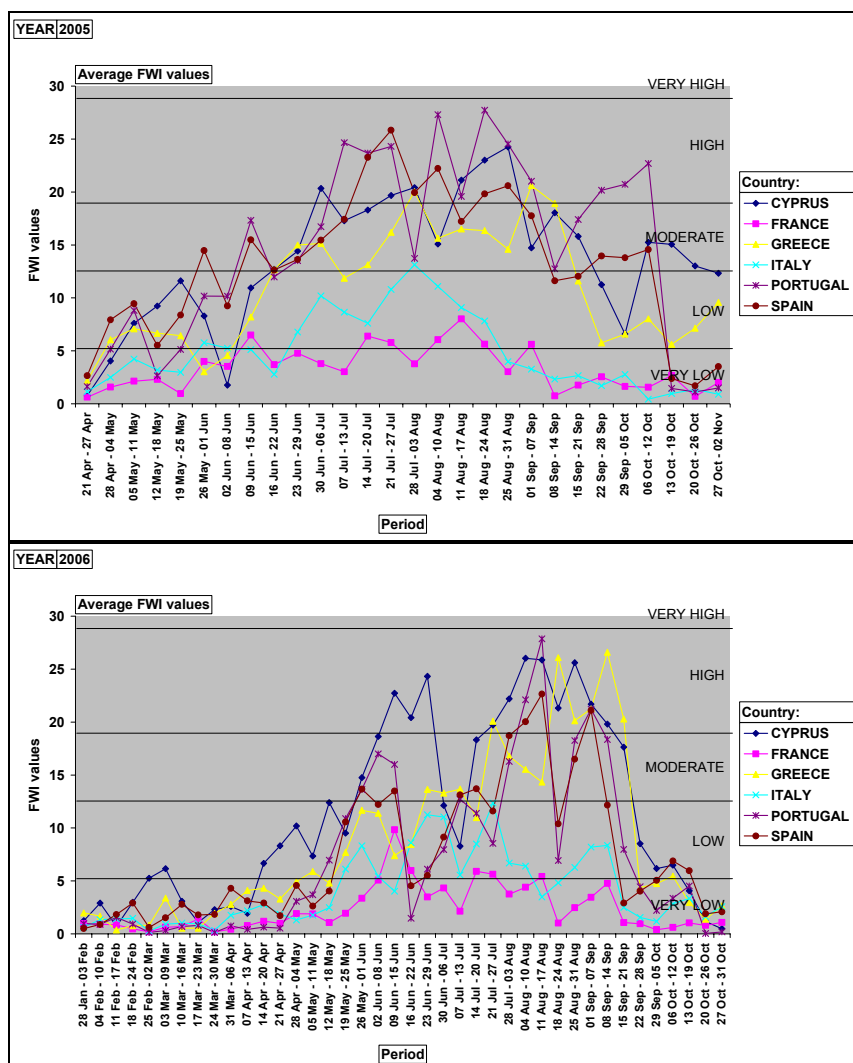


Figure 26. Fire risk trends as determined by the Fire Weather Index (FWI) for the last five years (2002 to 2006) in the EU Mediterranean countries.

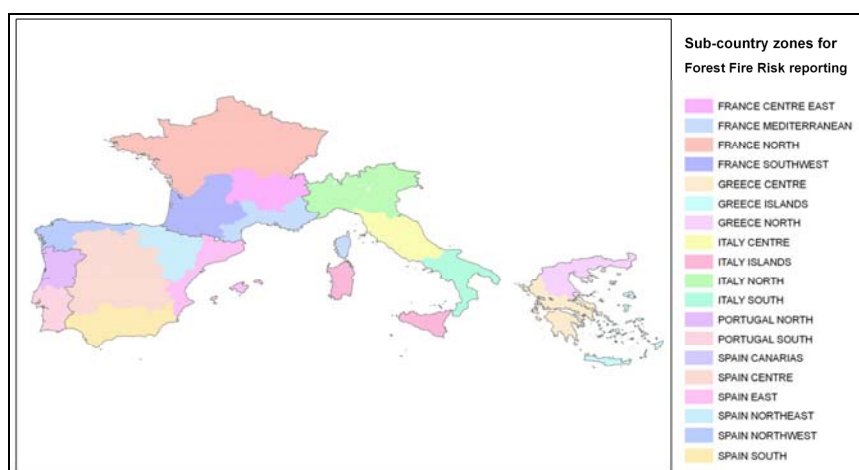


Figure 27. Administrative regions for fire risk reporting at sub-country level.

The following graphs (Figure 28 to Figure 32) show changes in FWI in 2006 (weekly averages) for each country in the sub-regions identified in Figure 27. 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.

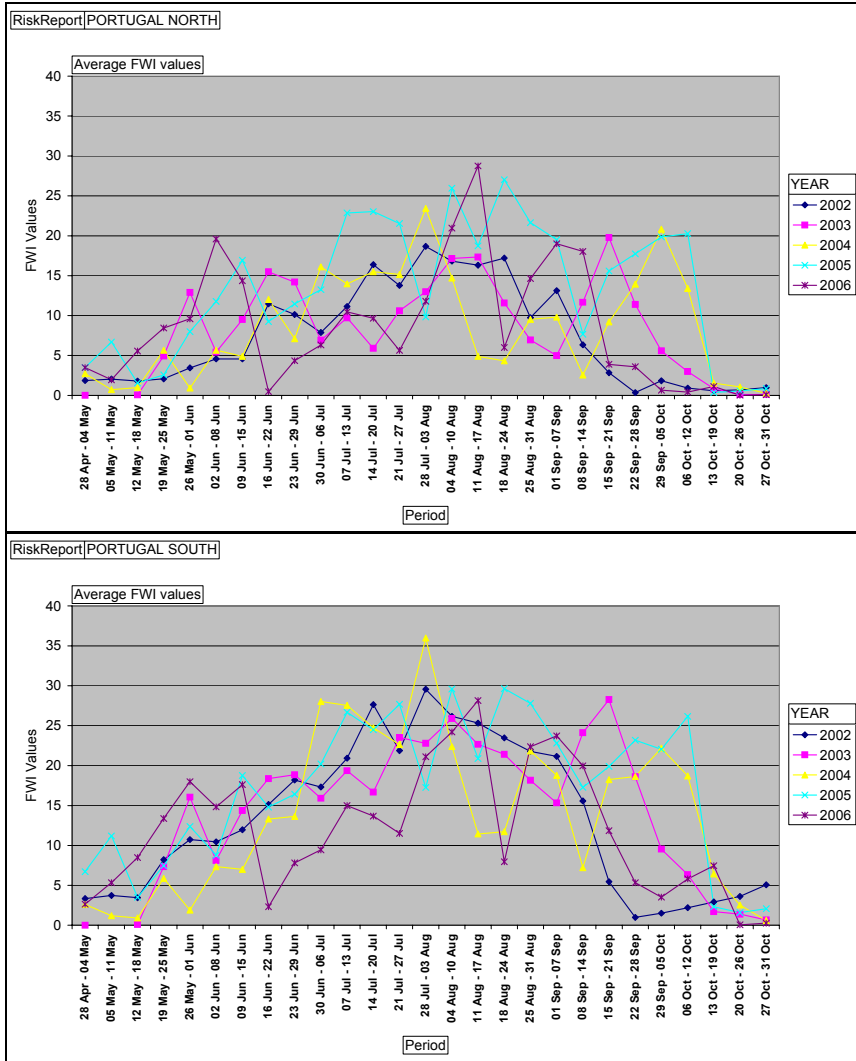
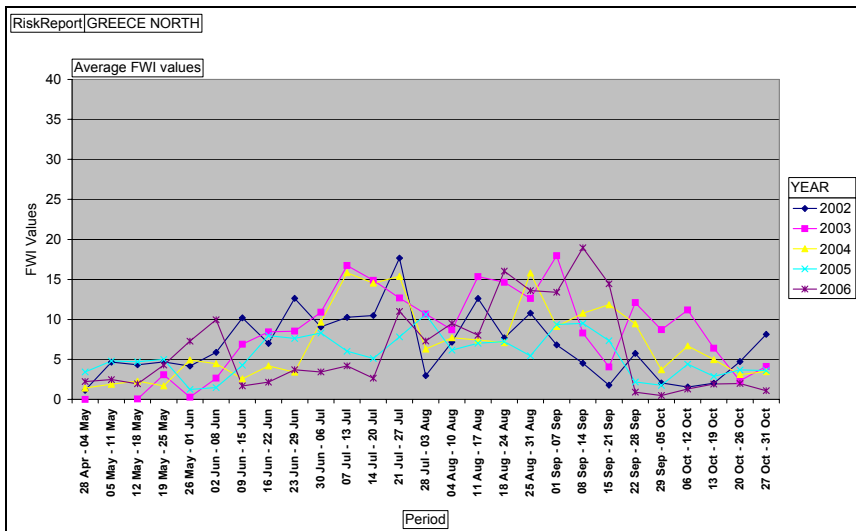


Figure 28. Fire risk trends in the years 2002 to 2006 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal



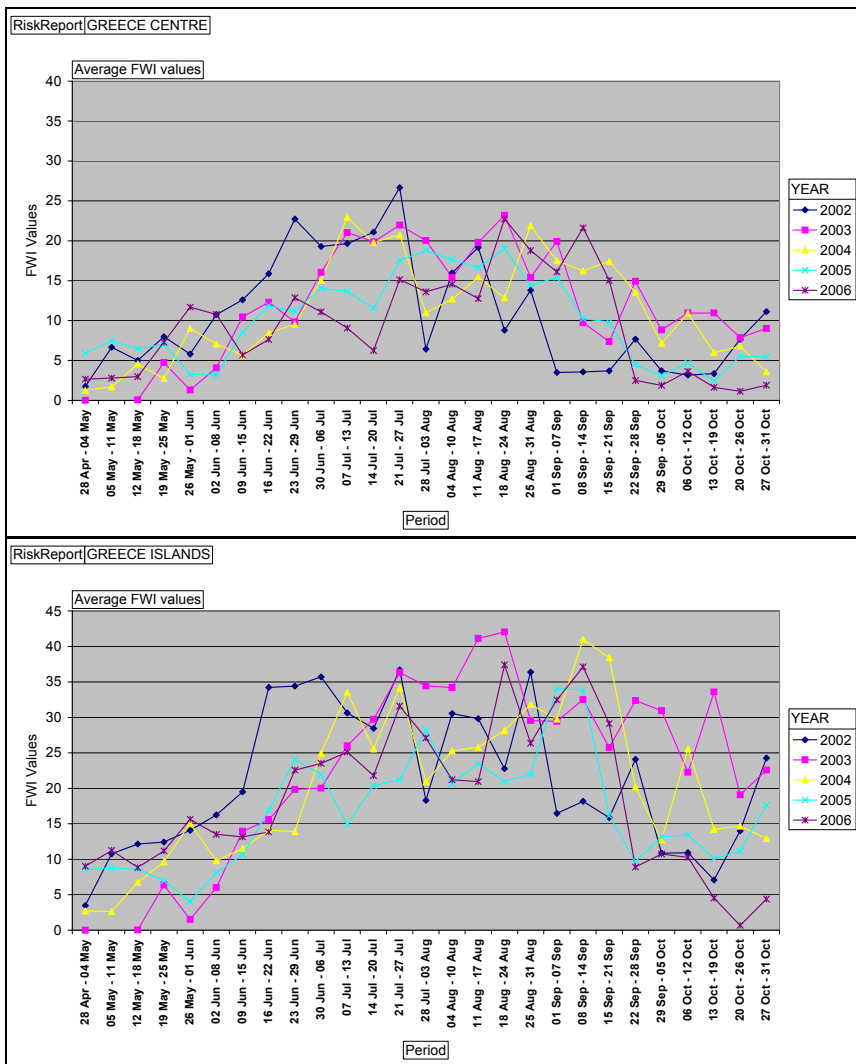
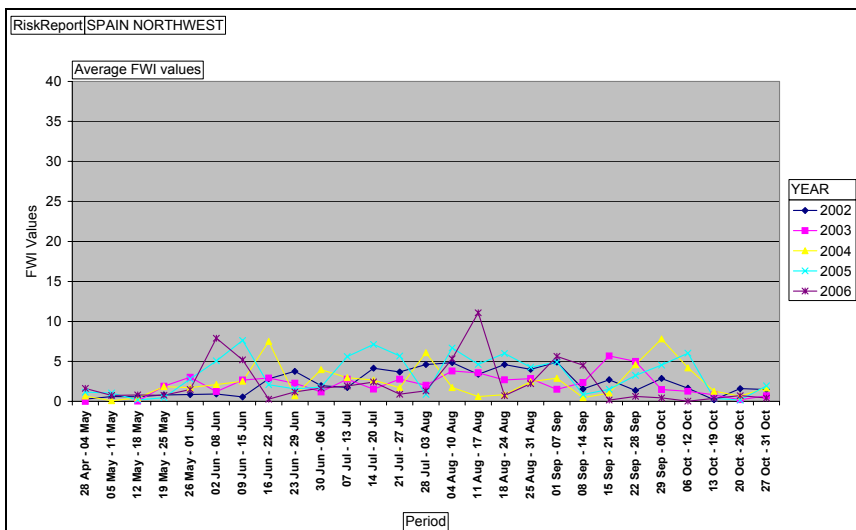
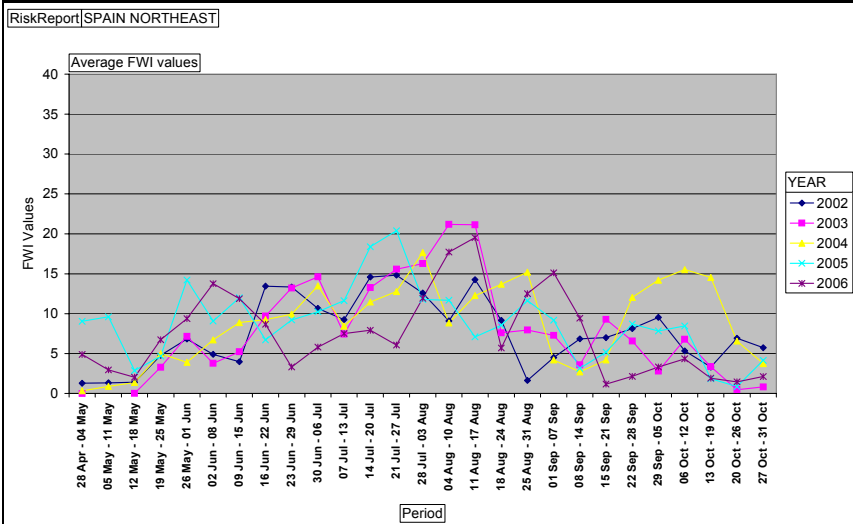
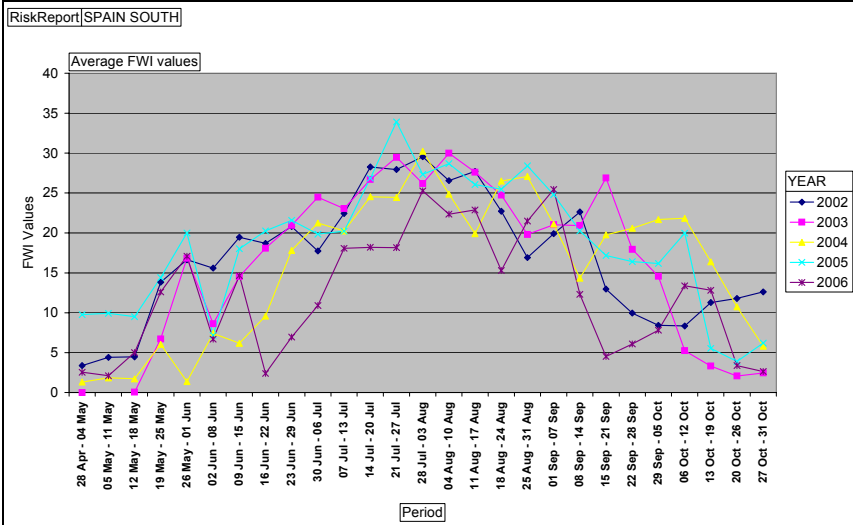
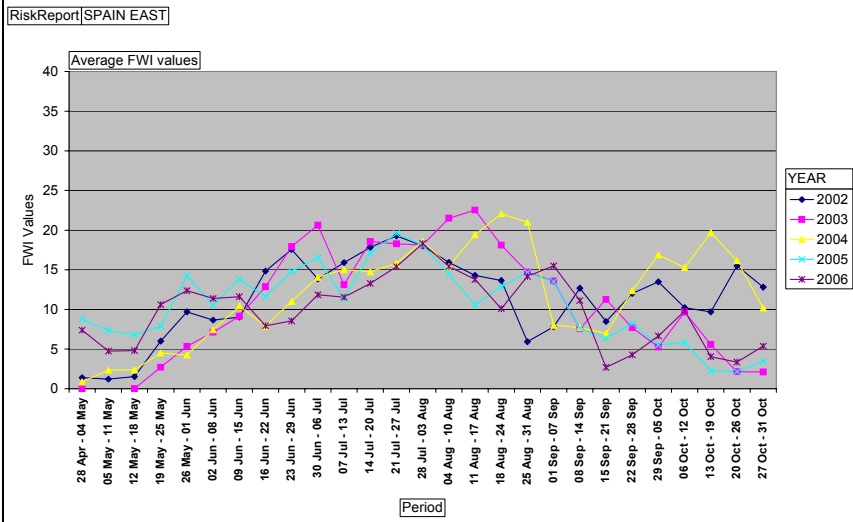


Figure 29. Fire risk trends in the years 2002 to 2006 as determined by the Fire Weather Index (FWI) in the regions identified for Greece





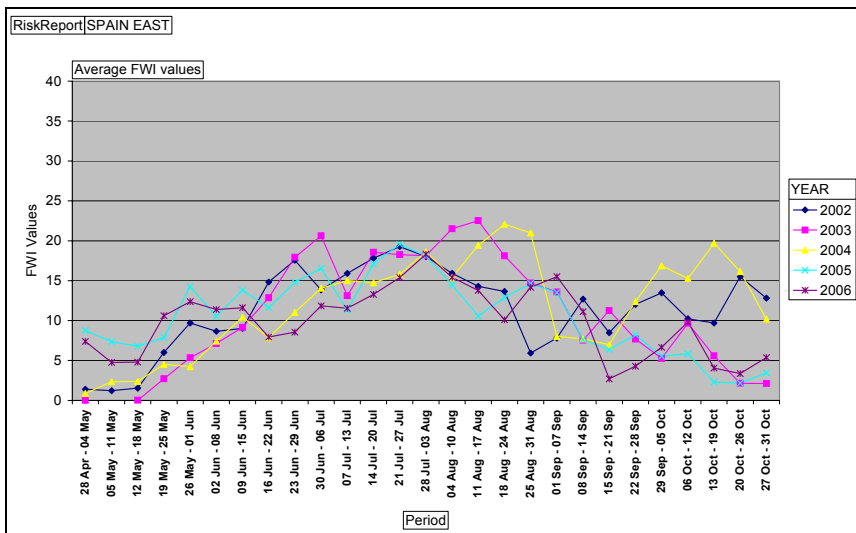
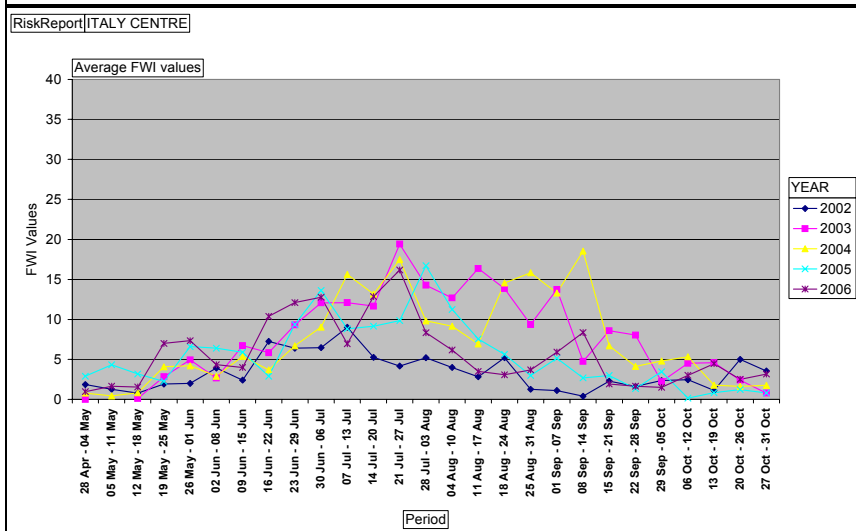
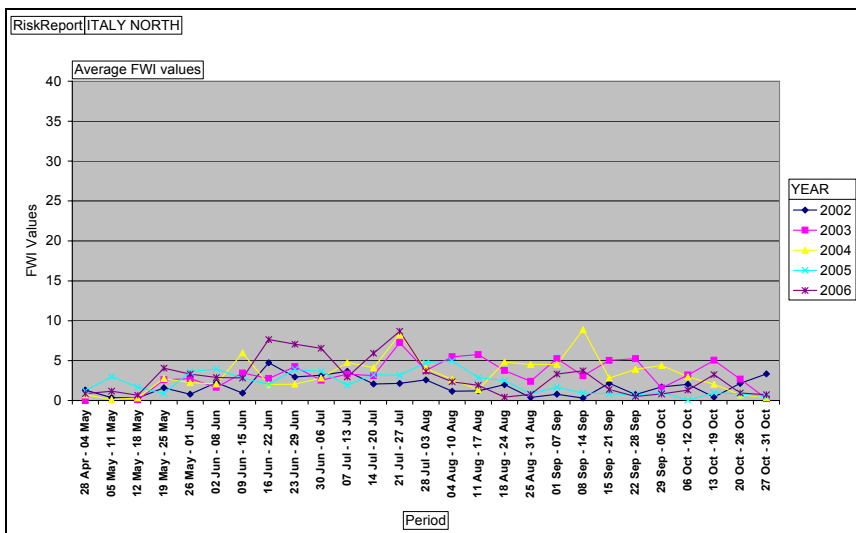


Figure 30. Fire risk trends in the years 2002 to 2006 as determined by the Fire Weather Index (FWI) in the regions identified for Spain





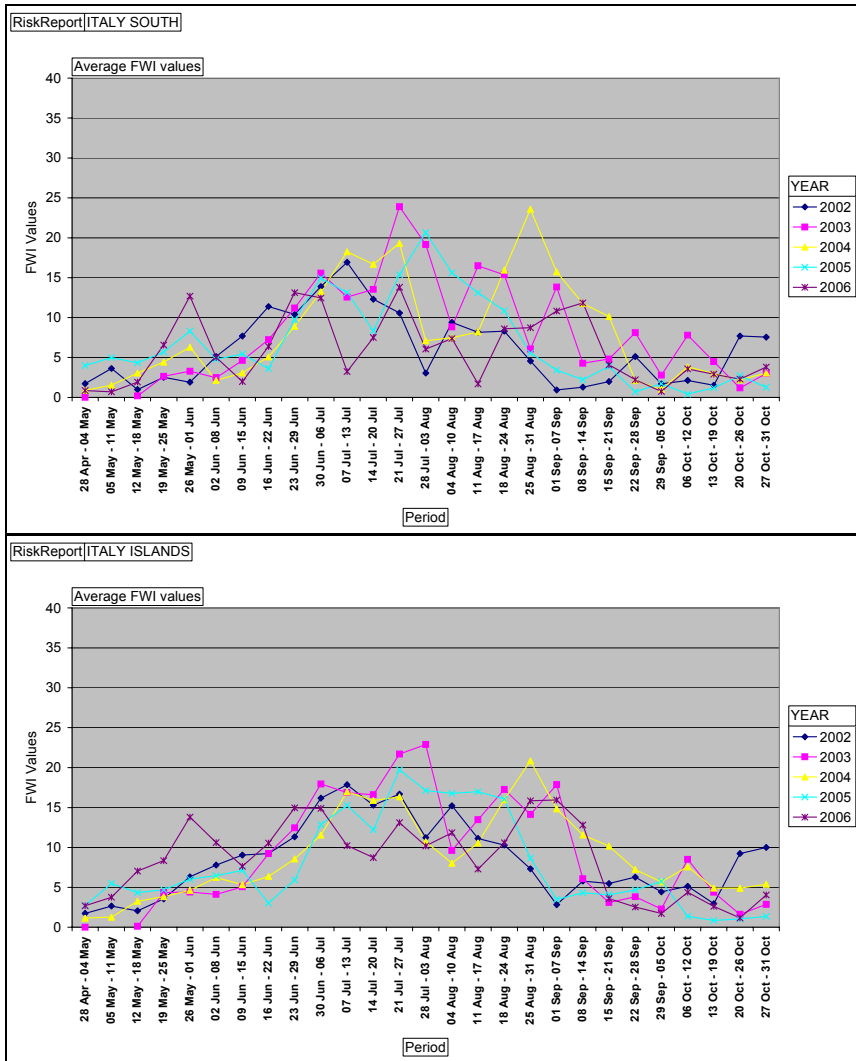
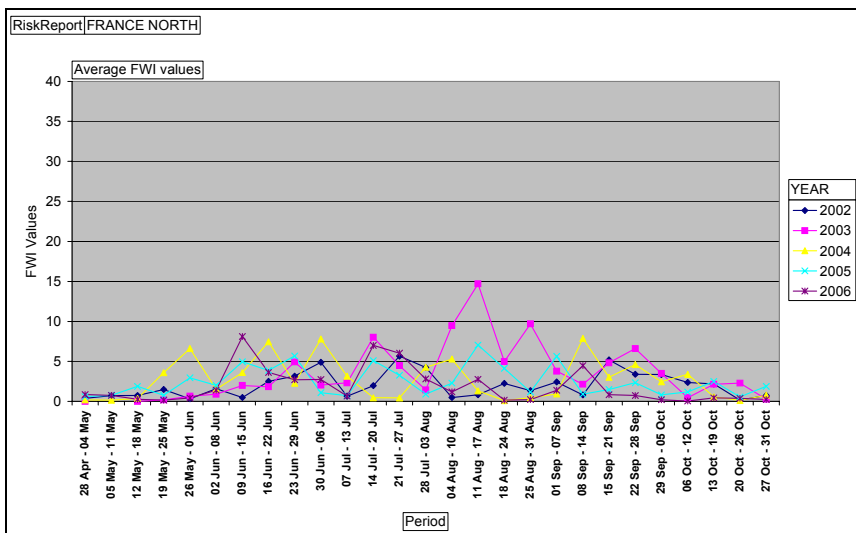


Figure 31. Fire risk trends in the years 2002 to 2006 as determined by the Fire Weather Index (FWI) in the regions identified for Italy



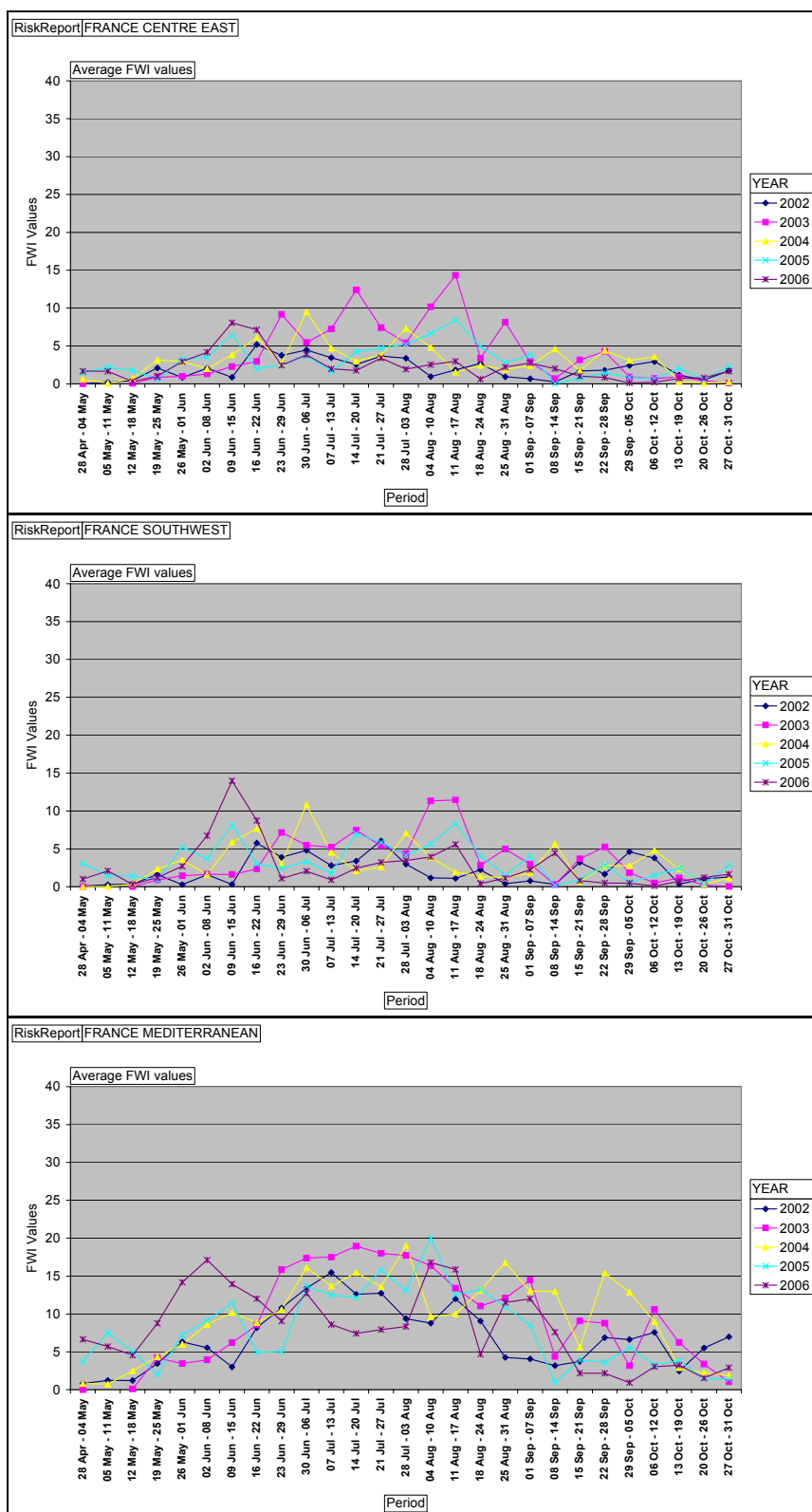
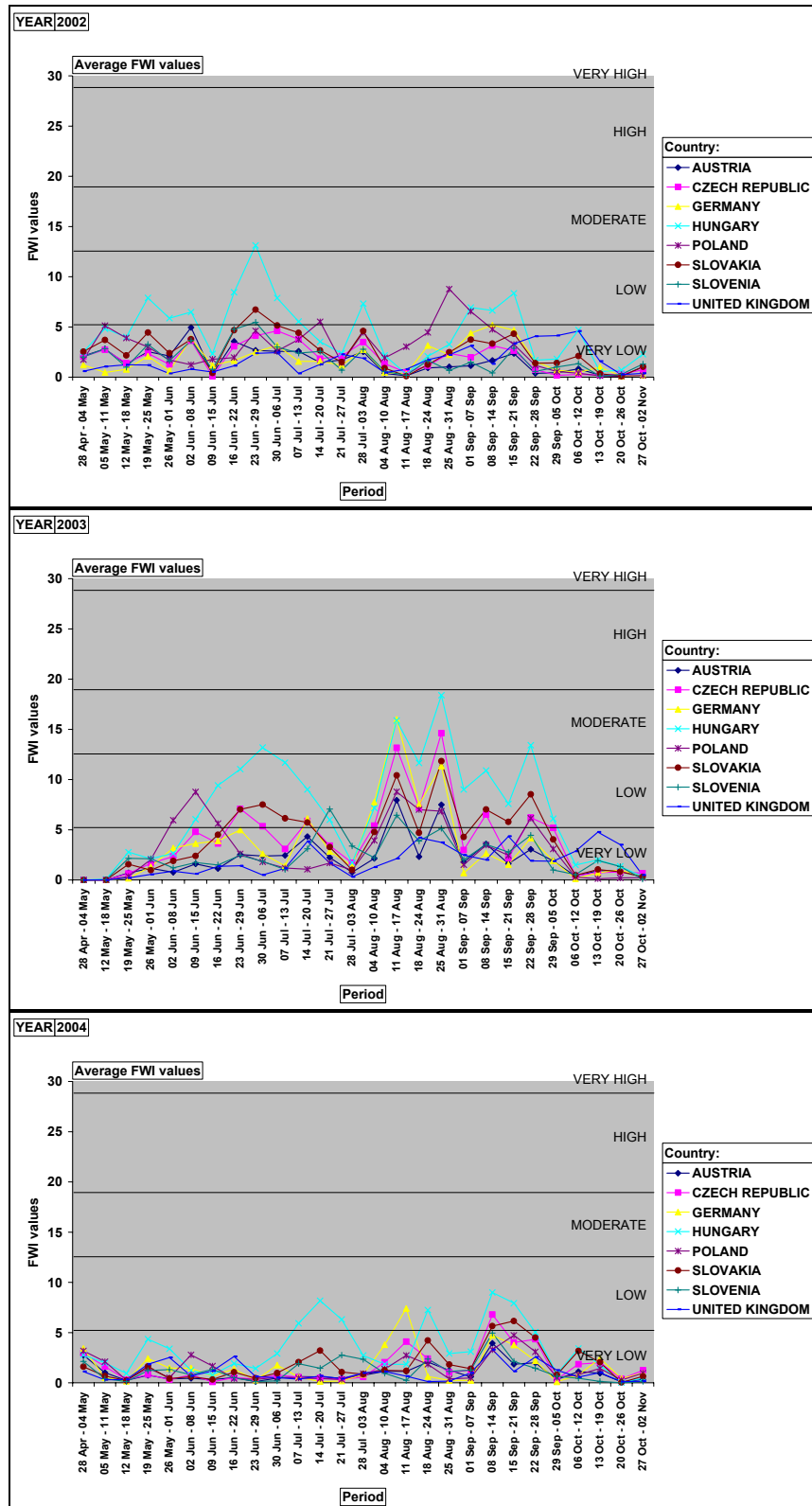


Figure 32. Fire risk trends in the years 2002 to 2006 as determined by the Fire Weather Index (FWI) in the regions identified for France.

Figure 33 shows fire risk trends in 2006 as determined by FWI in some EU temperate countries, while Figure 34 shows trends for some EU boreal countries, Figure 35 for EU new Member States and candidate countries. In all cases 2006 is compared with 2002, 2003, 2004 and 2005.

As in previous years, the Member States gave very positive feedback on the risk assessment activity, urging that the EFFIS Danger Forecast should be continued and improved as part of the European Forest Fire Information System. This dialogue with users and other stakeholders is bound to result in an

improved civil protection and forest fire service across Europe, and helps meet the EU's aim of providing environmental information and services that can be combined with other global environmental information products, in support of the Global Monitoring for Environment and Security (GMES) initiative.



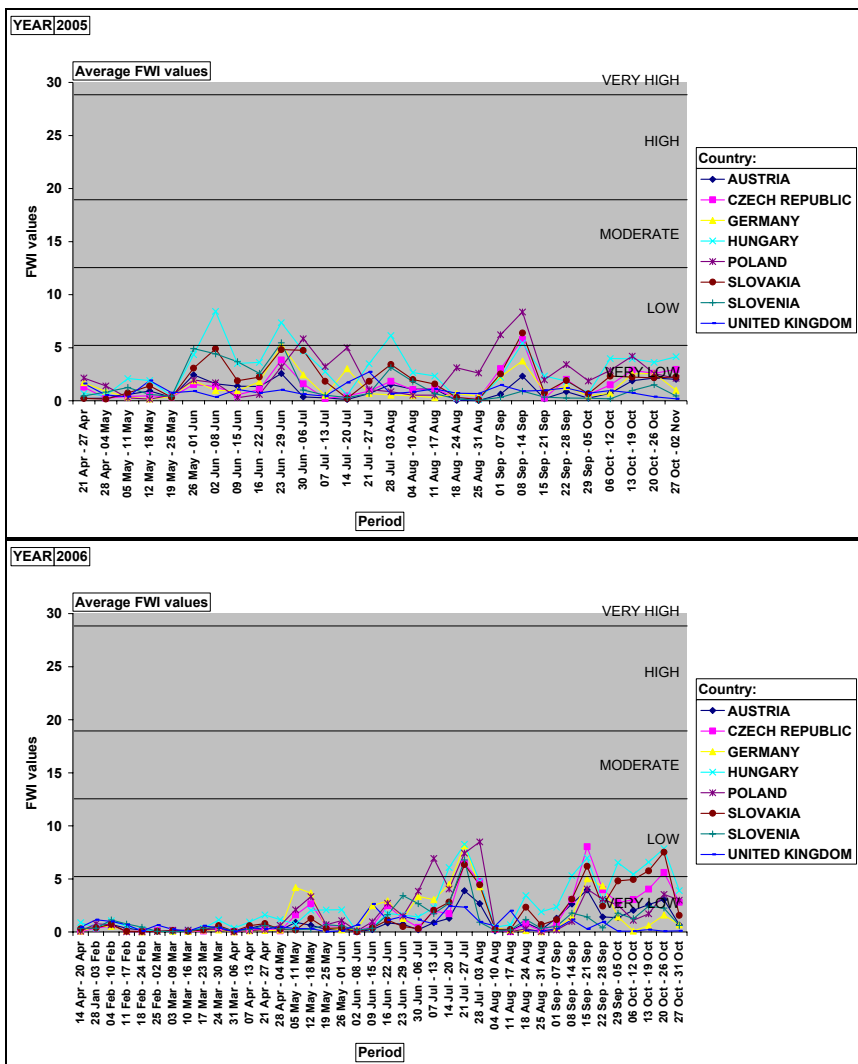
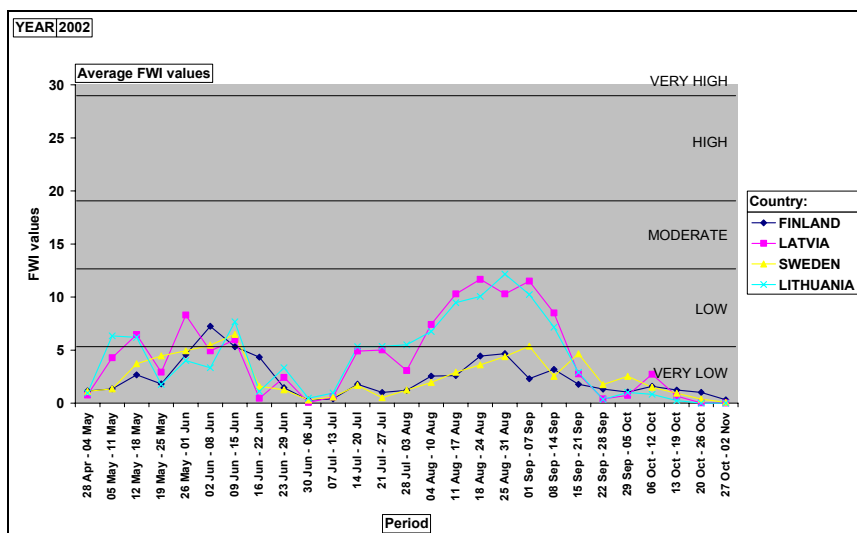
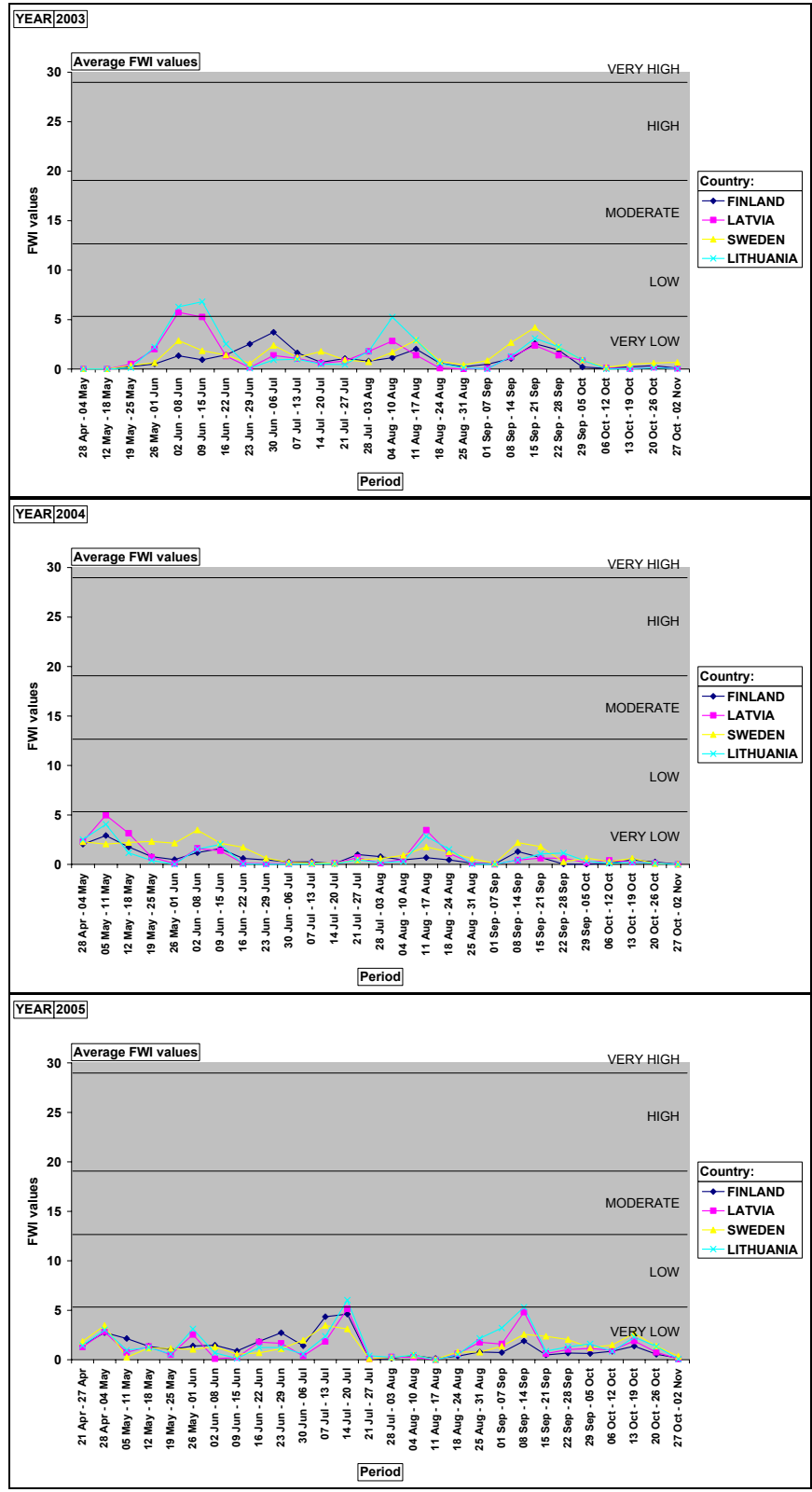


Figure 33. Fire risk trends as determined by the Canadian Fire Weather Index (FWI) in the last five years (2002 to 2006) in some EU temperate countries.





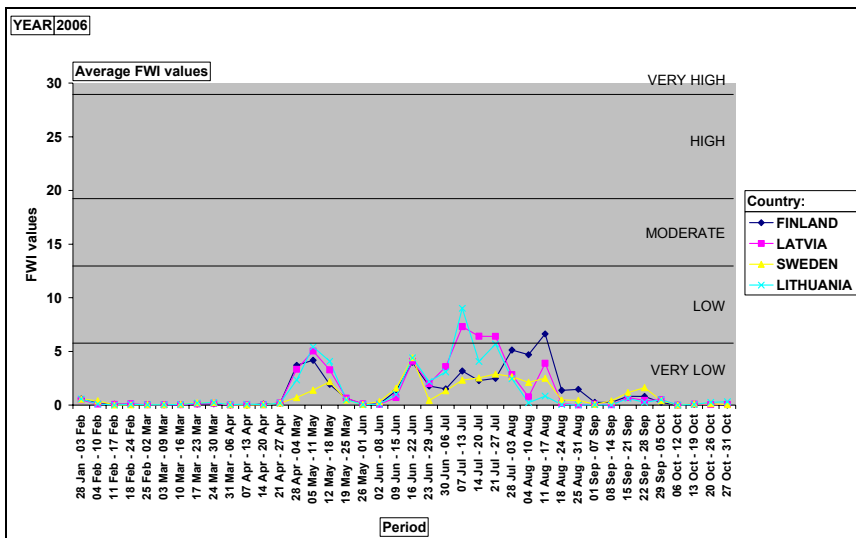
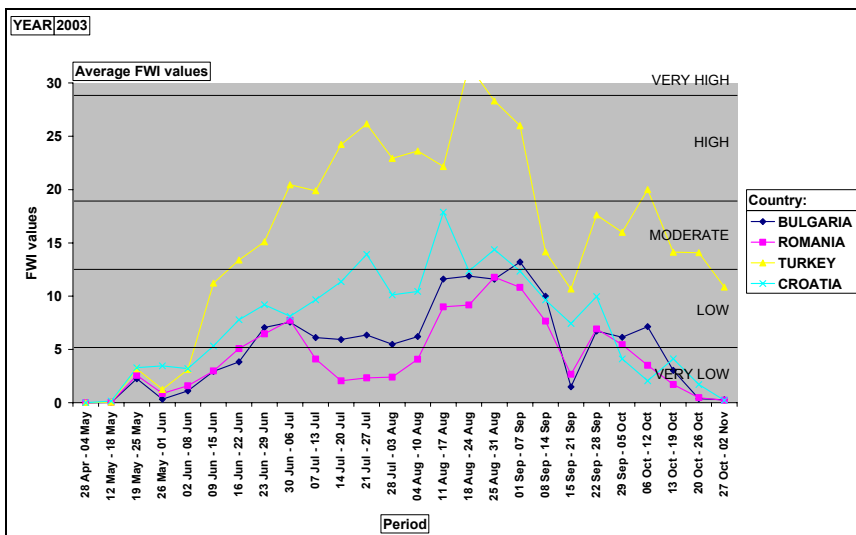
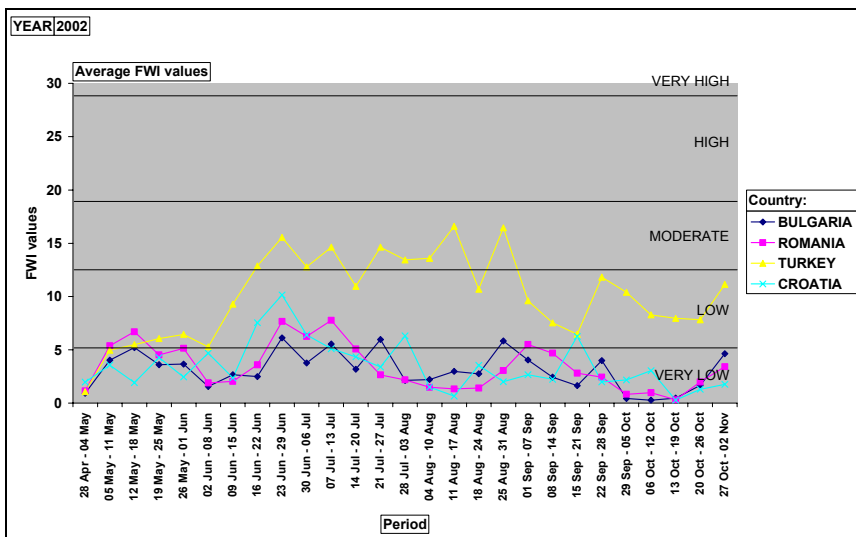


Figure 34. Fire risk trends as determined by the Canadian Fire Weather Index (FWI) in the last five years (2002 to 2006) in some EU boreal countries



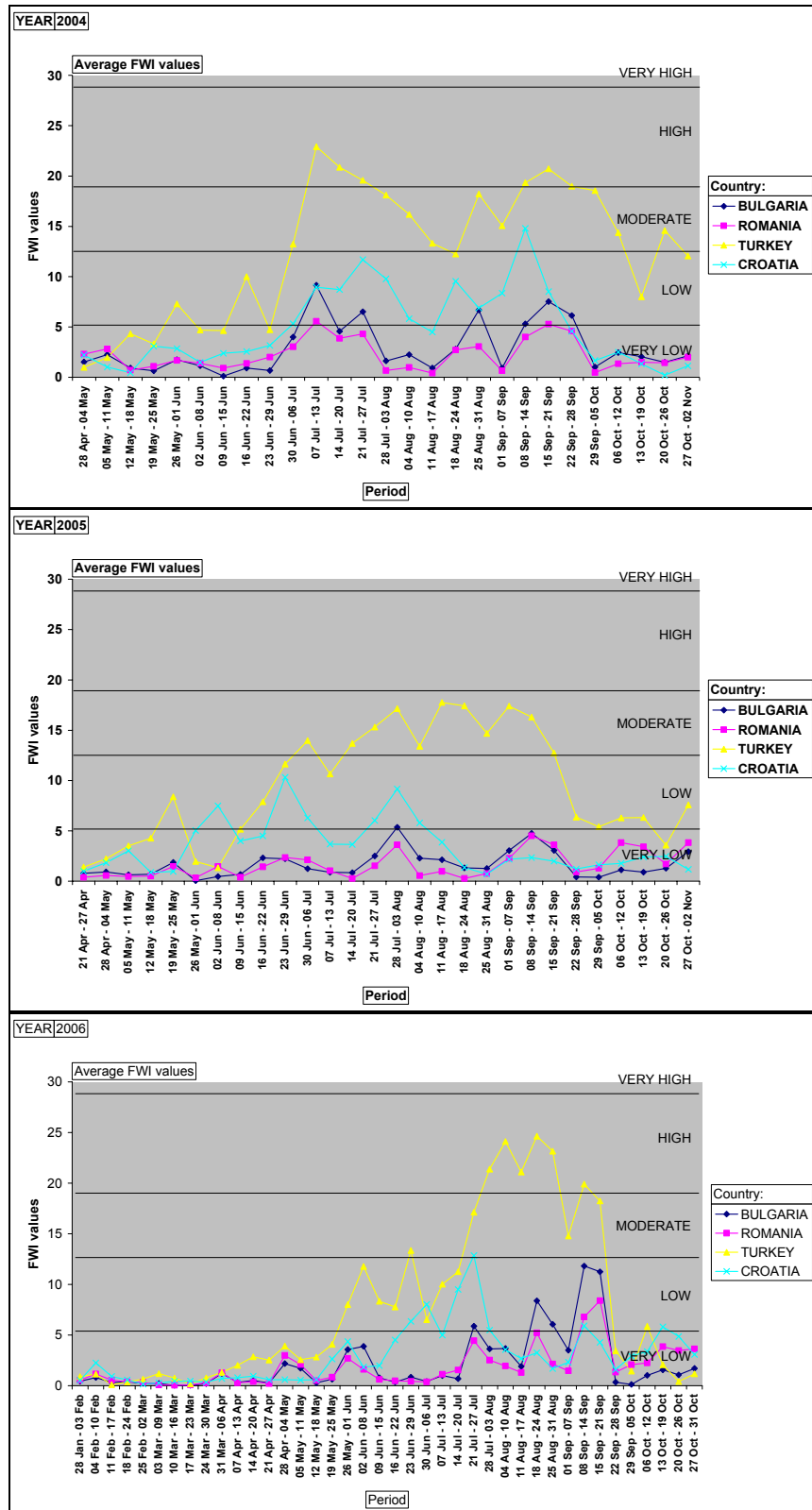


Figure 35. Fire risk trends (FWI) in the last five years (2002 to 2006) in EU new Member States (Bulgaria and Romania) and candidate countries (Croatia and Turkey).

### 3.2. EFFIS RAPID DAMAGE ASSESSMENT: 2006 RESULTS.

In order to improve the harmonization of burnt area data and statistics, maps of burnt areas were produced during the year through EFFIS Rapid Damage Assessment module. In order to obtain the statistics of the burnt area by land cover type the data from the European CORINE Land Cover 2000 (CLC 2000) database were used. Therefore the mapped burned areas were overlaid to the CLC 2000 data, allowing the derivation of damage assessment results comparable for all the EU Countries. This could lead to some discrepancies regarding the area of each type of land cover burned when compared with other sources that use different land cover maps.

EFFIS Rapid Damage Assessment is based on the analysis of MODIS satellite images. MODIS instrument is carried both on the TERRA (morning pass) and AQUA (afternoon pass) satellites. MODIS data has 2 bands with spatial resolutions of 250 meters (red and near-infrared bands) and 5 bands with spatial resolution of 500 meters (blue, green, and three short-wave infrared bands). Although mainly the 250 meters bands were used to map the burned areas, the MODIS bands at 500 meters resolution were sometimes used for confirmation. This type of satellite imagery 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. Although only a fraction of the total number of fires was mapped therefore, based on historical fire data we have verified that the area burned by wildfires of this size represents in most cases the large majority of the total area burned. This information should be compared with the official data from each Member State at the end of the fire season. In 2006, fires of at least 50 ha were mapped using EFFIS Rapid Damage Assessment.

The results for each of the five southern European countries mostly affected by forest fires (Portugal, Spain, France, Italy and Greece) are given in the following paragraphs. However, for the first time in this series of reports an analysis for some other countries that had large forest fires is also presented (Turkey, Croatia, Sweden, Slovenia, Cyprus, and The Netherlands)

The total area burned in 2005 by fires larger than 50 ha, as shown by analysis of satellite imagery, was 215 912 ha (Table 23). These figures may include agricultural and urban areas that were also burned during the forest fires.

Table 23. Areas burned by fires of at least 50 ha in 2006.

Country	Burnt area (ha)
Portugal	56 475
Spain	118 480
France	1 745
Italy	9 288
Greece	16 331
Turkey	8475
Croatia	2709
Sweden	1544
Slovenia	557
Cyprus	298
Netherlands	70
TOTAL	215 912

For the five southern European countries mostly affected by forest fires (Portugal, Spain, France, Italy and Greece) by modelling historical fire data (time series 1985-2001, 1985-2003 for Portugal, 1985-1997 for Greece), equations have been set up for the each country, which are able to predict with good accuracy the total area burned, given the area burned by large fires, i.e. by fires with final area burned of at least 50 ha. The total burned area estimated for the five above mentioned countries was 311 744 ha (Table 24).



Table 24. Estimated burned area (ha)

Country	Estimated burnt area (ha)	Estimated Burnt area interval (ha)
Portugal	80 705	[73 711, 87 699]
Spain	165 672	[151 622, 179 723]
France	7 434	[4 619, 10 248]
Italy	34 874	[22 120, 47 628]
Greece	23 059	[20 406, 25 612]
TOTAL	311 744	[272 478, 350 910]

### 3.2.1. Spain

Spain was the country with the most fire affected area. Most of the area burned occurred until the 15 of August with a relatively small increase of the burned area until the end of October. The total area burned mapped in Spain measured from satellite imagery until the 31 October 2006 was 118 480 ha. Figure 36 shows a combination of a satellite images with all the fires mapped in the region that has suffered the biggest damages (Galicia). Table 25 presents the distribution of the mapped burned area by land cover type using the CLC 2000 map. What is normally considered as forest area, i.e. including forest stands and shrubland, was burned 106 533 ha. The remaining burned area was distributed by agriculture (11 708 ha), and artificial surfaces, i.e. urban, industrial or social areas (239 ha).

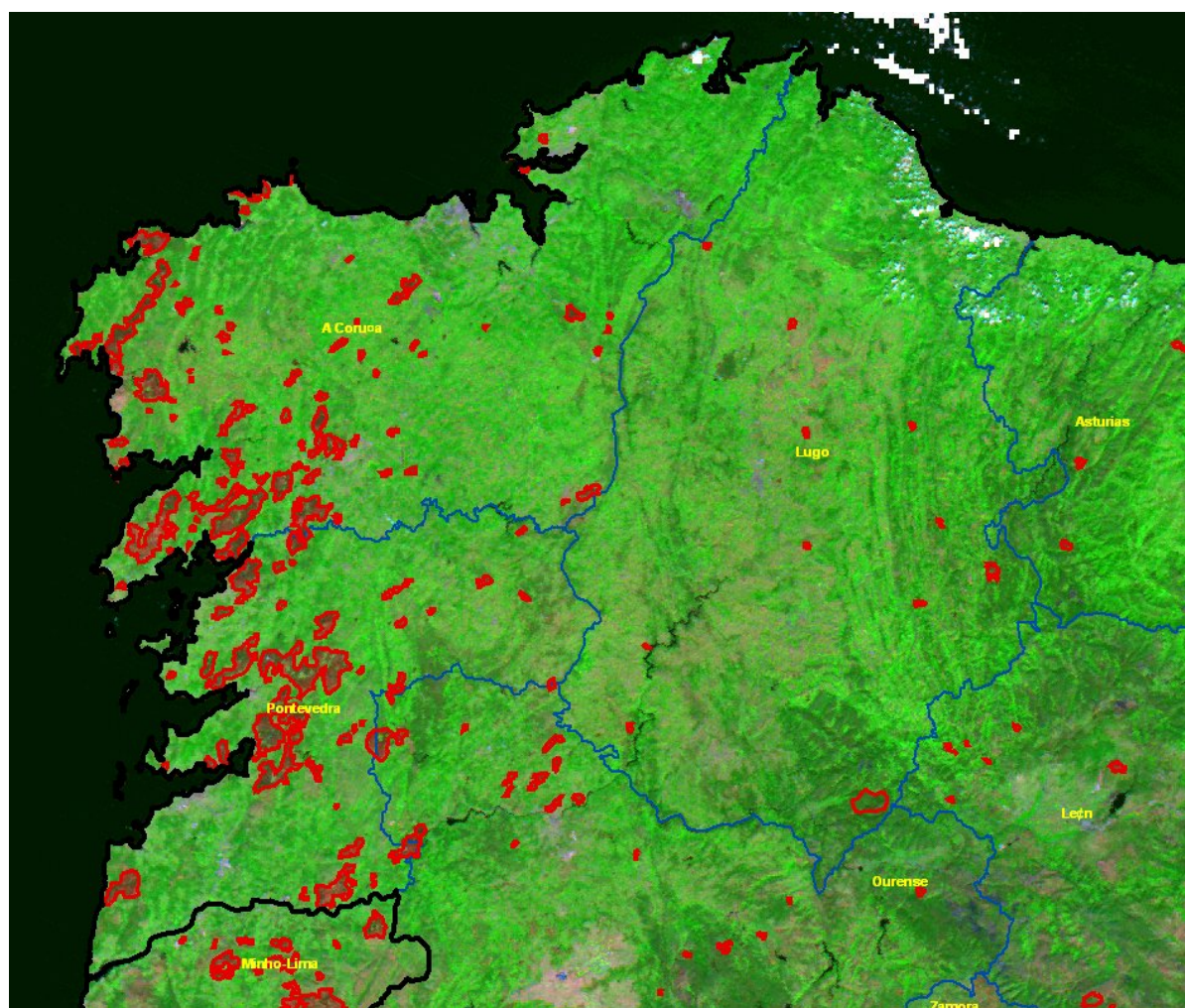


Figure 36. Satellite image showing the burnt areas (in red) in Galicia (Spain)

Table 25. Distribution of burned area (ha) in Spain by land cover type

Land cover	Area burned (ha)	% of total burned
Forest land	<b>106533</b>	89.9
Agriculture	<b>11708</b>	9.9
Artificial surfaces	<b>239</b>	0.2
<b>Total</b>	<b>118480</b>	<b>100.0</b>

### 3.2.2. Portugal

Portugal was the second country in terms of burned area of large fires with most of the area also being burned until the 15 August. The total area burned mapped in Portugal measured from satellite imagery up to 31 October 2006 was 56 475 ha. Table 26 presents the distribution of the mapped burnt area by land cover type derived using the CLC 2000 map. In terms of land cover, from a total of 56 475 ha of burnt area mapped, 50 247 ha were forest land, 6 119 ha were agricultural area, and 109 ha were artificial areas (urban, industrial and social areas).

Table 26. Distribution of burned area (ha) in Portugal by land cover types.

Land cover	Area burned (ha)	% of total burned
Forest land	<b>50247</b>	89.0
Agriculture	<b>6119</b>	10.8
Artificial surfaces	<b>109</b>	0.2
<b>Total</b>	<b>56 475</b>	<b>100.0</b>

Figure 37 shows a combination of a satellite images with all the fires mapped in Portugal.

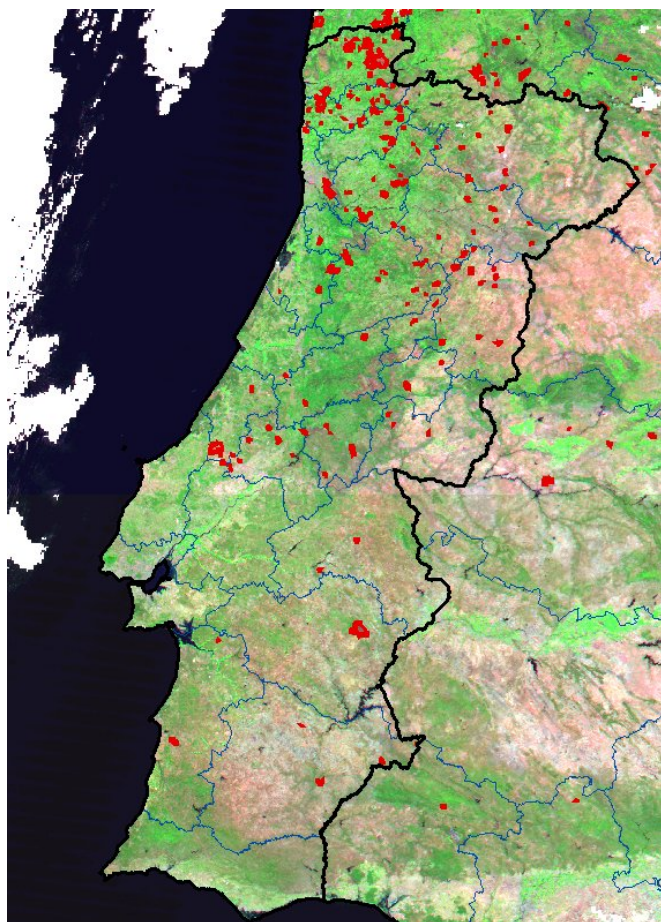


Figure 37. Satellite image showing the burnt areas in Portugal (in red).

### 3.2.3. Greece

The total burned area mapped in Greece until the 31 October 2006 was 16 331ha. Table 27 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 16 331 ha of burnt area mapped, 10 529 ha were forest land, 5 774 ha were agricultural area, and 28 ha were in artificial areas (urban, industrial and social areas). Figure 38 shows a combination of a satellite images with the mapped fires of Greece.

Table 27. Distribution of burned area (ha) in Greece by land cover types.

Land cover	Area burned (ha)	% of total burned
Forest land	10529	64.5
Agriculture	5774	35.3
Artificial surfaces	28	0.2
<b>Total</b>	<b>16331</b>	<b>100.0</b>



Figure 38. Satellite image showing the burnt areas in Greece (in red).

### 3.2.4. Italy

The total burned area mapped in Italy until 31 October 2006 was 9 228 ha. Table 28 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 9 228 ha of burnt area mapped, 7 067 ha of land have been burnt in forest, 2 142 ha in agricultural land, and 19 ha in artificial surfaces (urban, industrial and social areas). Figure 39 shows a combination of a satellite images with the fires mapped on Southern Italy.

Table 28. Distribution of burned area (ha) in Italy by land cover types.

Land cover	Area burned (ha)	% of total burned
Forest land	7067	76.6
Agriculture	2142	23.2
Artificial surfaces	19	0.2
<b>Total</b>	<b>9228</b>	<b>100.0</b>



Figure 39. Satellite image showing the burnt areas in southern Italy (in red).

### 3.2.5. Turkey

The total burned area mapped in Turkey until the 31 October 2006 was 8 475 ha. Figure 40 shows the fires mapped by satellite imagery in red.

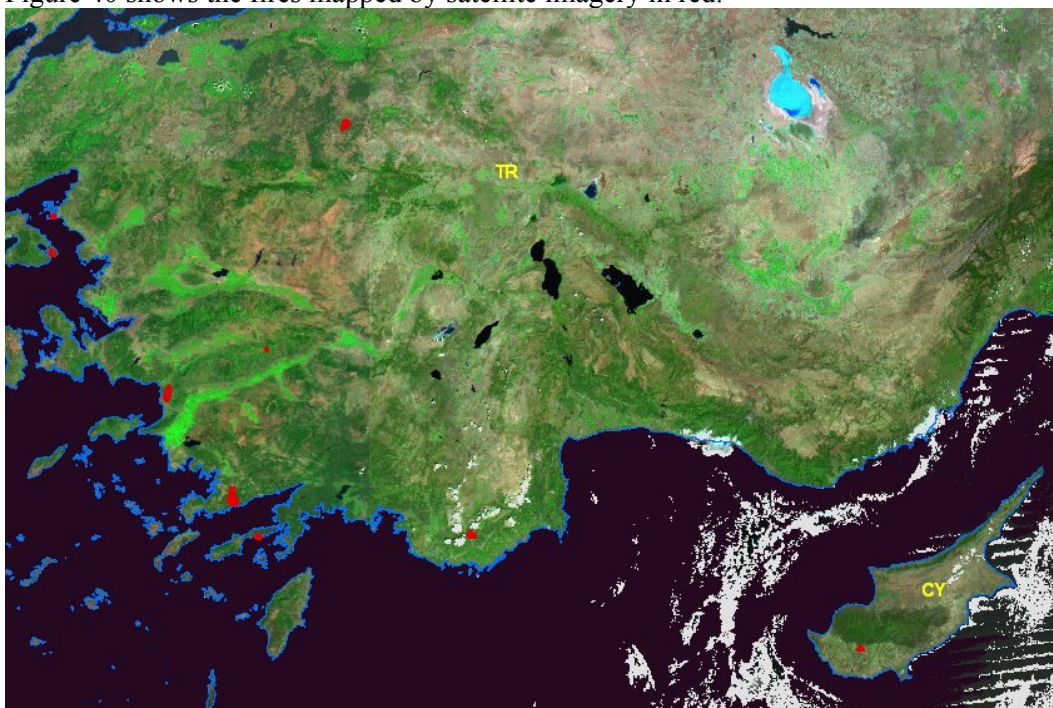


Figure 40. Satellite image showing the fires mapped in Turkey and Cyprus in red.

### 3.2.6. Croatia

The total burned area mapped in Croatia until the 31 October 2006 was 2 709 ha. Table 29 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 2 709 ha of burnt area mapped, 997 ha were forest land, 1 711 ha were agricultural area, and 1 ha were in artificial areas (urban, industrial and social areas).

Table 29. Distribution of burned area (ha) in Croatia by land cover types until 31 October 2006.

<b>Land cover</b>	<b>Area burned (ha)</b>	<b>% of total burned</b>
Forest land	997	37.0
Agriculture	1 711	63.0
Artificial surfaces	1	0.0
<b>Total</b>	<b>2 709</b>	<b>100.0</b>

Figure 41 shows a combination of a satellite images with fires mapped in Croatia.

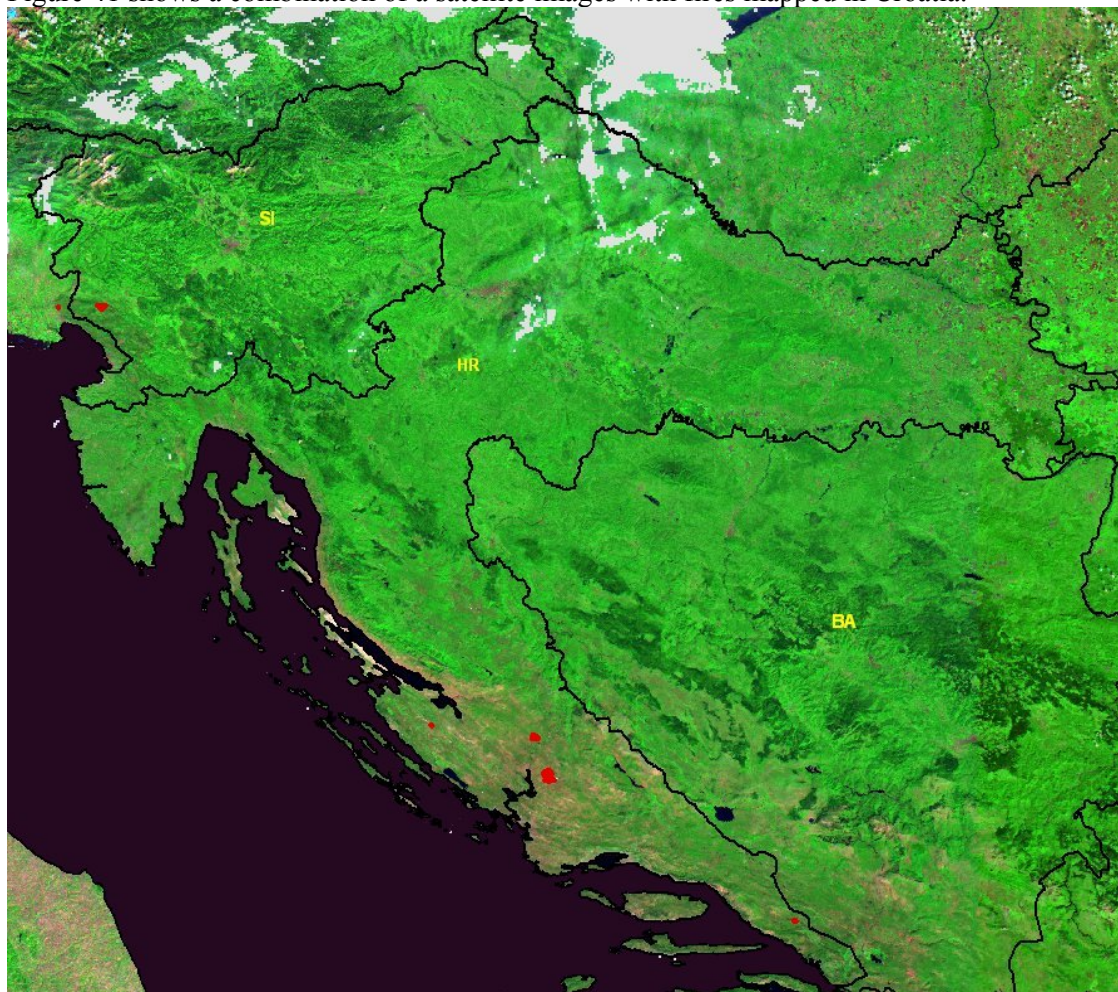


Figure 41. Satellite image showing the burnt areas in Croatia and Slovenia (in red).

### 3.2.7. France

The total area burned mapped in France measured from satellite imagery on 31 October 2006 was 1 867 ha.

Table 30 presents the distribution of the mapped burnt area by land use type using the CLC 2000 map. From a total of 1 867 ha of burnt area mapped, 1 720 ha were forest land, and 147 ha were agricultural area.

Figure 42 shows a combination of a satellite images with fires mapped in France.

Table 30. Distribution of burned area (ha) in France by land cover types until 31 October 2006.

Land cover	Area burned (ha)	% of total burned
Forest land	<b>1569</b>	89.9
Agriculture	<b>176</b>	10.1
Artificial surfaces	0	0.0
<b>Total</b>	<b>1745</b>	<b>100.0</b>

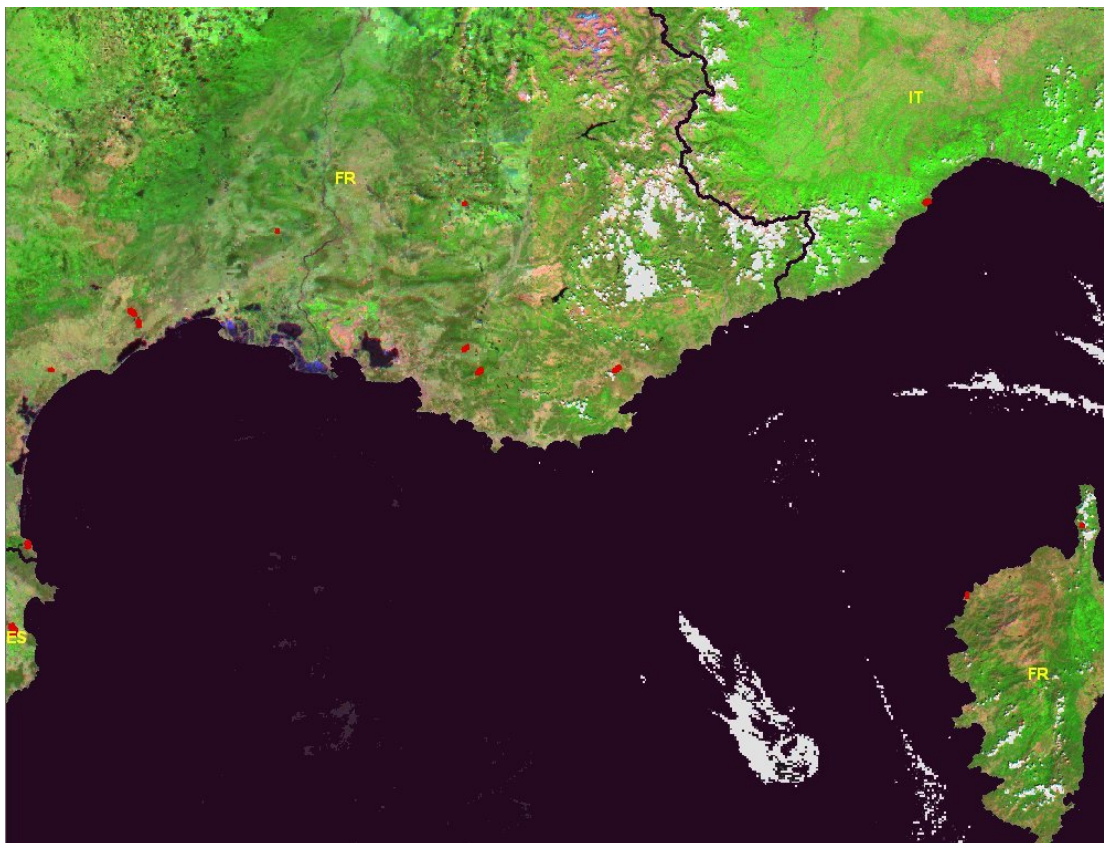


Figure 42. Satellite image showing the burnt areas in southeast France (in red).

### 3.2.8. Sweden

Sweden also had at least 2 fires larger than 100 ha. Despite the frequent cloud cover conditions it was possible to map the largest fire that burned 1 544 ha. Figure 43 shows this big fire in Sweden.

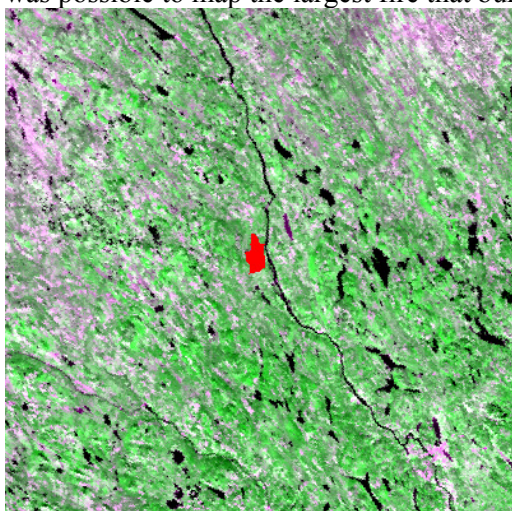


Figure 43. Satellite image showing the big fire in Sweden in red.

### 3.2.9. Slovenia

Slovenia had 4 fires larger than 100 ha. Satellite imagery analysis allowed to map the largest of these fires that burned 557 ha (Figure 41).

### 3.2.10. Cyprus

The total burned area mapped in Cyprus until the 31 October 2006 was 298 ha.

Table 31 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 298 ha of burnt area mapped, 93 ha were forest land, and 205 ha were agricultural area.

Figure 44 shows a satellite images with fires mapped in Cyprus.

Table 31. Distribution of burned area (ha) in Cyprus by land cover types until 31 October 2006.

Land cover	Area burned (ha)	% of total burned
Forest land	93	31.2
Agriculture	205	68.8
<b>Total</b>	<b>298</b>	<b>100.0</b>



Figure 44. Satellite image showing the burnt areas in Cyprus (in red).

### 3.2.11. Netherlands

The Netherlands had an exceptional large fire in May 2006 on a forest area that burned a total of 70 ha as mapped with the MODIS satellite imagery.

### 3.3. ASSESSMENT OF POSSIBLE DAMAGE ON NATURA 2000 SITES IN GALICIA (SPAIN)

The Natura 2000 consolidated spatial database provided by DG ENV was used to find sites of Natura 2000, which could be possibly affected by fire. Again, the spatial overlay with EFFIS forest fire geospatial database was used. It was found out that totally 14 Natura 2000 sites were affected by fire. From 4.8.2006 to 15.8.2006 the total burnt area inside Natura 2000 sites was 2,571.5 ha. The number for whole season is 5,174.1 ha. The list of affected sites is given in Table 32.

Using the digitized version of Atlas of mammals in Spain overlaid with EFFIS burnt area it was possible to find the mammal species, which could be possibly affected by fire. They are summarized in Table 33.

Similarly, using the digitized version of Atlas of birds in Spain the species of birds living in the burnt area were listed. They are summarized in Table 34.

Table 32. Natura 2000 sites directly affected by forest fires in Galicia

Site name	Burnt (4.8.2006-15.8.2006) [ha]	Whole season [ha]
Ancares - Courel	531.2	2624.2
Baixo-Mino	10.5	10.5
Branas de Xestoso	144.9	144.9
Carnota – Monte Pindo	31.6	310.6
Costa da Morte	382.2	497.7
Costa da Morte (Norte)	170.0	285.1
Macizo Central	414.4	414.4
Monte e lagoa de Laouro	100.6	100.6
Parga-Ladra-Tamoga	4.9	4.9
Rio Lerez	4.0	4.0
Serra do Candan	86.9	86.9
Serra do Careon	677.4	677.4
Sistema fluvial Ulla - Deza	12.0	12.0
Sobreirais do Arnego	0.9	0.9
<b>SUM</b>	<b>2,571.5</b>	<b>5,174.1</b>

Table 33. Mammal species possibly affected by forest fires

Erinaceus_europaeus	Myotis_nattereri	Glis_glis	Mustela_vison
Talpa_occidentalis	Myotis_myotis	Clethrionomys_glaresolus	Mustela_putorius
Galemys_pyrenaicus	Eptesicus_serotinus	Microtus_agrestis	Martes_martes
Sorex_granarius	Pipistrellus_pipistrellus	Arvicola_sapidus	Martes_foina
Sorex_minutus	Hypsugo_savii	Rattus_norvegicus	Lutra_lutra
Neomys_anomalus	Plecotus_auritus	Rattus_rattus	Meles_meles
Crocidura_russula	Plecotus_austriacus	Apodemus_sylvaticus	Genetta_genetta
Rhinolophus_hipposideros	Barbastella_barbastellus	Mus_spretus_lataste	Felis_silvestris
Rhinolophus_ferrumequinum	Tadarida_teniotis	Canis_lupus	Sus_scrofa
Rhinolophus_euryale	Oryctolagus_cuniculus	Vulpes_vulpes	Cervus_elaphus
Myotis_daubentonii	Sciurus_vulgaris	Mustela_erminea	Capreolus_capreolus
Myotis_emarginata	Eliomys_quercinus	Mustela_nivalis	



Table 34. Bird species possibly affected by forest fire

Tachybatus_ruficollis	Columba_livia	Prunella_modularis	Emberiza_citrinella
Podiceps_critatus	Streptopelia decaocto	Cettia_cetti	Emberiza_cia
Phalacrocorax aristotelis	Streptopelia_turtur	Acrocephalus_scirpaceus	Emberiza_cirlus
Ixobrychus_minutus	Cuculus_conorus	Acrocephalus_arundinaceus	Emberiza_schoeniclus
Ciconia_ciconia	Clamator_glandarius	Hippolais_polyglotta	Fringilla_coelebs
Anas_platyrhynchos	Tyto_alba	Sylvia_borin	Serinus_serinus
Anas_crecca	Bubo_bubo	Sylvia_atricapilla	Carduelis_chloris
Milvus_migrans	Asio_otus	Sylvia_communis	Carduelis_carduelis
Accipiter_gentilis	Otus_scops	Sylvia_melanocephala	Pyrrhula_pyrrhula
Accipiter_nisus	Athene_noctua	Sylvia_cantillans	Passer_domesticus
Buteo_buteo	Strix_aluco	Sylvia_undata	Passer_montanus
Aquila_chrysaetos	Caprimulgus_europaeus	Phylloscopus_collybita	Sturnus_unicolor
Circaetus_gallicus	Apus_apus	Phylloscopus_bonelli	Oriolus_oriolus
Falco_subbuteo	Alcedo_atthis	Regulus_ignicapilla	Garrulus_glandarius
Circus_pygargus	Upupa_epops	Cisticola_juncidis	Pica_pica
Falco_tinnunculus	Jynx_torquilla	Saxicola_rubetra	Pyrrhocolax_pyrrhocolax
Alectoris_rufa	Picus_viridis	Saxicola_torquata	Corvus_monedula
Perdix_perdix	Dendrocopos_major	Oenanthe_oenanthe	Corvus_corone
Coturnix_coturnix	Galerida_cristata	Monticola_saxatilis	Corvus_corax
Phasianus_colchicus	Lullula_arborea	Monticola_solitaria	Hydrobates_pelagicus
Rallus_aquaticus	Alauda_arvensis	Phoenicurus_ochruros	Botaurus_stellaris
Gallinula_chloropus	Riparia_riparia	Phoenicurus_phoenicurus	Anas_strepera
Fulica_atra	Hirundo_rustica	Erithacus_rubecula	Aythya_ferina
Tetrax_tetrax	Hirundo_daurica	Luscinia_megarhynchos	Aythya_fuligula
Haematopus_ostralegus	Delichon_urbica	Turdus_merula	Hieraaetus_pennatus
Charadrius_dubius	Anthus_campestris	Turdus_philomelos	Larus_ridibundus
Charadrius_alexandrinus	Anthus_trivialis	Turdus_vicivorus	Caprimulgus_ruficollis
Vanellus_vanellus	Anthus_spinoletta	Aegithalos_caudatus	Locustella_luscinioides
Actitis_hypoleucos	Motacilla_flava	Parus_cristatus	Regulus_regulus
Burhinus_oedicephalus	Motacilla_cinerea	Parus_ater	Muscicapa_striata
Rissa_tridactyla	Motacilla_alba	Parus_caeruleus	Petronia_petronia
Uria_aalge	Lanius_collurio	Circus_cyaneus	Emberiza_citrinella
Columba_palumbus	Lanius_senator	Sitta_europaea	
Columba_oenas	Cinclus_cinclus	Certhia_brachydactyla	

**BACKGROUND DOCUMENTATION**

Atlas de los mamíferos terrestres de España. Palomo, L. J. and J. Gisbert (Eds.). 2002. Dirección General de Conservación de la Naturaleza - SECEM - SECEMU, Madrid, Spain

Atlas de las aves reproductoras de España. Martí, and J. C. Del Moral(Eds). 2003, Dirección General de Conservación de la Naturaleza - Sociedad Española de Ornitología., Madrid.

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

European Communities, 2005, Forest Fires in Europe 2004, S.P.I.05.147, p. 45

Natura2000 consolidated spatial database. Version September 2006.

## ANNEX I

Table 35. Burnt area in the five Southern Member States (period 1980 – 2006) in hectares.

Year	PORTUGAL	(*)SPAIN	(*)FRANCE	ITALY	(*)GREECE	TOTAL
1980	44 251	263 017	22 176	143 919	32 965	506 720
1981	89 798	298 288	27 711	229 850	81 417	727 064
1982	39 556	152 903	55 145	130 456	27 372	405 432
1983	47 811	108 100	53 729	212 678	19 613	441 931
1984	52 710	165 119	27 202	75 272	33 655	353 958
1985	146 254	484 476	57 368	190 640	105 450	984 188
1986	89 522	264 887	51 860	86 420	24 514	517 203
1987	76 269	146 662	14 108	120 697	46 315	404 051
1988	22 434	137 734	6 701	186 405	110 501	463 775
1989	126 237	426 693	75 566	95 161	42 363	766 020
1990	137 252	203 032	72 625	195 319	38 594	646 822
1991	182 486	260 318	10 130	99 860	13 046	565 840
1992	57 011	105 277	16 593	105 692	71 410	355 983
1993	49 963	89 267	16 698	203 749	54 049	413 726
1994	77 323	437 635	24 995	136 334	57 908	734 195
1995	169 612	143 484	18 137	48 884	27 202	407 319
1996	88 867	59 814	11 400	57 988	25 310	243 379
1997	30 535	98 503	21 581	111 230	52 373	314 222
1998	158 369	133 643	19 282	155 553	92 901	559 748
1999	70 613	82 217	15 906	71 117	8 289	248 142
2000	159 605	188 586	24 078	114 648	145 033	631 950
2001	111 850	93 297	20 642	76 427	18 221	320 437
2002	124 411	107 464	30 160	40 791	6 013	308 839
2003	425 726	148 172	73 278	91 805	3 517	742 498
2004	129 539	134 193	13 711	60 176	10 267	347 886
2005	338 262	188 697	22 135	47 575	6 437	603 106
2006	75 510	148 827	7 500	39 946	12 661	284 444
% of total in 2006	27	52	3	14	4	100
Average(1980-1989)	73 484	244 788	39 157	147 150	52 417	557 034
Average(1990-1999)	102 203	161 319	22 735	118 573	44 108	448 938
Average (2000-2006)	194 986	144 177	27 358	67 338	28 878	462 737
Average (1980-2006)	115 621	187 789	30 015	115 874	43 237	492 551
TOTAL	3 121 776	5 070 305	810 417	3 128 592	1 167 396	13 298 878

(\*) provisional data for 2006

Source: European Commission and, for the Member States: Direcção-Geral dos Recursos Florestais, Ministério 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.

## ANNEX II

Table 36. Number of forest fires in the five Southern Member States (1980-2006)

Year	PORTUGAL	(*) SPAIN	(*)FRANCE	ITALY	(*)GREECE	TOTAL
1980	2 349	7 190	5 040	11 963	1 207	27 749
1981	6 730	10 878	5 173	14 503	1 159	38 443
1982	3 626	6 545	5 308	9 557	1 045	26 081
1983	4 539	4 791	4 659	7 956	968	22 913
1984	7 356	7 203	5 672	8 482	1 284	29 997
1985	8 441	12 238	6 249	18 664	1 442	47 034
1986	5 036	7 570	4 353	9 398	1 082	27 439
1987	7 705	8 679	3 043	11 972	1 266	32 665
1988	6 131	9 247	2 837	13 588	1 898	33 701
1989	21 896	20 811	6 763	9 669	1 284	60 423
1990	10 745	12 913	5 881	14 477	1 322	45 338
1991	14 327	13 531	3 888	11 965	858	44 569
1992	14 954	15 955	4 002	14 641	2 582	52 134
1993	16 101	14 254	4 769	14 412	2 406	51 942
1994	19 983	19 263	4 618	11 588	1 763	57 215
1995	34 116	25 827	6 563	7 378	1 438	75 322
1996	28 626	16 771	6 401	9 093	1 508	62 399
1997	23 497	22 320	8 005	11 612	2 273	67 707
1998	34 676	22 446	6 289	9 540	1 842	74 793
1999	25 477	18 237	4 960	6 932	1 486	57 092
2000	34 109	24 118	4 603	8 595	2 581	74 006
2001	26 533	19 547	4 309	7 134	2 535	60 058
2002	26 488	19 929	4 097	4 601	1 141	56 256
2003	26 195	18 616	7 023	9 697	1 452	62 983
2004	21 870	21 394	3 775	6 428	1 748	55 215
2005	35 697	25 492	4 698	7 951	1 544	75 382
2006	19 929	16 355	4 100	5 634	1 417	47 435
% of total in 2006	42	34	9	12	3	100
Average 1980-1989	7 381	9 515	4 910	11 575	1 264	34 645
Average 1990-1999	22 250	18 152	5 538	11 164	1 748	58 851
Average 2000-2006	27 260	20 779	4 658	7 149	1 774	61 619
Average 1980-2006	18 042	15 634	5 077	10 275	1 575	50 603
TOTAL	487 132	422 120	137 078	277 430	42 531	1 366 291

(\*) provisional data for 2006

Source: European Commission and, for the Member States: Direcção-Geral dos Recursos Florestais, Ministério 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.



European Commission

**EUR 22931 EN – Joint Research Centre – Institute for Environment and Sustainability**

Title: Forest Fires in Europe 2006

Authors: Paulo Barbosa, Giuseppe Amatulli, Roberto Boca, Andrea Camia, Jan Kucera, Giorgio Libertà, Jesus San-Miguel Ayanz, Guido Schmuck, Ernst Schulte, and Hans-Helmut Dierks

Luxembourg: Office for Official Publications of the European Communities

2007 – 77 pp. – 21 x 29.7 cm

EUR – Scientific and Technical Research series – ISSN 1018-5593

**Abstract**

This is the seventh “Forest Fires in Europe” report published by the European Commission. The report is normally published in summer of the following year in order to allow the different countries to compile official statistics of the fire season regarding the total number of forest fires and burned area. The fire season of 2006 can be defined as a relatively mild season, and if the total number of fires was still relatively high, the total burned area was definitely well below the average. In general there were not many extreme fire events and only the large fires that devastated Galicia (Spain) in the first two weeks of August, were object of great concern. The “Forest Fires in Europe 2006” report describes the latest developments in terms of support to forest fires fire prevention activities in the European Union, presents historical statistics in terms of number of fires and burned area, and describes the fire season in each of the contributing countries as well as the results from the European Forest Fire Information System: EFFIS Danger Forecast, that provides daily the 1, 2, and 3 day fire danger forecasts, EFFIS Rapid Damage Assessment, that performs the mapping and evaluation of land cover damages caused by fires of at least 50 ha, and includes also a summary of the impact of forest fires in Natura2000 areas in Galicia, Spain, in 2006.

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interest, whether private or national.

