

Report No 6

# Forest Fires in Europe 2005

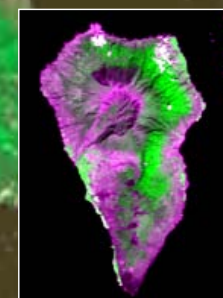


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Institute for  
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LAND MANAGEMENT AND NATURAL HAZARDS UNIT

DIRECTORATE-GENERAL ENVIRONMENT





# Forest Fires in Europe 2005

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### MEMBER STATES AND CANDIDATE COUNTRIES

Sources of data and comments are given in the text.

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

### **1.1. OVERVIEW OF FOREST FIRE MEASURES PROVIDED BY FOREST FOCUS (COUNCIL AND EUROPEAN PARLIAMENT REGULATION EC N. 2152/2003)**

The European Union is supporting since the Eighties the efforts implemented by Member States to fight forest fires in all their stages: prevention, suppression and restoration. That's because forest fires can severely affect all the functions developed by the forests of the Community from the economic, ecologic and social point of view; they can also better and more effectively be counteracted thanks to common EU activities.

One of the most recent tools in this sense is represented by 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 replaced two previous regulations aiming to protect the forests of the community and integrated them into a new scheme having a broader approach. The new scheme is composed by two main connected pillars: the monitoring of the forest health and the prevention of forest fires.

Concerning forest fires, it has to be recalled that the scheme represents the continuation of Regulation (EEC) N. 2158/92 of the protection of the Community forests against forest fires – focused on prevention – and the natural complement of the forest fires measures established in the field thanks to Regulation (EC) N. 2157/1999 of 17 May 1999 on Rural Development.

Forest Focus has been implemented through national programmes submitted by the EU Member States for the years 2003-2004 and 2005-2006. These programmes have been revised by the European Commission and approved through Commission decisions for the years 2003-2004, 2005 and 2006 in accordance to the financial rules of the European Union. The countries involved in the implementation of the forest fires prevention measures were those that had already implemented the previous scheme (France, Germany, Greece, Italy, Portugal and Spain), Finland, and some of the new member states who joined the European Union and the scheme in 2004 (Cyprus, Estonia, Hungary, Poland, Slovakia and Slovenia).

Forest Focus regulation focused mainly on forest monitoring and the related collection of data. Concerning fires, it offered the same range of forest fires prevention measures already co-financed by the previous scheme, provided that they were not already included in the rural development programmes submitted by Member States. The EU financial framework for the implementation of the whole scheme for the period 2003-2006 was EUR 65 million, of which some 9 million were to be used for forest fire prevention measures. Due to this limited amount it is clear that the support provided by the scheme was merely symbolic.

So far the most important achievement of the Regulation is probably represented by the continuation, improvement and enhancement of the forest fire database, a complete and unique collection of information on the fires occurred in the Union during last decades and linked to EFFIS (the European Forest Fires Information System) in order to further exploit its potential.

Inside Forest Focus the measures concerning forest fires are the following ones:

- Monitoring and collection of data on the forest fires occurred in the European Union. This database is composed by the information sent by the EU Member States according to a common format. Its existence implied the continuation, improvement and broadening of the harmonised database established by the previous scheme and known as the “common core database”. The database is currently managed by the Joint Research Centre and is included in EFFIS, where it is complemented by several modules such as fire danger forecast and damage assessment.
- Measures of prevention implemented by Member States. In general the measures co-financed by the scheme can be divided into two main groups: “intellectual” measures (public awareness campaigns and specialised training) and “field” measures related to investments for infrastructures (e.g. firebreaks, water points), co-financed only if not already covered by the Rural Development Programmes.
- Studies. Carried out by the Member States or the Commission, they have been chosen in order to have a relevant EU added value and a clear relation to the goals of the Regulation, represented mainly by prevention and monitoring of forest fires.

Table 1 shows the amount of co-financing (in EUR) provided by the scheme in relation to forest fires and for the whole four years period, subdivided by Member States and measures. It shows clearly that the amount allocated to Member States globally exceeded the minimum ceiling of 9 million Euro ring fenced inside the budget of the Regulation. The most successful measure is represented by the awareness raising campaigns (31.26%) followed by the measures related to the information system (25.43%) and by the studies (20.69%). It has to be added that the studies are globally represented by 26 proposals and carried out by the different Member states mentioned before.

Table 1. Total allocation of resources to Forest Focus forest fire measures in period 2003-2006 for Member States.

Member State	Info [€]	Awareness	Training [€]	Investments	Studies [€]	Total [€]
Cyprus	146 000	7 000	2 500	278 000	0	433 500
Estonia	0	6 500	0	8 500	0	15 000
Finland	15 000	0	0	0	0	15 000
France	242 178	0	0	0	483 937	726 115
Germany	19 109	620	9 907	301 163	10 150	340 949
Greece	874 721	406 818	352 273	150 000	384 600	2 168 412
Hungary	18 550	3 500	3 050	156 200	50 000	231 300
Italy	862 027	317 224	362 504	210 412	197 500	1 949 667
Poland	51 527	1 389	18 000	208 084	170 000	449 000
Portugal	415 000	756 000	380 000	0	1 140 000	2 691 000
Slovakia	14 478	2 500	0	0	0	16 978
Slovenia	17 325	34 000	21 375	0	0	72 700
Spain	326 015	2 155 448	194 000	15 385	6 000	2 696 848
Grand total	3 001 930	3 690 999	1 343 609	1 327 744	2 442 187	11 806 469
%	25.43	31.26	11.38	11.25	20.69	100.00

The repartition of the EU funds between measures is also shown in Figure 1, stressing, once more, the relevance of the campaigns and of the information measures inside the scheme. It has, however, to be underlined that the allocation of the funds between different measures corresponds to the amounts recommended by the Commission, but susceptible to a certain degree of flexibility during the implementation carried out by the Member States.

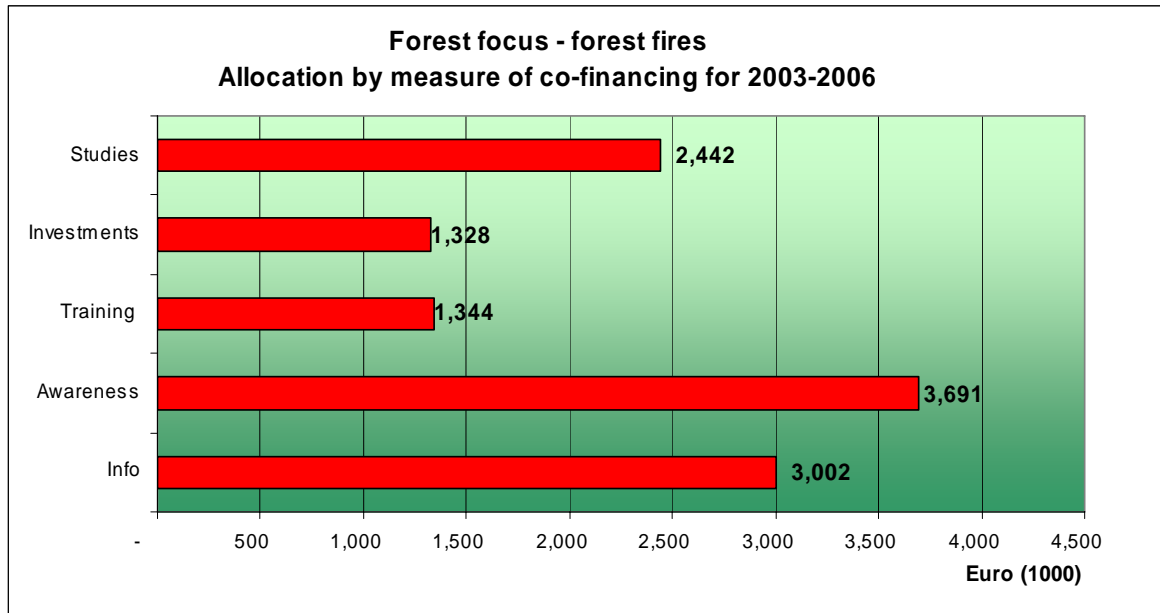


Figure 1. The division of EU funds among forest fire measures.

Figure 2 shows the percentage of the funds allocated between the EU Member States for the whole four years period. Those who received more financial support by the scheme were Spain (22.84%), Portugal (22.79%), Greece (18.37%), and Italy (16.51%), due to the relevant extension of the forest area under high and medium fire risk.

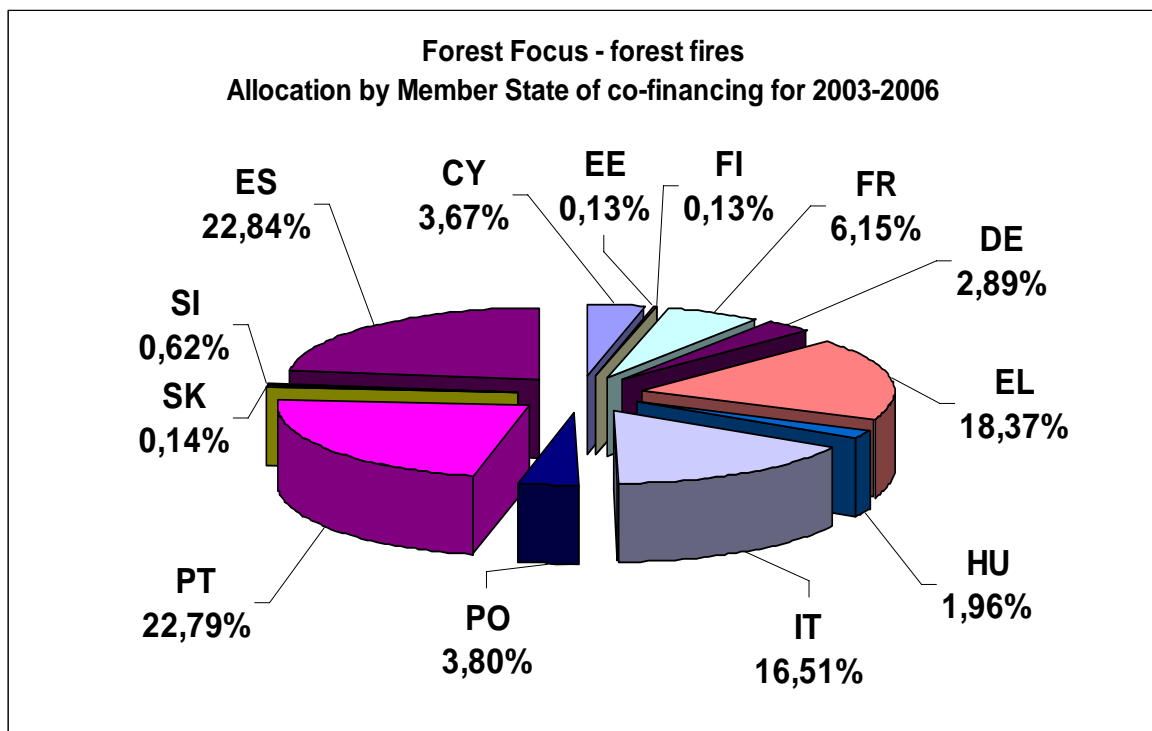


Figure 2. Allocation of the funds among EU member states for period 2003-2006.

In future, after the end of 2006 and the expiration of the scheme, the measures co-funded by Forest Focus related to forest fires monitoring and information (the “intellectual measures”) would be taken over and continued through LIFE+, the new financial



instrument for the environment, expected to have a solid informative connotation. The proposal of this European Parliament and Council Regulation has been adopted by the European Commission on 29 September 2004 and it is currently under discussion and finalisation.

The fight against forest fires should be also continued and complemented by the infrastructural and restoration measures co-funded through the new Rural Development Regulation (Regulation (CE) N. 1698/2005 of 20 September 2005) and some co-financing funds provided by the new Structural Funds.

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

### 2.1. SOUTHERN MOST AFFECTED MEMBER STATES (1980 – 2005)

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 2005, fires in these five countries burned a total area of 589 559 hectares, which is well above the average for the last 26 years. Similarly, the number of fires that occurred (73 325) is above the average for the last 26 years (see Table 2 for details).

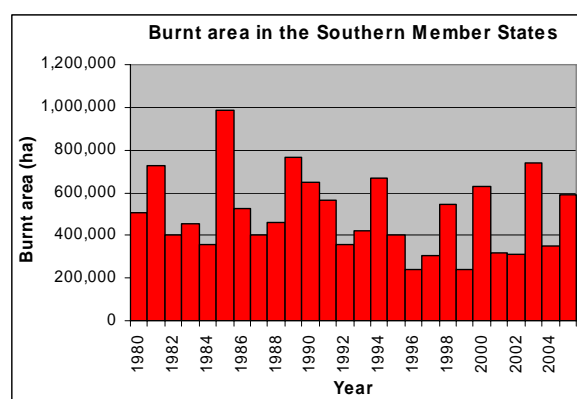
Figure 3a shows the total burnt area per year in the five Southern Member States since 1980. The statistics clearly vary considerably from one year to the next, which clearly indicates how much the burnt area depends on seasonal meteorological conditions. Year 2005 was not as “disastrous” as year 2003; however the burnt was well above the long term average with significant level of damage.

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

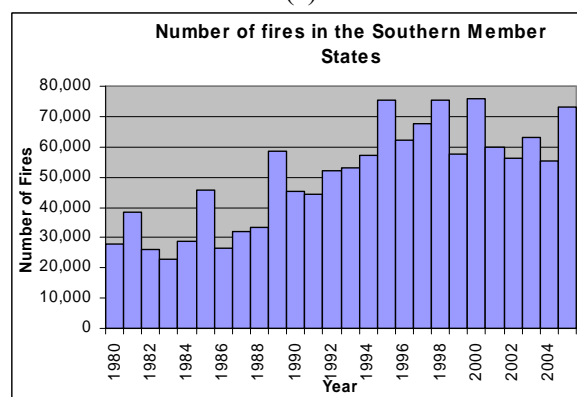
Figure 4a compares the yearly averages for burnt areas for the period 1980 to 2004 with the figures for 2005. It gives a comparison for each Member State and for all the Southern EU Countries, and shows that only in Portugal was the burnt area in 2005 above the average for the last 26 years. The overall figure for the five Southern Member States is above the 26 year average due the large forest fires in Portugal.

Figure 4b compares the yearly averages for number of fires for the period 1980 to 2005 with the figures for 2005. France, Italy and Greece were below the average for the last 26 years and the overall figure for the five Southern Member States is below the long-term average.

Figure 5 compares the contribution of each Member State in terms of burnt areas and numbers of fires with the overall figures for the five Southern Member States for 2005.



(a)



(b)

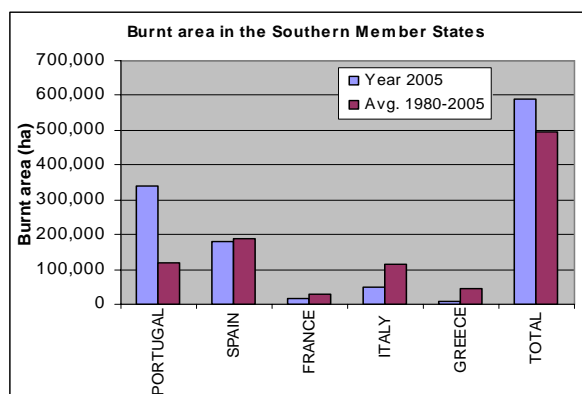
Figure 3. Burnt area (a) and number of fires (b) in the five Southern Member States for the last 26 years.

Table 2 gives a summary of the burnt areas and number of fires for the last 26 years, the average for the 1980s and 1990s, and the average for the last five years, together with the figures for 2005.

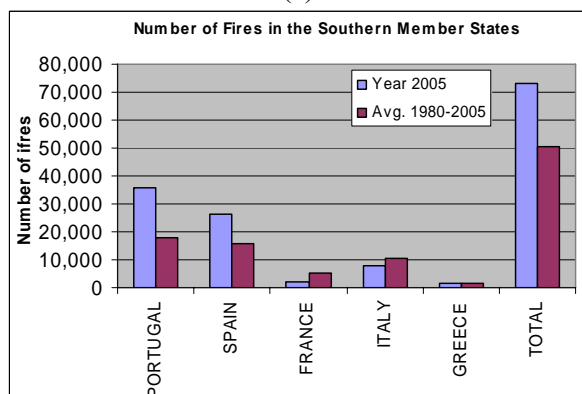
As mentioned, a total of 589 559 were burnt in the five Southern Member States in 2005, which is well above the average for the last 26 years (492 238 ha). The number of fires in these countries in 2005 was 73 325, which is also above the average for the last 26 years (50 565).

During 2005, about 88 % of the fires occurred in Spain and Portugal, accounting for approximately 85% 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 five years, the previous tendency of the five Southern Member States towards an increase in the number of fires seems to have stabilized. This may possibly be due to the public information campaigns carried out in all the countries and the improvements in the prevention and fire-fighting capacities of these countries.

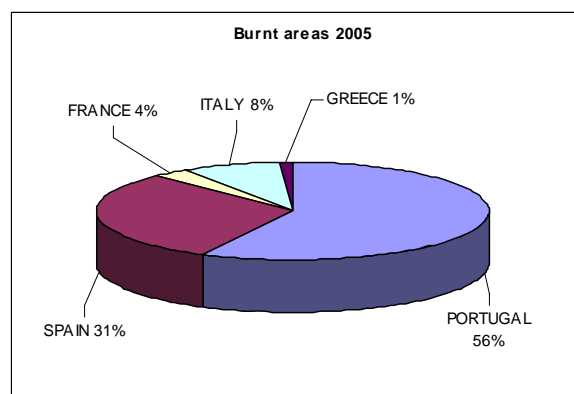


(a)

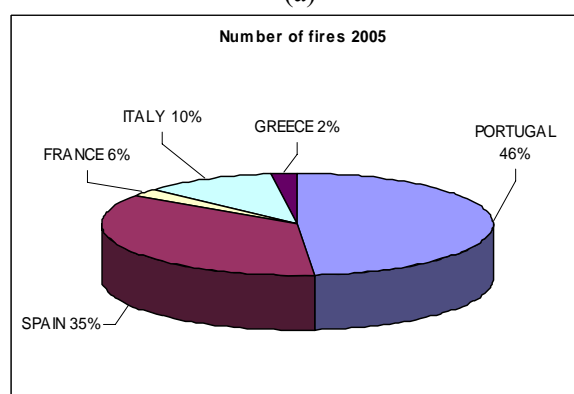


(b)

Figure 4. Burnt areas (a) and number of fires (b) in the five Southern Member States in 2005 compared with average values for the last 26 years.



(a)



(b)

Figure 5. Percentage of the total burnt areas (a) and the total number of fires (b) in each of the Southern Member State for 2005.

Table 2. Number of fires and burnt area in the five Southern Member States in the last 26 years.

Number of fires	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
2005	35 698	(*) 26 261	(**) 1 871	7 951	1 544	73 325
% of total in 2005	49	36	3	11	2	100
Average 1980-1989	6 778	9 514	4 910	11 571	1 264	34 036
Average 1990-1999	22 250	18 152	5 537	11 352	1 748	59 039
Average 2000-2005	28 568	21 570	4 278	7 739	1 834	63 988
Average 1980-2005	17 757	15 618	5 005	10 603	1 581	50 565
TOTAL (1980-2005)	461 685	406 080	130 136	275 669	41 114	1 314 684

Burnt areas (ha)	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
2005	338 262	(*) 179 929	(**) 17 356	47 575	6 437	589 559
% of total in 2005	57	31	3	8	1	100
Average 1980-1989	74 486	244 788	39 157	148 485	52 417	559 331
Average 1990-1999	102 203	161 323	22 695	108 890	44 108	439 219
Average 2000-2005	189 532	129 106	32 078	76 764	36 610	464 090
Average 1980-2005	108 582	188 265	31 156	118 303	45 932	492 238
TOTAL (1980-2005)	2 714 547	4 706 633	778 900	2 957 572	1 148 298	12 305 950

(\*) provisional data for 2005 (\*\*) for Mediterranean France only.

### 2.1.1. Portugal

Portugal suffered in end of 2004 and the entire year of 2005 a pronounced period of intensive drought. During eleven consecutive months the amounts of rain were almost insignificant or very below the normal values.

This situation has contributed to a very high drought of the forest fuels, conducting to an increasing of the fire risk ignition and propagation. At the end of August 2005, 71 % of the national territory was classified, by the National Drought Commission for 2005, as being in extremely drought conditions and 29 % as being in severe drought conditions (Figure 6).

Analysing the risk trend through the Daily Severity Rating (DSR) calculated based on the daily value of the Canadian Fire Weather Index – FWI received from the Portuguese Meteorological Institute, for the 2000 - 2005 period, it was possible to confirm the increase of fire risk for 2005 when, compared with the previous years (Figure 7).

The values of DSR observed in 2005 are the highest verified for this period, and had a significant increase after the beginning of August. There were in August 9 of the 10 highest fire risk days in 2005, considering the daily national average FWI classes.

These extreme situations contribute to the highest number of fire ignitions since 1980 (first year of data collection). There were 35 698 fires (27 519 smaller than 1 ha) that burned 338 262 ha of forestland, 213 517 ha of those on wooded land. When compared with the ten-year average this figure represents an increase of 32 % on the number of fires and an increase of 77 % of the burnt area.

Since the winter season added very a few amount of rain, there were 6 841 fires between January and March. These fires were responsible for 10 777 ha of burned area. On the 10th of January there was a fire in the Guarda district that burned 348 ha of shrub land. In the month of March, there were 7 fires larger than 100 ha mostly of those, concentrated in littoral district of Viana do Castelo e Aveiro.

In April and May with the falling of some rain the fire risk decreased. This situation has contributed to a number of fire ignitions close to the ten-year average. July and August with temperatures exceeding the 30 years monthly average in some of the inland south regions of the country that

dried up the fine fuels, where the most difficult months for fire suppression activities. In these two months 81 % (273 216 ha) of the total burned area took place. The biggest fire of 2005 took place on 19<sup>th</sup> July and started in the municipality of Seia (district of Guarda) in the Serra da Estrela Mountain, burning a total of 17 388 ha of forest and shrub lands.

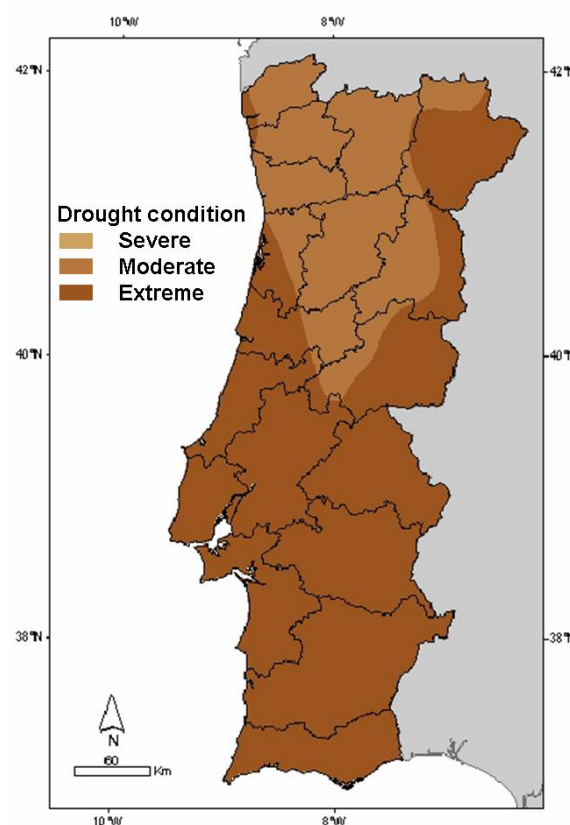


Figure 6. Spatial distribution of the Drought Index at 31 of August (Source: National Drought Commission Report, 2005).

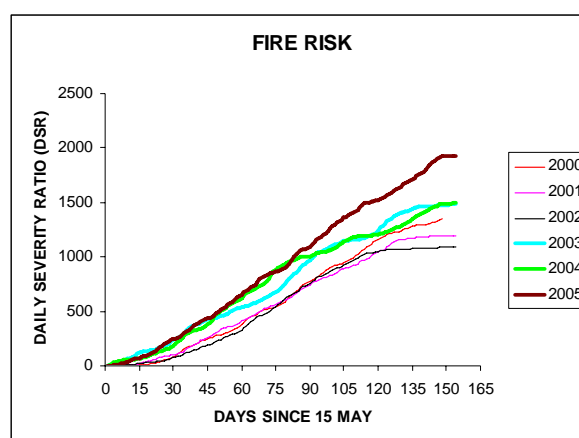


Figure 7. Evolution of the Daily Severity Rating calculated based on the daily FWI value (2000-2005)

These meteorological conditions were extended throughout all of September and the beginning of October, situation that already has been verified in 2004. The total burnt area in October (17 530 ha) was about 7 times higher than the 10-year average (2 353 ha). Finally, in the last weeks of October with the decrease of the temperatures and the occurrence of heavy showers fire activity was finally reduced. The increase of rain during the winter months leads to very low fire risk in November and December with 326 fires and 323 ha of burnt area.

The most affected regions were in the centre inland of the country, where fires burned mostly maritime pine areas and eucalyptus plantations. The largest burnt area occurred in the district of Coimbra (14 % of 2005 total), in the central part of country, where a total of 48 224 ha were burnt. The districts of Viseu and Vila Real were also very affected. The lowest burnt area took place in the south districts of the country, with Setúbal and Évora registering the lowest values. Faro, which was a very affected district in previous years, naturally had a high decrease on the burnt area, with 1 666 ha. The higher number of fires took place in the districts of Porto and Braga, in the Northwest Region of Portugal. This region is characterised by a large density of population who lives near forest land, associate with a small dimension of the forest property.

Figure 8. shows the year-on-year trend in number of fires and burnt areas in Portugal for the last 26 years.

#### Information to the public

Portugal continues in 2005 the efforts on public awareness and education campaigns initiated in 2002. In February the awareness and education action in schools (I Am a Friend of the Forest) was continued and extended to more schools, involving the participation of 84 Forest Rangers with new actions in 400 schools, affecting a total of 16 000 students. Some new awareness materials were developed (CD Rom, videos and several materials for teachers).

For the first time, in 2005 and during the fire season, people were daily informed of the fire risk forecast through the main mass media (television and newspapers), and throughout a pilot-project of automatic signalisation of the daily fire risk.

Also during the fire season there was a national campaign "Between ashes and green" with several actions posted in the fuels stations and in

outdoors located in the some of the main highways.

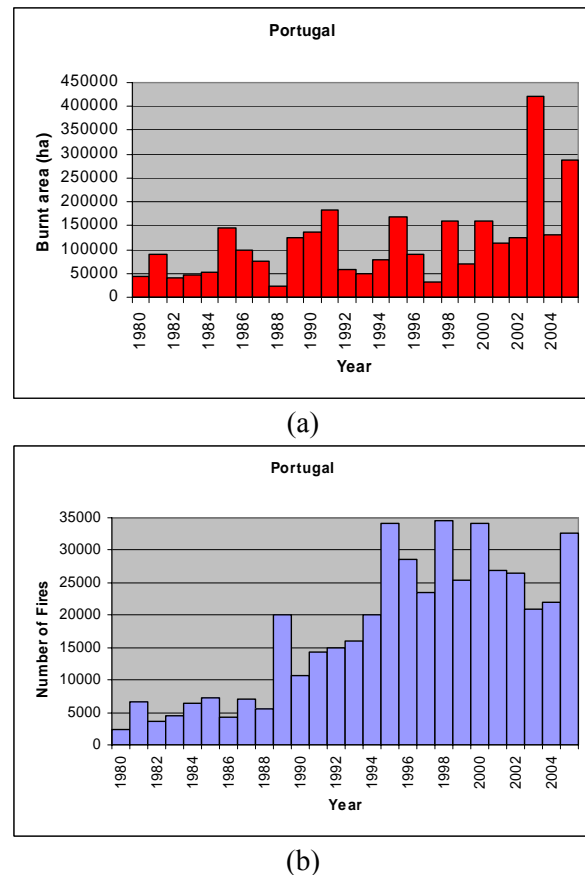


Figure 8. Burnt areas and number of fires in Portugal for the last 26 years.

#### Loss of Human Lives During 2005 Fire Season

In Portugal, there were 18 deaths during 2005 fire season, most of them (12) were fire-fighters. Three died as a result of traffic accidents, and the others died during fire-fighting operations (most of them were caught by fire) or in consequence of burns suffered during fire-fighting. There are also reports of 6 victims among civilians, most of them caught by fire when trying to protect their properties. Although some accidents occurred with aerial means, there is no report of deaths among pilots.

More than one thousand people needed medical assistance due to smoke intoxications, burns, wounds, etc.. From these, around 460 were fire-fighters and about 30 of them were seriously injured.

#### Operations on mutual assistance during 2005 fire season

During 2005, the abnormal situation of forest fires in Portugal led to the request of mutual assistance for several times. Those actions were taken under



the scope of bilateral agreements or according to MIC support.

During first large fires in June and July, there was a need of requesting aerial means to Spain, according to the bilateral cooperation agreement existent between the Portuguese Republic and the Kingdom of Spain.

By the middle of August (during the critical period occurred between days 14 and 26), the increasing number of forest fires led to a need of heavy aerial means (amphibious aircrafts) and this request was spread through MIC. Help was accepted from France, Germany, Netherlands and Italy. During this period and the next two months, Spain continued to provide help to Portugal with aerial means used for fire-fighting inside and outside the border area (5 km to each side of border line).

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

### 2.1.2. Spain

The end of year 2004 was characterized by precipitation shortage, especially the peninsular northwest experienced more intense accumulated drought. The month of January 2005 continued with the situation whereupon the previous year with very little precipitations finalized. To the end of month a cold wave affected to the peninsular northwest leaving abundant snow precipitations. In the rest of the territory shortage of rain and low temperatures combined with episodes of strong winds caused a high degree of drying of the vegetation and higher than normal forest fire risk. The aerial means of the Environment Ministry (MMA) took part in a total of 9 fires located in the peninsular west.

The beginning of February continued with low temperatures and some snow precipitations. The precipitation shortage specially affected the northwest of the Peninsula. During this month, in addition to the permanent bases of amphibious airplanes of Matacán and Torrejón de Ardoz, the MMA had a helicopter KAMOV K-32 11BC located in Ibias (Asturias) and a amphibious airplane CL-215 T in the airport of Santander. On the 16 February a new winter fire brigade (BRIF) was based in Tabuyo del Monte (León). The state means took part in 37 fires in the provinces of Leon, Zamora and Ourense which registered a greater number of fires.

March continued with rain absence which led to a high fire risk in the northwest. During both first thirds of the month there were several interventions from the aerial means of the MMA. In the last third there were precipitations generally over almost whole territory except the Canary Islands; although the rains were not abundant, they reduced the fire risk. During this month a new winter BRIF was based in Lassos (Ourense). Also there was a displacement of an airplane CL-215 from Matacán to Reus (Tarragona) to increase the territorial cover of the Mediterranean area during Easter. The means of the MMA had a total of 114 interventions with a total of 339 flight hours. There were 2 great fires in Pedralba of Pradería and Espadañedo (Zamora).

In April there were precipitations that, although little and irregular, contributed to reduce the fire danger. On the 15 of April finalized the period of operation of the winter BRIF of Tabuyo of Monte (Leon) and continued the one of Lassos (Ourense) until end of month. The interventions of state means concentrated in the beginning and in the end of month resulting in 24 performances.

May was characterized by the periods with cloudless skies and high temperatures alternating with periods of overcast skies and irregularly distributed rains. The accumulated precipitation deficit to a great extent continued increasing and the fire danger has been far beyond the one of previous years in this month. The means of the MMA had 28 interventions distributed in 8 Autonomous Regions.

The month of June had high temperatures and absence of rains in almost all the country. The opening of the base of amphibious airplanes of the base of Pollensa (Balears) was anticipated to day 1 and as of day 16 the detachments of amphibious airplanes were activated in Malaga, Zaragoza, Los Llanos (Albacete) and the Talavera Real (Badajoz), as well as the helicopter bases KAMOV K-32A 11BC of Huelma (Jaén) and Villares de Jadraque (Guadalajara). Also the Autonomous Regions started to activate their own aerial and terrestrial extinction means. There were aerial means of the MMA surpassing the 450 flight hours per day except in 6 days of this month. During this month three great fires took place located in Linares de Riofrío (Salamanca), Navarclés (Barcelona) and Quintana y Congosto (Leon).

July characterized itself by temperatures above the average for this month. Scarce precipitations were located in the peninsular north (coastal

Cantabrian and Pyrenean) and mountainous zones of the interior in many occasions with stormy character and strong electrical discharges. The meteorological risk was high during almost all the month with frequent episodes of extreme risk caused by land winds. To this meteorological risk it is necessary to add, due to the accumulated drought, the low moisture content of the vegetation. These circumstances favored the starting and the propagation of fires. During this month the activation of bases and means of extinction of the DGB and the Autonomous Regions was completed. The state means collaborated in the extinction of more than 240 fires with more the 1 600 flight hours. Nine big fires took place, being particularly serious by the affected surface and the death of 11 components of a fire brigade of the Junta de Castilla La Mancha, the fire of Riba de Saelices (Guadalajara); it initiated day 16 and was controlled day 20 with a burned surface more than 12 000 hectares. The situation of high accumulated drought, the occurrence of a number of fires greater than previous years, the great extension reached about some wrecks and the great social sensitivity increased by the accident of Guadalajara motivated the Government to approve the law RDL 11/2005 of 22 of July by which urgent measures in the matter of forest fires were approved. This RDL, among other measures, increased the airships contracted by the DGB and introduced limitations or prohibitions in activities that could cause forest fires.

August continued with very high fire risk. Temperatures went above 40°C in many inner provinces and little precipitations were located in the north of the Peninsula. In the mountainous zones of the interior the storms without precipitation and with electrical discharges caused numerous fires by lightning. During this month the airships contracted on the basis of RDL 11 /2005 were added to the extinction means of the DGB. The state means supported the Autonomous Regions in more than 500 fires exceeding more the 3 600 flight hours. During this month there were 21 big fires being the most significant those of Casavieja (Avila), Sierra de Cazorla (Jaén), Alía-Sevilleja de la Jara (Cáceres-Toledo) and in the provinces of A Corunna, Ourense and Pontevedra. During this month there was also support with amphibious airplanes to Portugal, consequence of the dramatic fire situations that the neighboring country suffered.

September began with the same situation whereupon August finalized. From the second

week precipitations located in the east and the peninsular northeast, sometimes of stormy character, diminished the risk in this area. In the northwest there was a decrease of temperatures that moderately reduced fire danger. The greater risk took place in Andalusia due to the existence of several days with land winds. Canary Islands had in the first third of month a situation of extreme risk caused by dry and warm winds coming from the African continent. The aerial means of the DGB made more than 250 interventions surpassing the 1 250 flight hours. Three big fires took place in Garafía (Isla de la Palma ), Lucillo (Leon) and Lanjarón (Granada).

During the first third of October the situation of the previous month was repeated. There were numerous fires in the peninsular northwest (Galicia, Asturias, Leon and Zamora). This advised to maintain operative the bases of Talavera Real (Badajoz) and Labacolla (La Coruna) with an airplane CL-215T and the transfer of a helicopter KAMOV to the base of Lassos during the first fortnight of the month. From the 10 of October the precipitations in all the territory reduced the forest fire risk. The most extensive fire happened in the Natural Park of the Lago de Sanabria (Zamora). There was a latent fire on a peat bog from the month of August with sporadic outcrops of flames to the surface. The strong wind propagated the flames with great speed and caused a fire of more than 10 000 hectares. This big fire was accompanied by others in the same zone. At the end of month, days 26 and 27, there was another big fire in Cangas de Nancea (Asturias). The airships of the DGB made during the first ten days this month 81 interventions surpassing the 530 flight hours. Also an airplane CL-215T located in Talavera la Real worked during two days in Portugal.

In the month of November there was a decrease of temperatures and significant precipitations. In the Canary Islands a tropical storm left abundant rains and strong winds mainly in the western islands. The fire risk was low over all Spain. During this month there was no intervention of aerial means of the DGB.

December was a dry month but the rains of previous months together with the low temperatures maintained a low fire risk. There was only 1 intervention of aerial means of the DGB with an amphibious airplane in Lugo.

### Number of fires and affected Surfaces

The numbers of year 2005 according to the data provided by the Autonomous Regions are shown in Table 3.

Year 2005 was the second year with greater number of fires (26 261) only surpassed by 1995. With respect to the forested surface covered by trees, year 2005 has been the one that presents a larger affected area (69 212 ha), surpassing widely the average of the previous decade. Regarding the forest land, the burned area of 2005 is the second (179 929 ha) after year 2000. The conditions of accumulated drought of this year have influenced remarkably in the obtained results.

These numbers are not including the data of herbaceous surface crossed by the fire in the territories of Andalusia and Extremadura since they have not been provided to the DGB. In any case, this herbaceous surface will not be of great magnitude because the conditions of drought have not favored the growth of grasses and the cattle has contributed to reduce even more the herbaceous fuel. The data of Guipúzcoa, Teruel, Zaragoza, Ciudad Real, Guadalajara and Valladolid are final.

### Victims

During 2005 there were 17 deaths of fire fighters. The accidents have been the following ones:

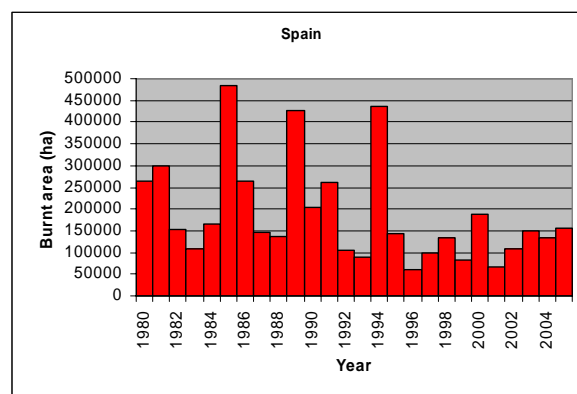
- on 7<sup>th</sup> June airplane Dromader PZL contracted by the Xunta of Galicia had an accident when it participated in the extinction of a fire in Beariz (Ourense),
- on 17<sup>th</sup> July in the fire of Riba de Saelices (Guadalajara) 11 fire fighters passed away when caught by the fire,
- on 6<sup>th</sup> August a fire fighter passed away caught by a rock when participating in the extinction of a fire in Casavieja (Avila),
- also on 6<sup>th</sup> August an accident of an airplane Dromader PZL contracted by the Xunta of Galicia caused the death of the pilot while fighting a fire in Monterrei (Lugo),
- on 28<sup>th</sup> August the pilot of an airplane AT-802 based in Son Bonet contracted by the Community of Balears passed away

when fighting a fire in Escorca (Island of Majorca),

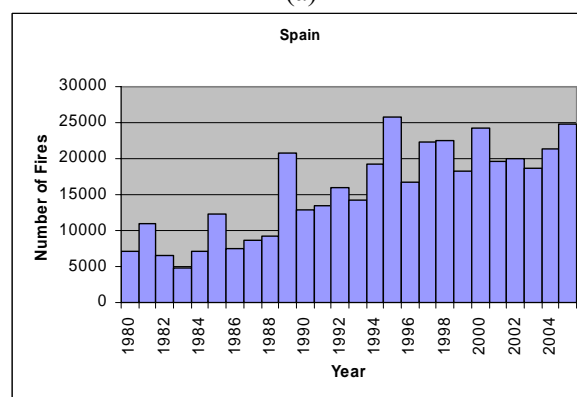
- on 4<sup>th</sup> September during the extinction of a fire in Montroy (Valencia) an accident of an airplane Dromader PZL caused the death of the pilot,
- 6<sup>th</sup> September a fire fighter of Junta de Castilla y León passed away due to a stroke while working in the extinction of a fire in Palaces of Sil (Leon).

Figure 9 shows yearly trends in the number of fires and burnt areas in Spain over the last 26 years.

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



(a)



(b)

Figure 9. Burnt area and number of fires in Spain over the last 26 years.

Table 3. Forest Fires from January 1st to December 31st provisional and definitive data (compiled on February 10th 2006)

PROVINCE / REGION	Num. of fire events		Burned Area				% AREA in relation to the existing area	
	Fires ≤ 1 ha	Fires ≥ 1 ha	Wooden Forest			Herbaceous Forest		
			Trees	Bush/Scrubland	Total			
Alava	19	21	65,83	30,27	96,10	12,54	0,052	0,060
Guipúzcoa	25	21	203,49	69,13	272,62	2,75	0,183	0,198
Vizcaya	99	62	113,51	101,29	214,80	17,00	0,094	0,155
PAIS VASCO	143	104	382,83	200,69	583,52	32,29	0,106	0,131
Barcelona	322	52	2.673,26	695,91	3.369,17	22,60	0,677	0,711
Girona	117	14	107,56	11,41	118,97	1,85	0,035	0,031
Lleida	129	62	234,25	233,57	467,82	38,46	0,059	0,071
Tarragona	130	59	693,45	758,82	1.452,26	0,00	0,418	0,530
CATALUÑA	698	187	3.708,52	1.699,70	5.408,22	62,91	0,293	0,295
A Coruña	1.904	737	3.198,76	6.235,17	9.433,93	0,00	0,792	1,852
Lugo	851	290	625,88	2.424,21	3.050,09	0,00	0,132	0,457
Ourense	2.750	1.542	10.331,61	19.978,66	30.310,27	0,00	3,178	5,213
Pontevedra	3.273	626	7.888,57	6.597,84	14.486,41	0,00	3,572	4,793
GALICIA (*)	8.778	3.195	22.044,82	35.235,88	57.280,70	0,00	1,547	2,780
Almería	51	41	44,80	541,20	586,00		0,050	0,104
Cádiz	132	29	51,20	490,20	541,40		0,041	0,137
Córdoba	104	35	64,50	190,10	254,60		0,026	0,042
Granada	125	56	588,20	1.527,20	2.115,40		0,315	0,356
Huelva	194	82	861,00	1.327,50	2.188,50		0,183	0,283
Jaén	251	48	2.342,20	2.172,10	4.514,30		0,959	0,727
Málaga	78	42	271,30	718,00	989,30		0,295	0,328
Sevilla	105	36	324,30	321,60	645,90		0,166	0,137
ANDALUCIA (**)	1.040	369	4.547,50	7.287,90	11.835,40	0	0,276	0,274
ASTURIAS (*)	912	1.369	1.520,75	6.044,65	7.565,40	0,00	0,467	1,134
CANTABRIA	62	333	1.206,15	2.416,06	3.622,21	854,45	0,771	1,385
LA RIOJA (*)	70	47	49,46	275,85	325,31	0,00	0,042	0,110
MURCIA (*)	108	32	40,93	218,47	259,39	0,00	0,022	0,051
Alicante	125	22	244,12	67,62	311,74	15,21	0,397	0,132
Castellón	136	34	319,03	786,70	1.105,73	355,16	0,216	0,366
Valencia	331	59	360,82	1.067,51	1.428,33	103,02	0,127	0,269
COM. VALENCIANA	592	115	923,97	1.921,83	2.845,80	473,39	0,187	0,273
Huesca	125	99	106,20	342,65	448,85	0,00	0,027	0,052
Teruel	169	39	192,59	351,49	544,08	45,55	0,048	0,066
Zaragoza	178	78	540,29	363,89	904,18	138,34	0,274	0,146
ARAGÓN (*)	472	216	839,08	1.058,03	1.897,11	183,89	0,085	0,084
Albacete	119	43	84,28	40,42	124,70	13,51	0,038	0,022
Ciudad Real	87	100	419,25	2.398,12	2.817,37	304,93	0,406	0,377
Cuenca	199	74	347,28	472,13	819,41	78,62	0,075	0,106
Guadalajara	171	73	10.925,76	2.743,51	13.669,27	57,21	3,713	1,857
Toledo	104	166	3.329,04	1.055,65	4.384,69	410,59	6,189	1,125
CASTILLA LA MANCHA	680	456	15.105,61	6.709,83	21.815,44	864,86	1,326	0,653
Las Palmas	47	5	143,32	28,41	171,73	18,42	0,914	0,079
S.C. de Tenerife	55	13	2.318,52	19,63	2.338,15	1,81	2,905	0,958
CANARIAS	102	18	2.461,84	48,04	2.509,88	20,23	2,578	0,521
NAVARRA	535	188	405,21	876,51	1.281,72	131,12	0,118	0,267
Badajoz	261	158	220,05	401,68	621,72		0,094	0,063
Cáceres	745	481	7.366,29	6.745,85	14.112,14		1,459	1,096
EXTREMADURA (**)	1006	639	7.586,34	7.147,52	14.733,86	0,00	1,025	0,647
ILLES BALEARS	132	15	49,84	66,01	115,85	231,11	0,046	0,170
MADRID	296	131	66,16	479,62	545,78	279,61	0,043	0,210
Ávila	148	96	567,27	1.048,98	1.616,25	198,48	0,437	0,337
Burgos	134	62	265,09	299,55	564,64	88,13	0,074	0,080
León	424	656	2.140,69	11.322,87	13.463,56	458,27	1,280	1,566
Palencia	112	72	586,97	283,87	870,84	25,88	0,810	0,351
Salamanca	293	162	1.698,54	1.795,72	3.494,26	354,07	1,236	0,535
Segovia	58	26	45,59	34,96	80,55	73,50	0,027	0,025
Soria	67	28	277,30	51,47	328,77	47,76	0,086	0,052
Valladolid	41	25	319,85	79,65	399,50	22,16	0,308	0,266
Zamora	262	555	2.371,79	18.926,45	21.298,24	784,62	1,953	4,643
CASTILLA Y LEÓN	1.539	1.682	8.273,09	33.843,52	42.116,61	2.052,87	0,522	0,978
CEUTA	0	0	0,00	0,00	0,00	0,00	0,000	0,000
MELILLA	0	0	0,00	0,00	0,00	0,00	0,000	0,000
TOTAL	17.165	9.096	69.212,09	105.530,11	174.742,20	5.186,73	0,621	0,690

### 2.1.3. France

On the whole, 22 400 ha (provisional area) were affected by fire in France in 2005. A total of 17 800 ha ("Prométhée" database) were touched by fire in the Mediterranean departments (the 10-year average is around 16 000 ha). Most of the fires occurred during the summer and burned 16 200 ha.

This assessment is worsened by the deaths of 6 people: 4 members of crew of planes of civil safety, the pilot of a light water bomber plane and a fireman.

The operational assessment in the Mediterranean departments is slightly higher than that of an "average" campaign. However it remains distant from those reached at the time of several difficult years such as: 1979 (51 000 ha), 1982 (46 000 ha), 1983 (46 000 ha), 1989 (53 000), 1990 (40 000 ha), 2003 (60 800 ha).

Until the end of August the weather conditions were difficult because of the dryness which prevailed in nearly whole Mediterranean zone. The regular establishment of sometimes violent windy modes led to very severe fire risk.

The accumulated number of sectors classified in exceptional or very severe risks in July and August, which is established to 785, shows the level of fire danger, with the average for this period of the year amounting to 470.

Twenty four fires exceeded more than 100 ha, including 4 with more than 1 000 ha. These figures are higher than the decennial averages which are established respectively to 17 and 3.

These important fires developed in 10 of the 15 Mediterranean departments: Alpes-de-Haute-Provence (2, of which fire GREOUX-les-BAINS burned 2 100 ha), Alpes-Maritimes (1), l'Ardeche (3), l'Aude (2), les Bouches-du-Rhône (4), Haute-Corse (2 which burned 2 250 ha in CALENZANA and 1 270 ha in PIEVE), Gard (1), Herault (1), Pyrénées-Orientales (2, of which the fire of TARERACH which burned 2 150 ha), Var (6).

Several of these fires (in particular in Alpes-de-Haute-Provence, Alpes-Maritimes, Bouches-du-Rhône, Var, where buildings were severely damaged or destroyed) again revealed the difficulties caused by the constructions whose owners do not generally respect the legal obligations of undergrowth clearance.

This operational situation, which highlights the extent of the vulnerable zone, led to the mobilization of the national aerial means. On the whole 410 of the 900 fires recorded since the end of June in Southern zone benefited from the contribution of national means (46%), which is a particularly high ratio (the average over the period 1989-2004 is 30%).

Finally, it should be stressed that the number of fires, relatively limited (less than 1 000), is lower than the average of last ten years, in spite of fire-favorable conditions. This shows the importance of the engagement of the services of police force and gendarmerie to control the most vulnerable forest areas together with the forest fire services. Their action made it possible to identify nearly a hundred authors of fire.

#### Implemented means

3 600 hours of flight of water bomber planes were carried out during the summer, including 1 670 hours of air force missions (200 fires benefited from the interventions). The share of the operational hours devoted to the air force (45%), is higher than the average which is established to 32%, which corresponds to the operational requirements resulting from the high level of the risks. At the time of these missions 2 050 tons of fire retardant were used.

The water bomber helicopter AIRCRANE intervened on about thirty fires (of which ten on the continent at the time of the unavailability of the CL415) and consumed 125 hours of flight. The quantities of released water (on average 60 tons per hour of flight) show the high operational output of this machine.

The UIISC intervened on 153 fires, and ensured 280 missions of ground survey. It should be noted that the delaying detachment of intervention was requested on the most important fires which developed on land. Its contribution was appreciated by the ground forces. 150 tons of terrestrial fire retardant were used.

Four columns of reinforcement were installed at the end of July in the sectors concerned with the highest risks (Haute-Corse, Var, Bouches-du-Rhône, Herault). These means were associated measures of preventive survey and intervened, since July 29, on the most important fires. They were gradually disengaged between August 8 and August 18, representing a contribution of 5 000 men-day. Their use appears "to be better targeted" compared to the most critical period of last year, the estimated columns having then represented a volume of 11 600 men-day.



Fire-fighting reinforcements were also mobilized representing a volume of 6 400 men-day and also the reinforcement of the command device (600 men-day).

The decision, for reasons of safety, to keep on the ground the fleet of the CL415 following the accident of Pelican 36 which has occurred on August 1 made this contest particularly difficult. This situation doubly penalized the effectiveness of the device of intervention, since on the one hand the capacity of air fight was cut down by the withdrawal of the CL415, on the other hand the water Tracker bombers limited their interventions in the field of the GAAR which accounted for only 40% of their activity against 65% in usual time. During these ten days, more than 30% of the summer destruction occurred, whereas the number of sectors classified in very severe risks accounted for only 25% of the total of the summer.

It should be noted that anticipation in the engagement of means made it possible to stop 75% of the fires before they reached 1 ha and 90% of the fires before they reached 5 ha. The surface affected by fire this year represents half of the average at the time of the eighties when the strategy of attack of incipient fires was not applied.

This already very difficult context in Southern zone was still worsened by the extension of the zone of risks to South-west and South-east. The surfaces affected by fire in these 2 zones, also weakened by the dryness, since the beginning of the summer remained more limited than those of the Mediterranean departments (400 ha in South-eastern zone, 1100 ha in South-western zone). However, the engagement of the national air means was not less necessary at the time of potentially dangerous fires due to threat on the population (5 fires in the Rhone-Alps area) or due to the economic stakes (25 fires in the Landes forest during the summer, 39 over the year). The extension of air means to this zone of intervention made more delicate the operational management of the fleet of water bomber planes.

Figure 10 shows trends in the number of fires and burnt areas in France over the last 26 years.

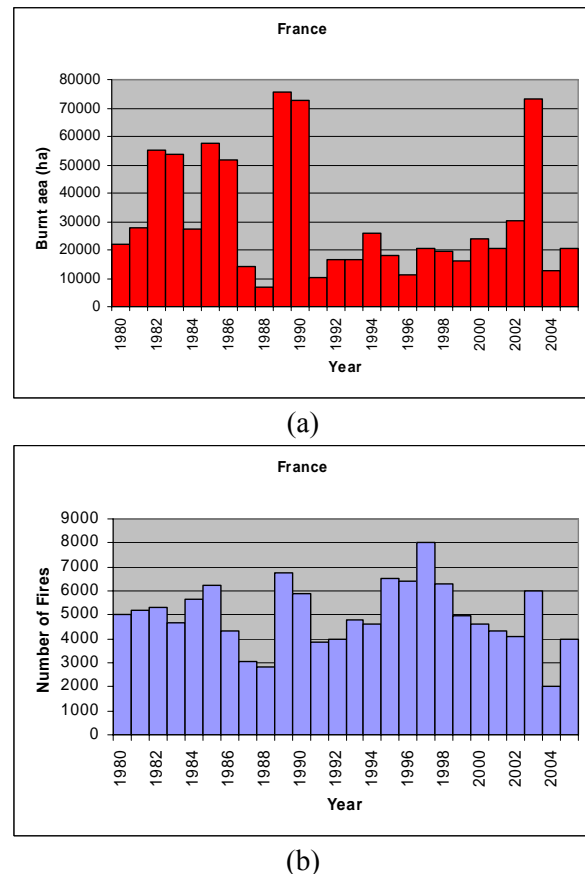


Figure 10. Burnt areas and numbers of fires in France over the last 26 years. The number of fires refers only to Southern France.

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

#### 2.1.4. Italy

In 2005, 7 951 forest fires burned 47 575 ha, of which 21 470 ha were on wooded land and 26 105 on non-wooded land.

Comparing with the previous year a slight increment of the fire number has been found, around 19%, and a small increase of 3% regarding the burned wooded land. However, the total extension of territory affected by fire has been reduced by 21%. If confronted with 2003 the reduction of 48% of the burned area has been even more noticeable. The small average fire size of 6 ha is also of relevance showing the excellent results achieved by the forest fire prevention and fighting system.

#### Forest fires per month

The correlation between forest fires and climate turns out obvious from the examination of the

distribution of the phenomenon in the various periods of the year. Normally fires are concentrated in the summer, with a peak of smaller intensity to the end of the winter. The differences found from one year to the other are an expression of the climatic conditions. Also 2005, characterized by winter fires and from a particularly elevated fire peak in the month of July, has confirmed the evidenced correspondence.

The year started with 222 fires in January going up to 425 in February and 488 in March. After a spring stop, the phenomenon resumed in July, with 2 525 fires, and practically finished at the end of August, with little fire activity remaining from September to December. July has recorded the more critical situation of the entire year.

#### Forest fires by region in 2005

The map of fire in the various regions, in 2005, has been characterized by the important number of events in Sardinia that, with 3 044 fires, has been the center of a true and own emergency. The high number of fires was accompanied by average fire size of 4 hectares.

After the Sardinia, the regions that have recorded the higher number of fires have been Calabria (818) and Campania (752).

Sicily had the most extended wooded surface covered by fire (3 815 hectares), but the situation has turned out serious also in Liguria (3 380 hectares) and Sardinia (3 176 hectares).

Sardinia was the region with the largest forest fire area: 13 416 hectares; also in Sicily and Calabria the spread of fires was important: 8 589 and the 6 922 hectares respectively.

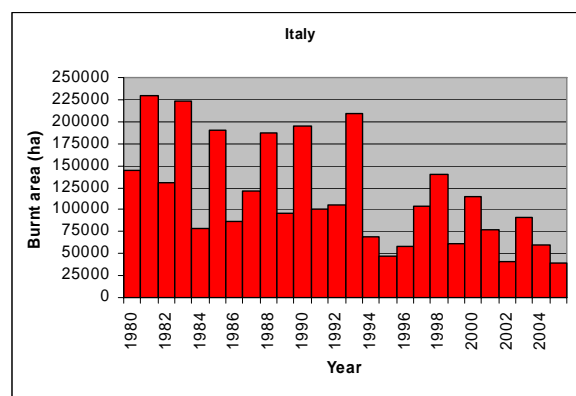
The situation in northern Italy was also serious. Piemonte, Lombardy and Valle d'Aosta have been particularly hit from winter fires. The Piemonte, with 1 192 hectares of burnt forest surface has exceeded the Campania (1 177 hectares).

Particular attention deserves Valle d'Aosta, that had the highest burned area per fire: 27 hectares. However, the total number of events has been quite reduced (12). That was due to two particular fires, developed in only day, 12 March, due to the persistent winter drought.

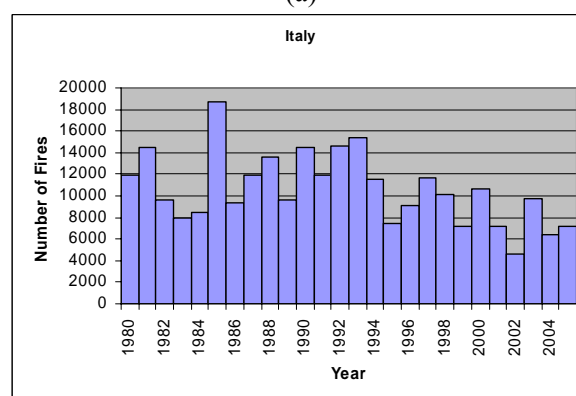
Also Sicily and Liguria have been characterized by high average surface of fire of approximately 12 hectares in both regions.

The yearly trends in terms of numbers of fires and burnt areas during the last 26 years in Italy are shown in Figure 11.

(Source: *Corpo Forestale dello Stato and Dipartimento della Protezione Civile, Ufficio Pianificazione, Valutazione e Prevenzione dei Rischi, Servizio Rischio Incendi Boschivi, Italy*).



(a)



(b)

Figure 11. Burnt areas and numbers of fires in Italy over the last 26 years.

#### 2.1.5. Greece

The provisional results of the fire campaign of 2005 in Greece, as verified by the Forest Service are shown in Table 4.

Table 4. Provisional forest fire data (1.1.2005 – 31.1.2005)

		(1)	(2)	(1+2)
Number of fires	<1 ha	1 199	4 915	6 114
	1 - 5 ha	228	262	490
	5 - 500 ha	116	87	203
	>500 ha	1	0	1
	TOTAL	1 544	5 264	6 808
Burned areas (ha)	Wooded	5 517.6	0	5 517.6
	Non wooded	919.8	2 577.5	3 497.3
	TOTAL	6 437.4	2 577.5	9 014.9

(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 2005 in Greece per region is indicated in Table .

The summer of 2005 was without extreme weather conditions. There were neither heat waves of big duration nor very strong winds (meltemia) which we usually face during the summer months in Greece. Additionally they were some periods with rainfalls especially in the North Greece. Under these conditions, only a small number of forest fires exceeded 100 ha of burnt area and just one exceeded 500 ha. Most of the fires with burnt area between 100 to 500 ha happened with chronological order in the Regions of Anatoliki Sterea (Evia Island-17/4), Attiki (Spetses Island-23/7), Epirus (Preveza-29/7), Peloponissos (Patra-30/7), Crete Island (Herakleio-3/8) and Peloponissos (Tripoli-20/8).

The largest fire in which burnt area reached and exceeded 500 ha happened in the Region of Attica (Rafina-28/7) in wild-land urban interface and at the same time more than 100 houses were damaged. This fire resulted to have the region of Attica the largest burnt area (1 455.6 ha) while the region of Peloponnesus continues to have the largest number of fires (281).

In comparison to annual means of the last decade (number of fires: 1 810, burnt area: 44 703 ha) the number of fires remained lower and the burnt area at the level of 20% of the mean.

The aerial means used during the campaign are shown in Table 6.

During the fires there were some injured from 6 little accidents but fortunately no one died.

Table 6. Aerial means participated during the campaign of 2005.

STATE OWNED MEANS		Number
AIRCRAFTS	CL-215	14
	LARGE CL-415	10
	C-130 + MAFFS	1
	SMALL PEZETEL	18
	GRUMMAN	3
HELICOPTERS	H/P PK 117	3
	SUPER PUMA	1
TOTAL		50
HIRED MEANS		Number
HELICOPTERS	H/P MI-26	4
	H/P SIKORSKY 64	3
	H/P MI-8-MTV	2
	H/P KA-32	3
TOTAL		12

The personnel involved in suppression efforts 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.

During the fire campaign, in response to two demands of mutual assistance from Portugal (20 & 26/8/2005), in the first one due to state of alert in the country was not possible to dispose aerial means and in the second one it was declared the possibility to dispose 2 aircrafts for a week which finally they weren't asked to intervene.

Table 5: Total forest fires review in Greece of 2005 by regional forest administration

FOREST ADMINISTRATION AUTHORITIES	TOTAL NUMBER OF FIRES	<1 ha	1-5 ha	5-500 ha	>500 ha	TOTAL BURNED AREA (ha)	WOODED (ha)	NON WOODED (ha)
EAST MAC. & THR.	36	23	12	1	0	66.1	52.3	13.8
CENT. MACEDONIA	85	72	7	6	0	166.6	150.6	16.0
W. MACEDONIA	111	79	24	8	0	191.9	131.3	60.6
EPIRUS	266	219	38	9	0	702.6	608.9	93.7
THESSALY	63	50	7	6	0	143.4	141.8	1.6
IONIAN ISLANDS	141	102	28	11	0	384.8	369.0	15.8
W. GREECE	188	153	20	15	0	403.9	391.6	12.3
ST. GREECE	162	128	18	16	0	728.8	636.5	92.3
ATTIKI	64	39	9	15	1	1 455.6	1 037.8	417.8
PELOPONNISOU	281	228	40	13	0	1 352.9	1296.6	56.3
N. AIGAIUO	59	45	6	8	0	260.0	148.0	112.0
S. AIGAIUO	26	14	8	4	0	196.9	180.4	16.5
CRETE	62	47	11	4	0	383.9	372.8	11.1
TOTAL	1 544	1 199	228	116	1	6 437.4	5 517.6	919.8

In addition to the regional data on forest fires, Fire Brigade of Greece has reported the number of fires in other non-forest land areas burnt. Data are shown in Table 5.

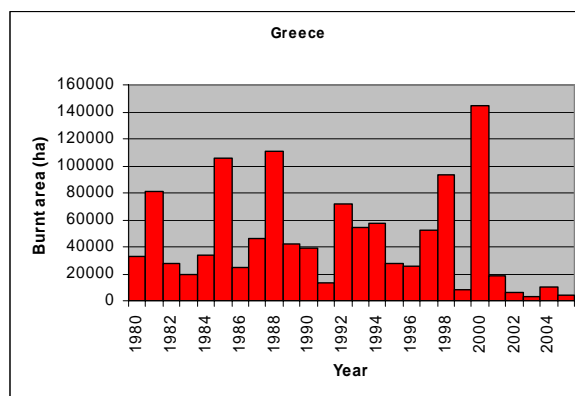
Overall the improvements in planning to confront fires in Greece during the last 5 years seem to produce satisfactory results. This planning will continue and during the 2006 campaign with minor modifications. Aircraft will continue to operate as in the previous years; coordination and prevention efforts will be better technologically supported and will be given more focus on public awareness campaigns and further education of personnel involved.

The yearly trends in terms of numbers of fires and burnt areas during the last 26 years in Greece are shown in Figure 12.

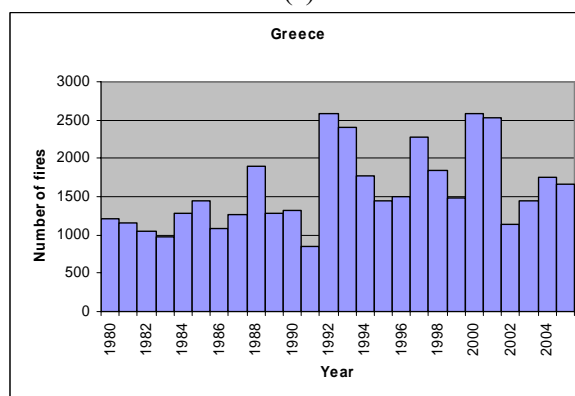
Table 5. Fires in non-forest land of Greece in 2005

Forest administration	Number of fires					Burned area (ha)
	Total	<1 ha	1-5 ha	5-500 ha	>500 ha	
EAST MAC. & THR.	313	306	6	1	0	86.0
CEN. MACEDONIA	980	930	41	9	0	392.6
W. MACEDONIA	362	274	78	10	0	419.2
EPIRUS	308	293	13	2	0	148.0
THESSALY	148	130	13	5	0	156.6
IONIAN ISLANDS	379	363	15	1	0	92.0
W. GREECE	901	885	10	6	0	151.0
ST. GREECE	205	184	19	2	0	78.4
ATTIKI	100	98	2	0	0	17.1
PELOPONNISOU	1 013	941	30	42	0	673.7
N. AIGAIUO	36	34	2	0	0	8.9
S. AIGAIUO	178	152	20	6	0	175.2
CRETE	341	325	13	3	0	178.8
TOTAL	5 264	4 915	262	87	0	2 577.5

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



(a)



(b)

Figure 12. Burnt areas and numbers of fires in Greece over the last 26 years.

## 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 areas burnt differ significantly from those of the Southern States as presented in the previous chapter.

### 2.2.1. Austria

In 2005, there were 1 759 wildland fires with total burnt area 104 ha and 954 forest fires which resulted in 74 ha of burnt land. Most of the fires were smaller than 1 ha, the largest fire event resulted in 5 ha of burnt area.

(Source: Federal Fire Brigade Federation, Austria)

### 2.2.2. Cyprus

During the year 2005, a total number of 185 forest fires broke out in Cyprus affecting an area of 1 838 ha of wooded and non-wooded land. The trends regarding both the number of fires and burnt areas over the last 6 years are shown in the following figures. Analyzing the number of fires during the period 2000-2005 it can be concluded that, each year the number of forest fires ranges between 250-300 fires. The total burnt area during this period was 20 465 ha. (Figure 13 and Table 6).

A number of 7 forest fires with burnt area size equal or greater than 50 ha were recorded.

No casualties were reported in Cyprus during the fire season of 2005.

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 16 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 2005. Additionally, 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 six years (2000 – 2005) was found to be 12 minutes and the burnt area for 81 percent of the total number of fires, did not exceed the size of one hectare.

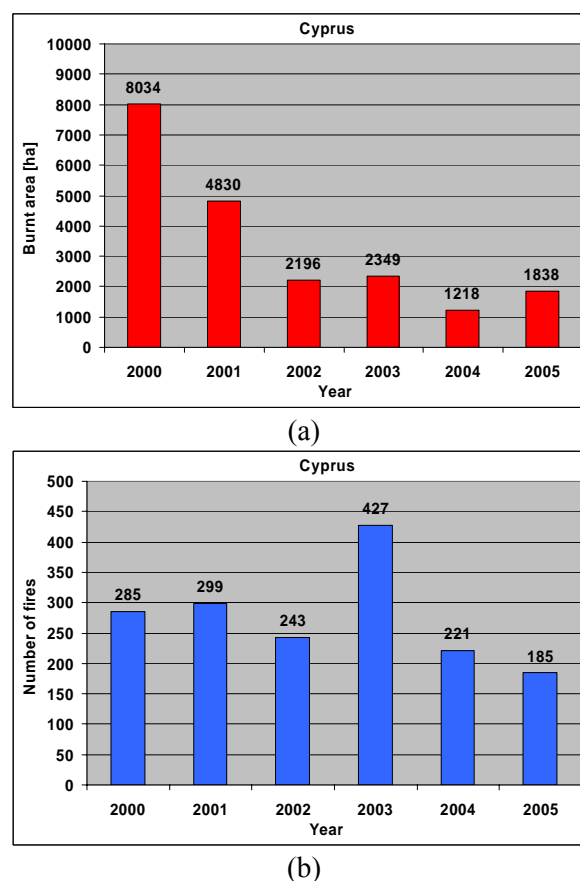


Figure 13. Burnt areas and numbers of fires in Cyprus over the last 5 years.

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



Table 6. Numbers 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	8 034	2 552	5 482
2001	299	4 830	778	4 052
2002	243	2 196	166	2 030
2003	427	2 349	921	1 428
2004	221	1 218	667	551
2005	185	1 838	962	876

### 2.2.3. Czech Republic

In 2005, number of fires reached 619 with the total burned area 227 ha. The detailed fire event summary for last 4 years is given in Table 7. The fire causes are summarized in Table 8. Figure 14 show the historical records of burnt areas and number of fires during last eleven year.

(Source: Ministry of Interior of the Czech Republic)

### 2.2.4. Finland

In Finland, there were 2 696 fires in 2005, from which 1 069 were forest fires. Out of the total burnt area 1 068.07 ha, 494.68 ha were classified as forest fires. Average burnt forest area per fire was 0.46 ha.

The burnt area and number of fires for years 1996-2005 is shown in Figure 15.

(Source: Ministry of Interior, Finland)

Table 7. Summary of forest fire events for years 2002-2005 in Czech Republic.

	2002	2003	2004	2005
A. Number of fires	604	1 754	873	619
B. Area burned by type of land	178	1 236	335	227
1. Forest and other wooded land	178	1 236	334	227
1.1. High forest	51	359	80	60
(a) Coniferous	19	265	50	18
(b) Non-coniferous	3	17	6	8
(c) Mixed	29	77	24	34
1.2. Coppice and coppice with standards	47	137	99	76
1.3. Other wooded land	80	740	154	91
2. Other land (agriculture and pasture land, heathland, etc.)	0.0	0.0	1.0	0.0

Table 8. Summary of forest fire causes for years 2002-2005 in Czech Republic.

	Number of fires				Burned Area [ha]			
	2002	2003	2004	2005	2002	2003	2004	2005
1. Known causes, of which:	450	1 164	641	432	110.3	464.7	222.2	155.3
1.1. Human causes	450	1 164	641	432	110.3	464.7	222.2	155.3
(a) Arson	29	72	52	35	6.4	23.6	47.2	4.2
(b) Negligence	338	966	532	367	89.6	257.7	158.6	143.6
1.2. Natural causes	12	33	17	8	1.4	12.0	0.9	0.3
2. Unknown causes	154	590	232	187	68.3	770.8	112.3	70.4

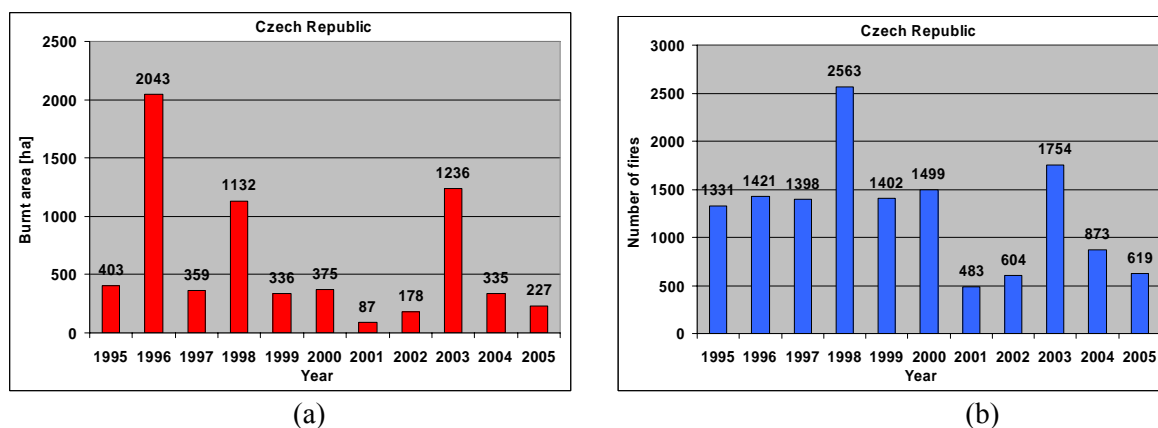


Figure 14. Burnt areas (a) and numbers of fires (b) in the Czech Republic in the last eleven years.

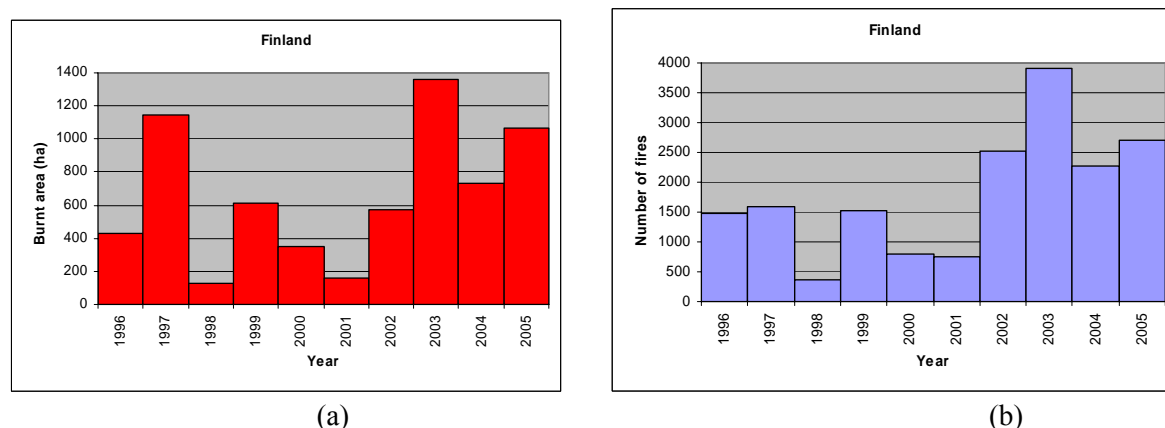


Figure 15. Burnt areas (a) and numbers of fires (b) in Finland for the last 10 years.

### 2.2.5. Germany

In 2005, 496 fires damaged 183.4 ha of forest. Average burned area per fire was approx 0.4 ha. The total damage was estimated to be 400 000 euro.

Trends of burned areas and number of fires from 1991 (after unification of Germany) is shown in

Figure 16.

Distribution of fires in coniferous and deciduous forests for each Bundesland is given in Table 9, summary of forest fire causes is given in Table 10.

Finally, Table 11 shows the historical record of fire causes in Germany from 1977 to 2005.

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

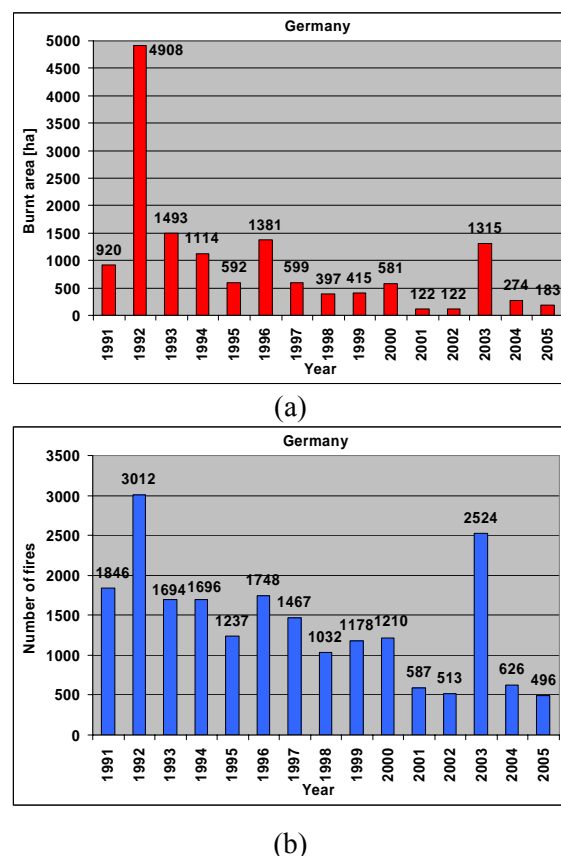


Figure 16. Burnt areas (a) and numbers of fires (b) in Germany for last 15 years.

Table 9. Distribution of fires in coniferous and deciduous forests in 2005 in Germany.

Bundesland	Coniferous	Deciduous	Together	
	Area (ha)	Area(ha)	Number	Area (ha)
Baden-Württemberg	0.6	9.2	10	9.8
Bayern	14.2	14.2	33	28.4
Berlin	2.3	0.3	19	2.5
Brandenburg	42.8	13.7	185	56.5
Bremen	0.0	0.0	0	0.0
Hamburg	0.0	0.0	0	0.0
Hessen	1.0	0.8	10	1.8
Mecklenburg-Vorpommern	34.5	0.2	42	34.7
Niedersachsen	8.6	6.5	20	15.0
Nordrhein-Westfalen	3.3	0.2	17	3.5
Rheinland-Pfalz	1.1	0.1	10	1.2
Saarland	0.0	0.0	0	0.0
Sachsen	3.7	6.9	50	10.7
Sachsen-Anhalt	11.9	6.2	85	18.2
Schleswig-Holstein	0.0	0.0	0	0.0
Thüringen	0.2	0.9	15	1.1
former FRG	31.0	31.3	119	62.3
former GDR	93.1	28.0	377	121.1
Germany	124.2	59.3	496	183.4

Table 10. Summary of fire causes in 2005 in Germany.

Bundesland	Arsons		Negligence		Other		Natural Causes		Unknown Causes		Together	
	Num	Area (ha)	Num	Area (ha)	Num	Area (ha)	Num	Area (ha)	Num	Area (ha)	Num	Area (ha)
Baden-Württemberg	0	0.0	5	0.5	2	0.3	0	0.0	3	9.0	10	9.8
Bayern	4	3.5	9	5.3	15	17.8	0	0.0	5	1.8	33	28.4
Berlin	10	0.7	2	0.5	0	0.0	0	0.0	7	1.4	19	2.5
Brandenburg	46	13.7	29	5.6	10	1.0	9	1.3	91	35.0	185	56.5
Bremen	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Hamburg	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Hessen	5	0.3	3	0.1	0	0.0	0	0.0	2	1.3	10	1.8
Mecklenburg-Vorpommern	12	1.3	7	27.3	3	1.5	0	0.0	20	4.6	42	34.7
Niedersachsen	5	11.2	2	0.3	6	2.1	1	0.0	6	1.4	20	15.0
Nordrhein-Westfalen	2	0.0	9	2.1	1	0.5	0	0.0	5	1.0	17	3.5
Rheinland-Pfalz	0	0.0	1	0.2	1	0.1	1	0.1	7	0.9	10	1.2
Saarland	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Sachsen	5	0.6	9	1.1	1	0.0	0	0.0	35	8.9	50	10.7
Sachsen-Anhalt	20	5.8	11	1.6	6	3.2	6	0.9	42	6.7	85	18.2
Schleswig-Holstein	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Thüringen	5	0.6	5	0.3	0	0.0	2	0.1	3	0.1	15	1.1
former FRG	26	15.7	31	8.9	25	20.8	2	0.1	35	16.8	119	62.3
former GDR	88	21.9	61	36.0	20	5.7	17	2.3	191	55.3	377	121.1
Germany	114	37.6	92	44.9	45	26.4	19	2.4	226	72.1	496	183.4

Table 11. Historical record of fire causes (number of fires and burned areas) in Germany.

Year	Arson		Negligence		Other causes		Natural Causes		Unknown causes		Together		Damage(estimated)	
	Num	Area (ha)	Num	Area (ha)	Num	Area (ha)	Num	Area (ha)	Num	Area (ha)	Num	Area (ha)	Mio. €	€ / ha
1977 <sup>1)</sup>	172	80	384	151	248	215	2	0	294	167	1 100	613	1.3	2 085
1978 <sup>1)</sup>	94	32	212	76	157	103	8	0	163	78	634	289	0.6	2 123
1979 <sup>1)</sup>	75	34	219	79	203	154	2	0	201	89	700	356	0.6	1 724
1980 <sup>1)</sup>	132	57	471	368	375	886	4	1	388	233	1 370	1 545	1.9	1 258
1981 <sup>1)</sup>	125	33	255	143	79	207	1	0	184	114	644	497	1.3	2 572
1982 <sup>1)</sup>	223	138	441	164	198	327	3	1	379	121	1 244	751	1.9	2 519
1983 <sup>1)</sup>	197	92	296	150	227	256	22	1	367	293	1 109	792	3.4	4 326
1984 <sup>1)</sup>	183	105	460	264	148	303	2	0	370	203	1 163	875	2.6	2 980
1985 <sup>1)</sup>	146	47	163	67	72	86	2	0	139	42	522	242	0.7	2 747
1986 <sup>1)</sup>	146	36	151	48	121	152	5	1	195	56	618	293	0.7	2 443
1987 <sup>1)</sup>	99	41	168	136	105	96	2	0	110	46	484	319	0.8	2 565
1988 <sup>1)</sup>	143	21	164	432	104	86	6	0	142	127	559	282	0.7	2 539
1989 <sup>1)</sup>	237	64	192	39	135	117	12	1	230	60	806	281	0.9	3 275
1990 <sup>1)</sup>	225	86	311	131	152	146	28	6	285	113	1 001	481	5.4	11 162
1991	460	127	395	245	333	309	11	4	647	236	1 846	920	1.7	1 834
1992	550	309	710	680	386	1 274	133	966	1 233	1 679	3 012	4 908	12.8	2 604
1993	385	178	466	444	112	119	79	11	652	740	1 694	1 493	5.4	3 630
1994	345	170	485	352	111	84	131	50	624	459	1 696	1 114	1.3	1 193
1995	273	149	345	230	40	18	51	15	528	180	1 237	592	1.5	2 505
1996	334	204	555	477	133	300	16	1	710	400	1 748	1 381	4.2	3 036
1997	355	115	381	172	154	126	36	9	541	178	1 467	599	1.5	2 542
1998	221	61	202	108	172	86	66	9	371	134	1 032	397	1.6	4 037
1999	330	122	226	91	56	24	63	9	503	167	1 178	415	1.4	3 477
2000	306	96	199	65	87	104	89	31	529	286	1 210	581	2.1	3 642
2001	159	33	113	19	58	30	20	2	237	38	587	122	0.5	3 598
2002	157	25	102	38	43	13	23	3	188	43	513	122	0.5	3 715
2003	537	320	492	168	152	389	111	23	1 232	415	2 524	1 315	3.2	2 421
2004	157	46	153	52	33	61	11	2	272	114	626	274	0.5	1 816
2005	114	38	92	45	45	26	19	2	226	72	496	183	0.4	2 147
Change from 2004 to 2005 in %:														
	-27	-18	-40	-14	36	-57	73	19	-17	-37	-21	-33	-21	18
Average of years:														
1977-1990 <sup>1)</sup>	157	62	278	161	166	224	7	1	246	124	854	544	1.6	3 165
1991-2005	312	133	328	212	128	197	57	76	566	343	1 391	961	2.6	2 813

<sup>1)</sup>only for former FRG

## 2.2.6. Hungary

In Hungary 150 forest fire occurred in 2005. Total burned area was 3 530 hectares. Compared with the previous years the number of fires decreased, but the detected data of burned area is increased significantly.

Most of the burnt area belongs to the class of other land (79 %), the rest was wooden land. Average fire size was 23.5 ha for other land and 4.5 ha in forest land. The latter number is much higher than previous year (2.5-3.0 ha in 2004).

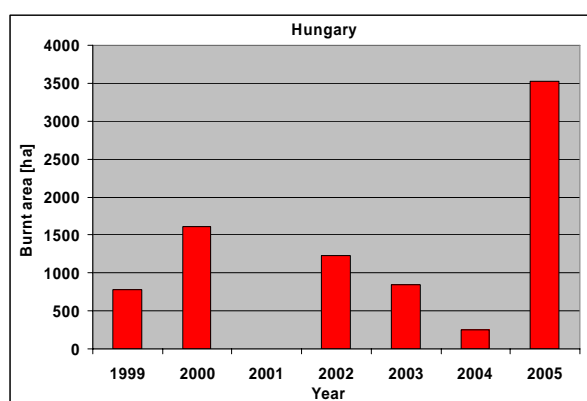
Most of the forest fires occurred in northern region of Hungary. Two thirds of the forest fires happened near the city of Ozd, which was similar to previous years. The large forest fires occurred

2005 was a wet year, compared with previous years the precipitation increased of 20%. There was a lot of rain in spring when the majority of forest fire happened in previous years. In spite of the wet weather, 90 % of forest fires occurred in March and April. There were only 2 fires in May.

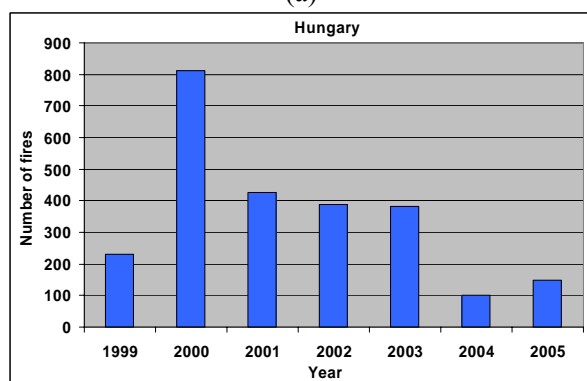
in periphery of villages Sajokaza and Fedemes. In the first case it was burned 5.0 hectares of forest land and 150 hectares other land. In the second case it was damaged 20 hectares of forest land and 500 hectares of other land.

Most of causes (59.3 %) are unknown, share of natural causes is 24.6 %, negligence 14.6 % and arsons were responsible for 1.3 % of the fires.

Burnt area and number of fires for period from 1999 to 2005 are given in Figure 17.



(a)



(b)

Figure 17. Burnt areas (a) and numbers of fires (b) in Hungary from 1999 to 2005.

(Source: State Forest Service, Hungary)

## 2.2.7. Latvia

In Latvia, 365 forest fires were recorded in 2005. The season was quiet without any big damage on forest. The total burned area was 120.49 ha. 89% for fires did not exceed area of 0.5 ha. The average burnt area per fire was 0.28 ha, which belongs to the lowest figures for last 15 years. There were no casualties in forest fire fighting.

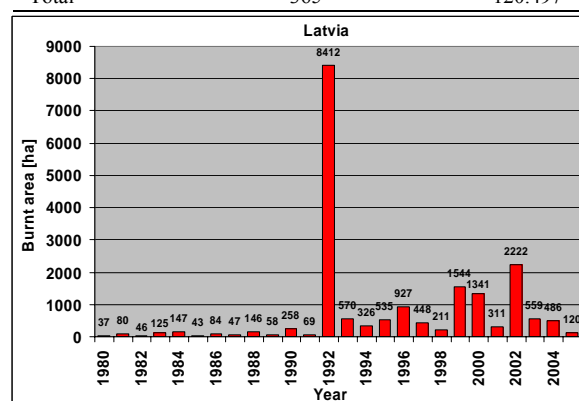
Table 12 shows distribution of burnt area and number of fires in each region.

Figure 18 shows burnt areas and number of fires from 1980 to 2005.

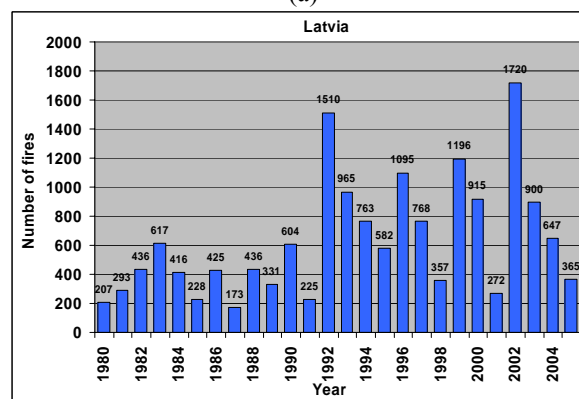
(Source: State Forest Service, Latvia)

Table 12. Distribution of number of fire and burnt area in 2005 in each region of Latvia

Region	Number of fires	Burnt area [ha]
Aizkraukles	3	0.230
Alūksnes	4	0.910
Balvu	6	0.688
Bauskas	6	0.854
Cēsu	7	6.370
Daugavpils	56	24.721
Dobeles	2	0.023
Gulbenes	7	1.810
Jēkabpils	5	2.010
Jelgavas	12	5.975
Krāslavas	7	1.010
Kuldīgas	8	1.830
Liepājas	14	3.120
Limbažu	4	0.403
Ludzas	4	2.700
Madonas	2	0.110
Ogres	10	2.452
Preiļu	2	0.800
Rēzeknes	9	3.090
Rīgas	146	46.320
Saldus	1	0.020
Talsu	2	0.970
Tukuma	7	1.526
Valkas	14	2.130
Valmieras	2	0.190
Ventspils	25	10.237
Total	365	120.497



(a)



(b)

Figure 18. Burnt areas (a) and numbers of fires (b) in Latvia from 1980 to 2005.



## 2.2.8. Lithuania

### Lithuanian forests statistics

Forests cover 2 091 million ha or 32.0 % of the territory of Lithuania. Forest area per one inhabitant of the country reach 0.61 ha. Average age of forests stands is 53 years.

State forests occupy 49.8 %, private forests 32.7 % and forest reserved for restitution 17.5 % of total forest land. Total number of private forest holdings in Lithuania is 231 900 ha, average area of private forest holding is 4.6 ha.

Coniferous stands dominate in Lithuania (58.1 %), followed by soft-broadleaves (37.2 %) and hard-broadleaves (4.7 %) stands. Pine stands cover 36.2 %, spruce stands 21.8 % and birch stands 20.6 % of the total forest area.

### Forest fire statistics

The average number of forest fires per year in Lithuania during the last 15 years is about 750. The average burnt area per year is about 350 ha of forests. Number of forest fires significantly went up during hot and dry meteorological conditions (for example, in 1992, 1999, 2002). In average 92 % of forest fires arise because of human activities; in that number 22 % were caused by grass burning and 3% by arson.

In 2005, the weather conditions were unfavourable for forest fires. Their number has decreased to 301 (from 468 in 2004). Forest fires occurred in the area of 51 ha. Overall forest fire development is shown in Figure 19.

### Forest fire risk classes

In accordance with Forest Fire prevention regulations, the Lithuanian forests fall into three risk classes in reference to the tree species (coniferous or deciduous), age (more and less than 40 years old), forest site types (soil humidity and richness of nutrients). There are about 40 % of high risk class forests, 23 % of medium and 37 % of low ones in the country.

In terms of the fire risk the most hazardous forests are Druskininkai - Varėna (145 000 ha), Labanoras - Pabradė (91 000 ha) and Kazlų Rūda (59 000 ha).

### Integral state system of fire prevention measures

Pursuant to the Law on Forests of the Republic of Lithuania, the integral state system of fire prevention measures is applied within the forest territories, not depending on ownership forms. This system includes the measures for forest fire surveillance, prevention and fire protection. The main objectives of the system are: to reduce forest fires hazards, to improve their prevention, to increase forest stands' resistance to fires and to forecast fires. The Lithuanian Directorate General of State Forests coordinates the implementation of the integral state system of fire prevention measures. This system is financed by state forest enterprises and municipalities.

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

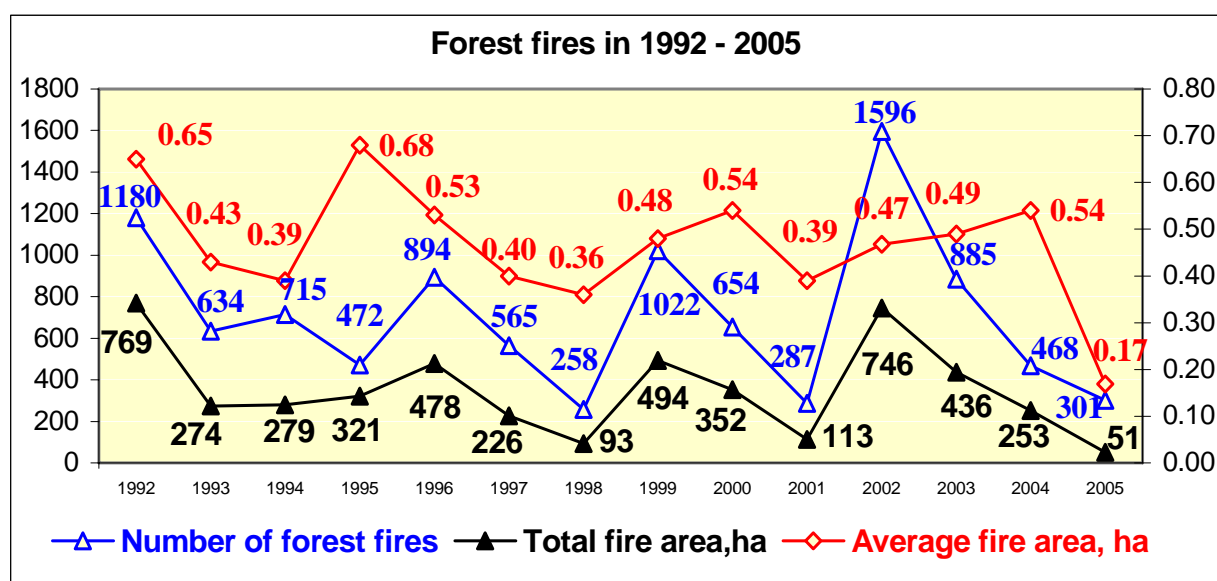


Figure 19. Historical development of forest fires in Lithuania.

### 2.2.9. Poland

#### The occurrence of forest and wildland fires in Poland in the period 2004-2005

A disquieting phenomenon in recent years in Poland was a continuous growing trend of forest and wildland fires which dramatically disturb the life processes of ecosystems. In the case where their range covers substantial surface areas they are even regarded as environmental disasters. The growing forest-fire risk in Poland (a similar trend can also be found in other countries) is due primarily to the site and stand conditions (60% of poor coniferous sites, pine monocultures), the dominating share of coniferous species (76.5%), mostly pine (68.2%) as well to the age structure of forests (64.7% of younger stands). This contributes to the accumulation of flammable materials and the emergence of a dead upper soil layer facilitating the breakout and spread of fires.

Changes in forest-fire risk were mostly affected by weather conditions which set out the time limits of the fire season. In Poland, this season extends, in general, from March through October. However, the occurrence of warm and snowless winters causes also an extension of the fire season to include the winter and autumn months, which once were not included in the period of high flammability.

The development of the fire risk was mostly determined by the weather conditions which occurred in the past years. As a result of this, in 2004, in Poland there were 7 219 forest fires and 22 906 wildland fires, whereas in 2005 the respective numbers were 12 500 and 2 637. In 2004, the number of forest fires represented 40% of the number of fires in the previous year of 2003 (i.e. less by almost 10,000), but 161% of the number of fires in the year 2001 with low flammability. Their number was at the level of the mean value from the 1990s (7 698). In 2005, there was a significant increase, with the level of 11 100 fires exceeded for the fourth time (previously in 1992, 2000 and 2003) and the level of 10 000 fires exceeded for the sixth time (previously in 1992, 1994, 2000, 2002 and 2003).

Figure 20 shows the distributions of forest fires across the country in the individual provinces and months of the forest-fire risk season (from 1 April to 30 September). In 2004, the central and western regions of the country demonstrated the highest flammability in the period in question: Mazowieckie province (17.7%), Lubuskie (12.3%), Wielkopolskie and Łódzkie provinces (each 9 %) as well as Kujawsko-Pomorskie and

Śląskie provinces (each 8 %). In 2005, as much as 26 % of fires in this period occurred in Mazowieckie, Łódzkie (11 %) and Lubuskie (8 %) provinces as well as Kujawsko-Pomorskie (8 %) and Śląskie (7 %) provinces. In most provinces forest fires peaked in April, both in 2004 and in 2005. In 2004, such peaks also occurred in September in Śląskie and Łódzkie provinces. Comparison of the mean values from the past two 5-year periods – 1996-2000 and 2001-2005 – for forest and wildland fires indicates a clear increase in both their number (by 75% for their total number) and the area burnt (by 26%).

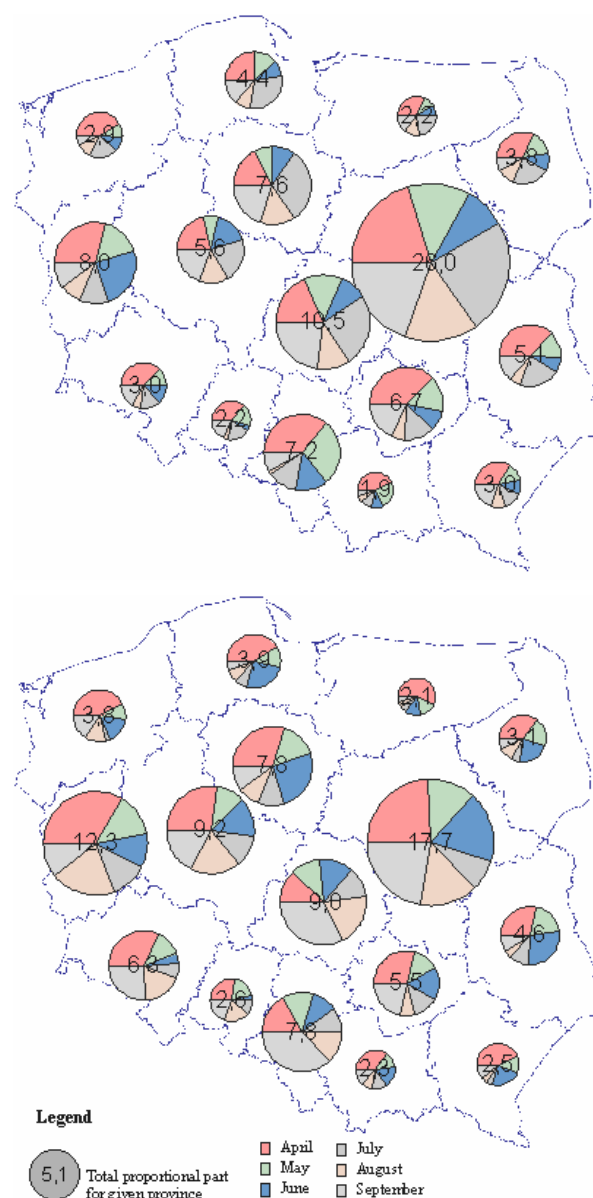


Figure 20. Proportional distribution of number of forest fires by province and months in fire period 2005 (upper) and 2004 (lower) in Poland ((i.e. from 1 April to 30. September)

The mean surface areas of one forest fire for all types of ownership fell by a factor of almost two in 2004 (to 0.60 ha) and in 2005 (to 0.55 ha) compared with 2003.

In addition to the weather conditions, the substantial number of forest fires was enhanced by the continuously large number of other wildland types. Another significant fact was that from 2002 to 2003 there was a very substantial decrease in the surface area of the set-aside and uncultivated parts of arable land (from 2 302 million to 1 305 million ha). This must have had some impact on the frequency of fire outbreaks there and the danger they posed for forests.

#### Causes

The dominating cause of fires, including the fires of both forests and wildland, were cases of deliberate arson, representing more than 50% in the period 2004-2005. The second most important cause was human carelessness of all kinds, which contributed to forest fires to an extent of 41% (2004) and 39% (2005) as well as to wildland fires to an extent of 34% (2005). Of these causes, the most important one was the carelessness in the handling of an open fire (29-36%). Natural causes, i.e. atmospheric discharges, caused forest fires to an extent of 0.35 of cases only and wildland fires to an even lesser extent. Unknown causes varied about levels of 7 % to 8 %.

#### Ecological Aspects of Fires

Fires from 2004 to 2005 were one of the most important factors damaging the forest environment. These fires affected both the whole ecosystem and its particular elements: forest stand, herbaceous vegetation, fauna and soil, depending on fire intensity and duration of fire (fire residence time). Fire, which is part of the natural environment, was also a rapidly acting factor which transformed these elements. The degree of its destructive power depended on a number of factors: stand species composition, age of trees, terrain relief, and weather conditions both prior and after fire.

One direct effect of a fire was either partial or complete destruction of plants or at least a decrease in their vitality. Total destruction occurred following a crown fire of younger stands. Partial destruction was usually a result of surface fires, especially in old growth stands. Partial destruction led to a decrease in a stand's silvicultural value and reduced the increment. During the first 2-3 years after a fire often no visible decrease was observed. After a few years an increased process of tree decline was observed.

The weakened trees also became infected by noxious insects and pathogenic fungi. In turn this led to their die-off. Such stands became a spreading spot for pests, threatening the healthy adjacent forests. Fire also influenced plant succession. A secondary effect of forest fire was the change of abiotic components of the ecosystem (microclimate, soil). Removing a fire-damaged stand resulted in turning the area into marsh (rapidly increased ground water table) or could be the trigger of moving poor sandy soils (moving dunes). Finally, erosion could be started in mountainous terrain.

Grassy ecosystems were also destroyed by fire. These were areas of high natural value, characteristic of high degree of biodiversity exceptional in the rest of Europe - reserves and national parks. Fires in marshy terrains, peatlands and reed areas posed danger to moose resting places, birds' nesting area, and to protected rare plants.

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

Table 13. Wildfire database for Poland in the period 1994-2005.

Year	Number of Fires			Burned Area [ha]			Average Area [ha] of Fire		
	Forest	Wild-land	Forest and Wild-land	Forest	Wild-land	Forest and Wild-land	Forest	Wild-land	Forest and Wild-land
1994	10 710	5 167	15 877	9 171	19 215	28 386	0.86	3.72	1.79
1995	7 681	5 733	13 414	5 306	13 342	18 648	0.69	2.33	1.39
1996	7 924	11 883	19 807	14 120	44 808	58 928	1.78	3.77	2.98
1997	6 818	12 486	19 304	6 598	41 832	48 430	0.97	3.35	2.51
1998	6 166	11 545	17 711	4 019	26 561	30 580	0.65	2.30	1.73
1999	9 820	16 015	25 835	8 307	27 484	35 791	0.85	1.72	1.39
2000	12 428	16 024	28 452	7 013	24 264	31 277	0.56	1.51	1.10
2001	4 480	16 167	20 647	3 429	28 509	31 938	0.77	1.76	1.55
2002	10 101	22 537	32 638	5 593	26 293	31 886	0.55	1.17	0.98
2003	17 088	53 367	70 455	28 554	95 906	124 460	1.67	1.80	1.77
2004	7 219	22 906	30 125	4 338	31 749	36 087	0.60	1.39	1.20
2005	12 500	28 637	41 137	6 860	29 074	35 934	0.55	1.02	0.87
Year Average									
1996-2000	8 631	13 591	22 222	8 011	32 990	41 001	0.93	2.43	1.85
2001-2005	10 235	28 650	38 885	9 643	42 082	51 725	0.79	1.47	1.33

## 2.2.10. Slovenia

In 2005, there were 73 forest fires resulting in 279.73 ha of burned area. The classification of fires based on type of affected forest for years 2002-2005 is given in

Table 14. The causes of these fires are given in Table 15.

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

Table 14. Detailed fire classification based on forest type for years 2002-2005 in Slovenia.

	2002	2003	2004	2005	Share in 2005
A. Number of fires	60	224	51	73	
B. Area burned by type of land [ha]	160.79	2 100.14	138.17	279.73	100%
1. Forest and other wooded land	77.47	1 592.84	76.87	142.23	51%
1.1. High forest	57.06	352.37	34.27	110.43	39%
1.1.1. Coniferous	34.56	196.69	11.00	83.54	30%
1.1.2. Deciduous	9.26	93.21	15.07	19.00	7%
1.1.3. Mixed	13.24	62.47	8.20	7.89	3%
1.2. Coppice	2.12	796.40	5.00	20.00	7%
1.3. Other wooded land	18.29	444.07	37.60	11.80	4%
2. Other land	83.32	507.30	61.30	137.50	49%
C. Area burned by type of ownership [ha]	160.79	2 100.24	138.17	279.73	100%
1. Public	28.18	716.00	19.06	149.73	54%
1.1. Forest and other wooded land	17.31	576.90	14.76	81.73	29%
1.2. Other land	10.87	139.10	4.30	68.00	24%
2. Private	132.61	1 384.24	119.11	130.00	46%
2.1. Forest and other wooded land	60.16	1 016.14	62.11	60.50	22%
2.2. Other land	72.45	368.10	57.00	69.50	25%
D. Average burned area per year [ha]	2.68	9.38	2.71	3.83	

Table 15. Summary of fire causes in Slovenia.

	2002		2003		2004		2005	
	Num.	Area [ha]	Num.	Area [ha]	Num.	Area [ha]	Num.	Area [ha]
A. Total fires	60	160.79	224	2 100.14	51	138.17	73	279.73
1. Known causes of which:	34	118.70	132	766.56	39	130.11	46	219.52
1.1. Human causes	32	118.49	89	526.91	34	123.11	39	198.22
1.1.1. Arson	5	5.20	26	108.21	4	3.00	8	24.04
1.1.2. Negligence	27	113.29	63	418.70	30	120.11	31	174.18
1.2. Natural cause (lightning)	2	0.21	43	239.65	5	7.00	7	21.30
2. Unknown causes	26	42.09	92	1 333.58	12	8.06	27	60.21
B. Supplementary information:								
Total negligence	27	113.29	63	418.70	30	120.11	31	174.18
1. Agriculture operations	6	10.55	27	203.96	6	7.01	10	137.00
2. Logging and forest operations	1	2.50	2	0.60	0	0.00	2	1.10
3. Other industrial activities	0	0.00	0	0.00	0	0.00	0	0.00
4. Communications (railways, electricity lines, etc.)	10	81.13	27	156.40	22	112.75	14	33.00
5. General public (campers, other visitors, children)	9	11.11	7	57.74	2	0.35	5	3.08
6. Other (military, ect.)	1	8.00	0	0.00	0	0.00	0	0.00

### 2.2.11. Sweden

A summary of the numbers of fires and burnt areas according to land cover type in Sweden for 2005 and the previous 5 years is shown in Table 16. Detailed description of the fire situation and conditions in 2005 follows.

After the heavy storm (Gudrun) in the south of Sweden a lot of actions were organized as preventive measures and preparedness for operational work to handle major forest fires in the area of broken forest. In early spring it was rather wet, while at the beginning of summer it was hotter and drier. That was the reason for some forest fires during this period. Conditions were gradually becoming critical, but fortunately the sufficient rainfalls in the middle of July stabilized the situation. Modernized, more efficient and better trained fire organizations together with special prevention actions resulted in the situation without any major forest fire.

The trend in the numbers of fires and burnt areas over the last 6 years is shown in Figure 21. In 2005 both the numbers of fires and the burnt areas were slightly below the average for the last 6 years and significantly lower than in 2003.

(Source: Swedish Rescue services SRSA, Sweden).

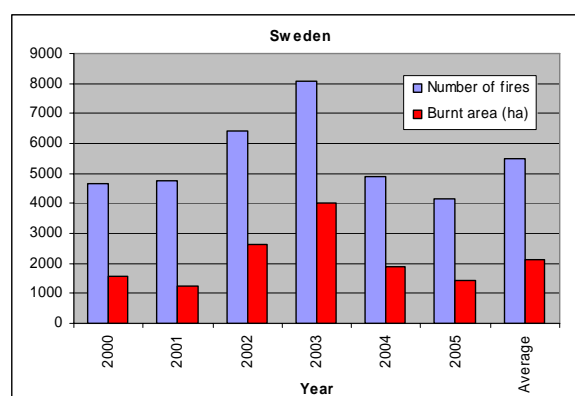


Figure 21. Burnt areas and numbers of fires in the last 6 years in Sweden

Table 16. Numbers of fires and burnt areas in Sweden by land cover type

Number of Fires				
Year	Productive woodland	Other wooded land	Non-wooded land	Total
2000	400	1755	2553	4650
2001	476	1669	2686	4774
2002	922	2637	2931	6421
2003	840	2777	4665	8071
2004	492	1802	2661	4887
2005	596	1527	2011	4134
Burnt area (ha)				
Year	Productive woodland	Other wooded land	Non-wooded land	Total
2000	784	329	440	1552
2001	412	286	556	1254
2002	877	413	1336	2626
2003	1316	1021	1665	4002
2004	896	550	437	1883
2005	691	342	402	1435

### 3. FIRE SITUATION IN EU CANDIDATE COUNTRIES

#### 3.1. Romania

During the past two decades, forest fires were not such a great problem in Romania when compared to other European countries. In

Table 17 a statistics of forest fires can be observed.

Between the years 1986-2005 a number of 2 989 forest fires were recorded, affecting a total surface of 12 991.1 ha of forests, as represented in Figure 22.

However, the data recorded in the latest period is somewhat alarming taking into account the number of fires and forest damaged areas in the years 2000 and 2002. In the past two years the number of forest fires has decreased due, at least in part, to the fluctuating climate conditions: heavy rains that actually caused floods.

In 2005 there were reported 64 forest fires compared to only 34 in the previous year; also an increase of the total area affected was monitored (up to 162.4 ha of forest) compared to the same year. Although a decrease in forest fires alerts can be observed by setting against these data to those recorded in the 2000-2002 period, the situation is not comfortable because the previous fire-risk climate conditions can re-occur in the general context of global warming and especially in the

south-western part of the country where sub-Mediterranean climate influences are presented.

March and April were of the highest risk concerning forest fires in 2005, as seen in Figure 23, compared to the previous year, when in March and September most fires were announced. Rains were a key factor that decreased the risk of fires, but unfortunately produced floods.

In Romania the fire damage assessment is currently made taking into account only the financial point of view, the ecological damage not being monitored as it should be. Consequently, it is of less relevance since the damages are underestimated and hard to assess and there is a lack of a coherent procedures of damage assessment. During 2004-2005 there were no forest fire related human casualties.

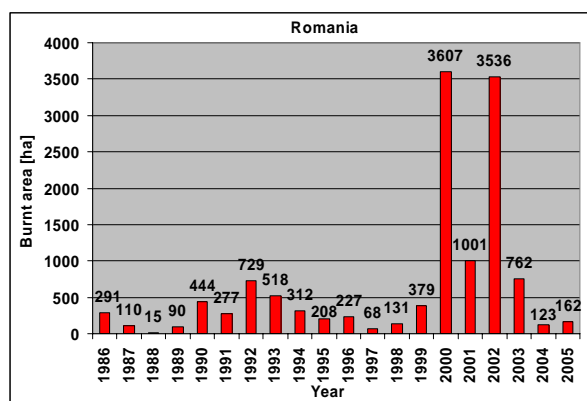
Another aspect that should attract interest upon forest fires in Romania are the major changes in the ownership structure of forests. According to the national legislation regarding forest restitution, it is during the year 2006 that this restitution will be accomplished. In this case, two thirds of the entire timbered land of Romania will be credited to private owners (maybe hundreds of thousands) which will make the forest fire protection more difficult.

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

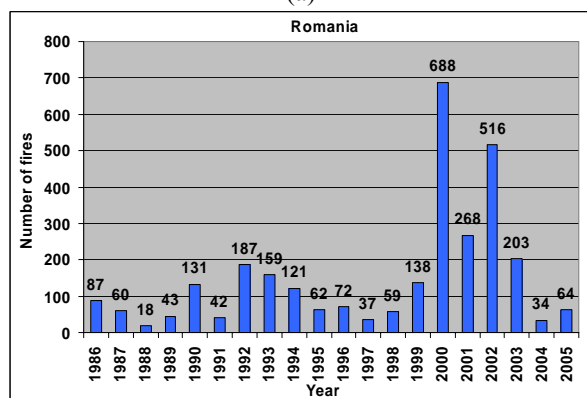
Table 17. Forest fire statistics in Romania during 1986-2005

Year	Number of reported Fires	Total forest area burned [ha]	Presumed causes			
			unknown	natural	accidental	deliberate
1986	87	291.0			not monitored	
1987	60	110.0			not monitored	
1988	18	15.0			not monitored	
1989	43	90.0			not monitored	
1990	131	444.0			not monitored	
1991	42	277.0			not monitored	
1992	187	729.0			not monitored	
1993	159	518.0			not monitored	
1994	121	312.0			not monitored	
1995	62	208.0			not monitored	
1996	72	227.0			not monitored	
1997	37	68.0			not monitored	
1998	59	131.0			not monitored	
1999	138	379.0			not monitored	
2000	688	3 607.0			not monitored	
2001	268	1 001.0			not monitored	
2002	516	3 536.0			not monitored	
2003	203	762.0			not monitored	
2004	34	123.7	2	-	32	-
2005	64	162.4	7	1	53	3





(a)



(b)

Figure 22. Number of fires (a) and burnt areas (b) in Romania during 1986-2005.

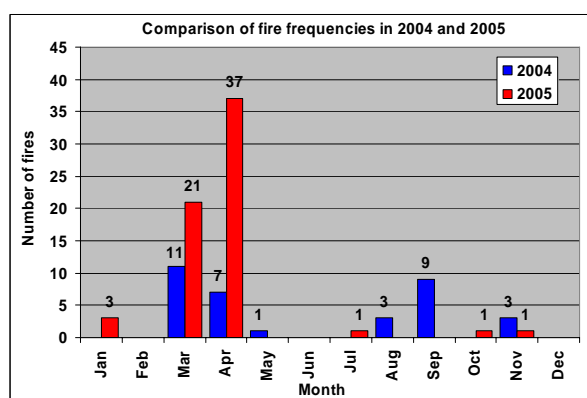


Figure 23. Comparison of forest fire frequency during years 2004 and 2005 in Romania

### 3.2. Turkey

In Turkey 1 530 forest fires occurred in 2005 burning a total area of 2 821 ha. Compared with the year 2004 both numbers of fires and the burned area decreased (1 756 fires and 4 876 ha in 2004). Number of forest fires and burned area for each forest administration is given in **Error! Reference source not found.** (Anex III). The historical records of burned areas from 1996 to 2005 is given in Figure 24.

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

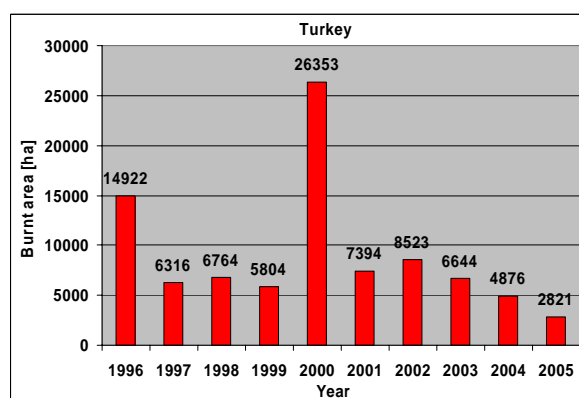


Figure 24. Burned areas records from 1996 to 2005 in Turkey.

Table 18. Number of forest fires and burned area for each administrative region of Turkey in 2005.

Forest administration	Number of fires				Area [ha]		
	Total	<1.0 ha	1.1 - 5.0 ha	5.1 - 500.0 ha	Total	Wooded	Non wooded
ADANA	64	48	14	2	95	75	20
ADAPAZARI	27	22	5		25	19	6
AMASYA	52	43	9		32	18	14
ANKARA	47	35	11	1	42	30	12
ANTALYA	278	234	37	7	404	307	97
ARTVİN	5	2	2	1	9	1	8
BALIKESİR	52	36	11	5	260	108	152
BOLU	17	13	4		18	16	2
BURSA	34	33	1		11	8	3
ÇANAKKALE	24	23	1		8	6	2
DENİZLİ	115	107	6	2	47	31	16
ELAZIĞ	16	2	8	6	115	57	58
ERZURUM	2	1	1		2	2	0
ESKİŞEHİR	16	13	2	1	11	9	2
GİRESUN	8	2	6		18	14	4
ISPARTA	28	27	1		10	9	1
İSTANBUL	58	49	9		32	28	4
İZMİR	139	131	3	5	438	399	39
K.MARAŞ	68	47	18	3	93	87	6
KASTAMONU	27	24	3		18	16	2
KONYA	24	21	3		12	7	5
KÜTAHYA	26	24	2		8	6	2
MERSİN	48	46	2		13	12	1
MUĞLA	255	225	20	10	945	885	60
SİNOP	26	12	13	1	35	29	6
TRABZON	11	5	3	3	58	4	54
ZONGULDAK	63	47	14	2	63	39	24
TOTAL	1 530	1 272	209	49	2 821	2 222	599
%	100	83.1	13.7	3.2	100	78.8	21,2

#### **4. 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>) 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 EFRFS). The module forecasts forest fire danger in Europe on the basis of a number of meteorological fire danger indices and an integrated fire potential index, 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. Therefore, also in 2005, EFFIS Danger Forecast started to evaluate forest fire danger on 1 May 2005, and ended on 31 October 2005. 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 Damage Assessment module. The evaluation focuses on Southern Europe and is based on the analysis of

satellite imagery and geographic information. Since 2000 and until 2004, 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 Damage Assessment. This module has been run in parallel with a new module for the fast appraisal of fire damages called EFFIS Rapid Damage Assessment during 2003 and 2004. 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 already during 2005. With this system the evaluation of damages is performed 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 this research activity start to be visible now and will slowly be available in the EFFIS web mapping interface.

##### **4.1. EFFIS DANGER FORECAST: 2005 RESULTS**

The EFFIS Danger Forecast (formerly referred to as the European Forest Fire Risk Forecasting System (EFRFS)) was developed to support the Commission's Directorate-General for the Environment and the forest fire-fighting services in the EU Member States. As mentioned previously, since 2002, at the request of the Member States, operation of the EFFIS Danger Forecast has been extended to six months starting on 1 May and ending on 31 October. The same time window was maintained in 2005 and six meteorological indices were used to compute daily fire risk. The Fire Potential Index (FPI) had to be stopped in June due to problems of reception of NOAA-AVHRR data, and it could not be restarted afterwards. The FPI is currently under

revision for extending the computational window to the enlarged Europe.

The summer fire season 2005 has been characterized by unusual drought conditions since its beginning. After a sharp increase of the fire risk level in June, critical situations were encountered along the season, with peaks of fire activity and very highly risk levels during the months of July and August, especially in the Southwestern part of the EU.

Portugal and Spain in particular have experienced severe weather conditions early in the season, than again in July and August. After a short interruption due to rainfall events at the end of July, the fire season started to build up again early in August, reaching extremely critical conditions around mid of the month; Portugal is by far the country that has been most dramatically affected.

Thanks to the rainfall events towards the end of August, the risk level was finally lowered at the beginning of September in most of Europe. During the month of September and until today, the risk level due to fire weather conditions

rebuilt again in Portugal, and to a less extent in Spain.

Through the Danger Forecast module of EFFIS the situation has been continuously monitored and the risk level analyzed and mapped. The risk trend assessed in the different countries during the 2005 season is given in what follows, comparing it with the same periods of the previous years.

In Figure 25 seasonal averages of the risk level estimated with the Fire Weather Index (FWI) are shown for the years 2002 to 2005. In the Iberian peninsula the 2005 was to some extent more similar to the dramatic 2003, while for the rest of Europe the conditions were less problematic.

In Figure 26 a series of monthly FWI averages throughout Europe is given for 2005. The early start of the fire season in 2005 is evident, as well as the critical situation of the Iberian peninsula especially during July and August.

The maps and graphs presented in what follows also show seasonal trends in the FWI during 2005 and a comparison with previous years.

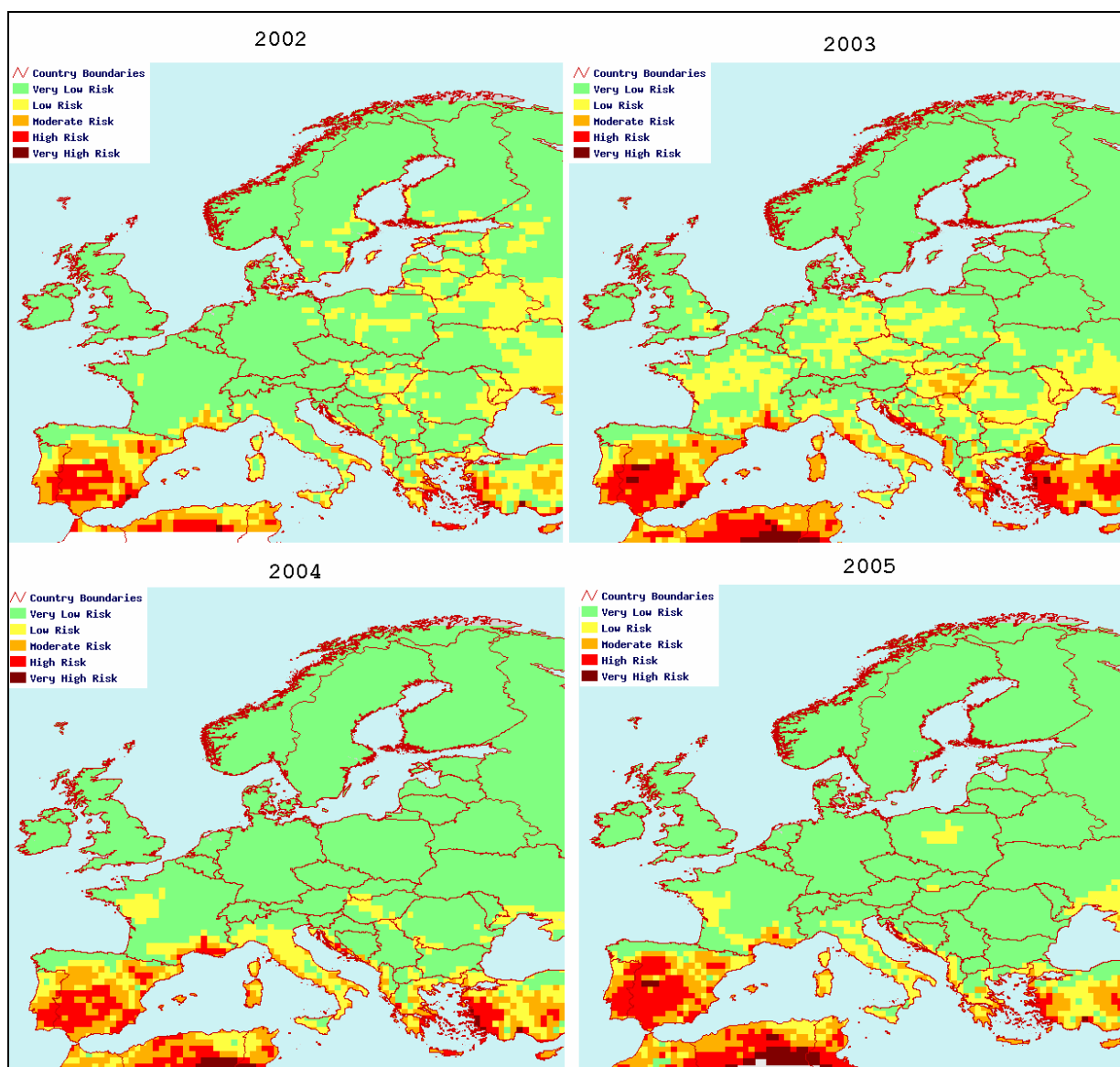


Figure 25. Seasonal averages (from 1 June to 30 September) of forecasted (day+1) Fire Weather Index (FWI) values. Comparison of 2002, 2003, 2004 and 2005.

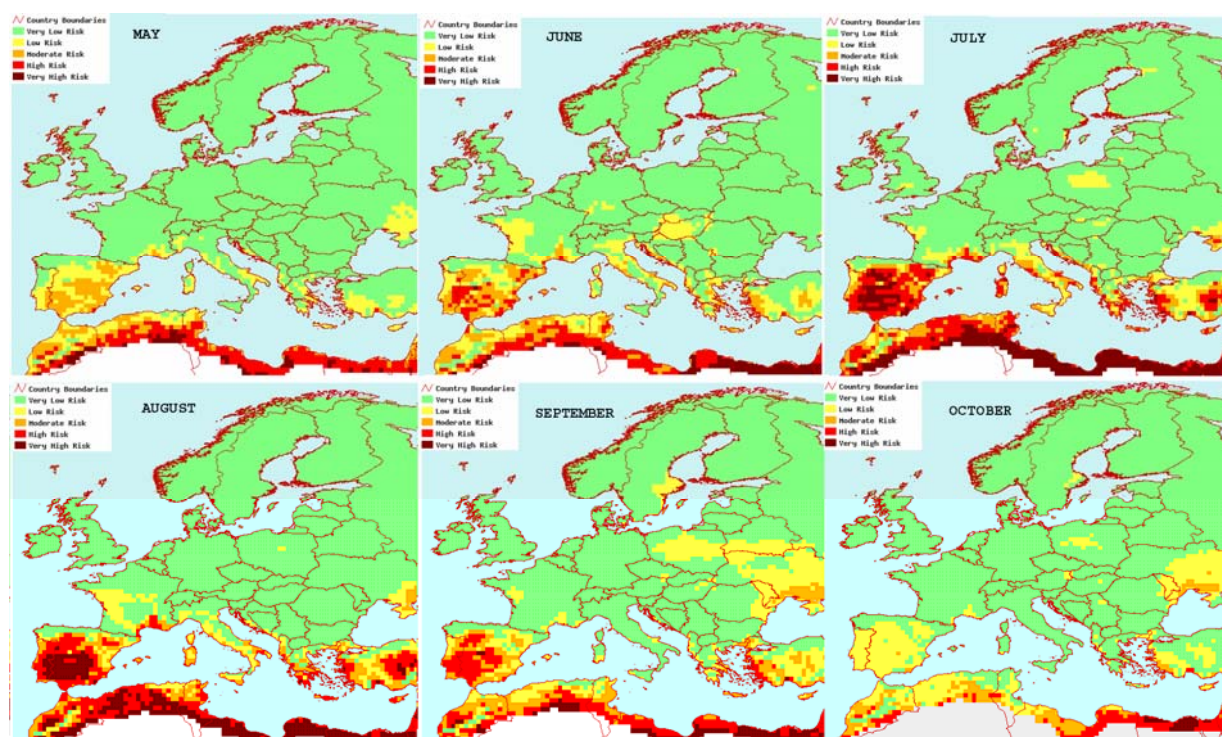


Figure 26. Monthly fire risk levels in 2005: monthly averages of forecasted (day+1) Fire Weather Index (FWI) values.

Figure 27 shows fire risks through 2005 as determined by the average FWI values in the Mediterranean Member States (weekly averages) and compares them with the last two years.

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



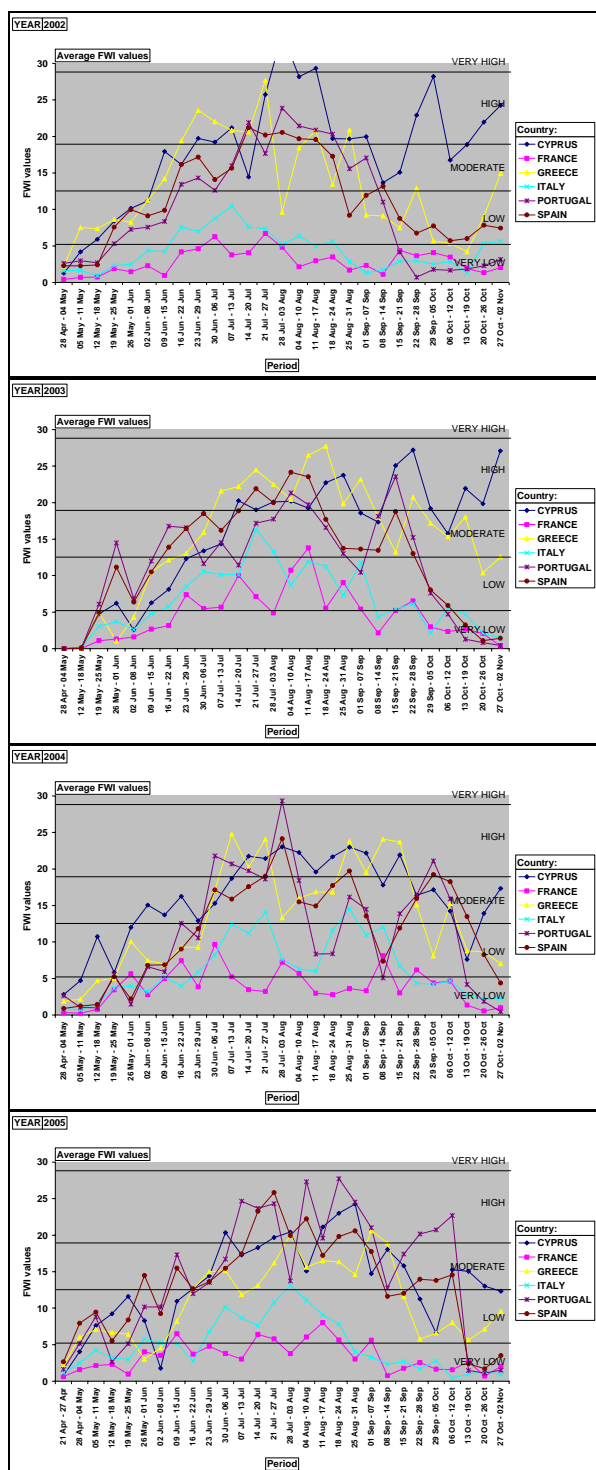


Figure 27. Fire risk trends as determined by the Fire Weather Index (FWI) for the last four years (2002 to 2005) in the EU Mediterranean countries.

Weekly averages for an entire country tend to flatten local fire risk peaks, so they become less evident, especially in those countries such as France or Italy, where there are strong differences in fire risk level with changing latitudes.

Therefore, to show more clearly the seasonal changes in FWI in the larger EU Mediterranean countries, i.e. Portugal, Spain, France, Italy and

Greece, their territory has been further divided for risk reporting, according to the map showed in Figure 28. 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.

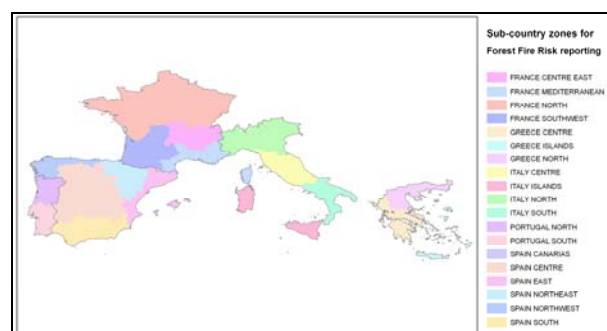


Figure 28. Administrative regions for fire risk reporting at sub-country level.

The following graphs (Figure 29 to Figure 33) show changes in FWI in 2005 (weekly averages) for each country in the sub-regions identified in Figure 28. 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.

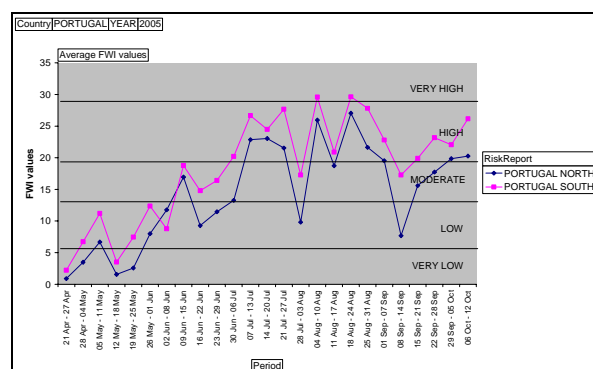


Figure 29. Fire risk trends in 2005 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal



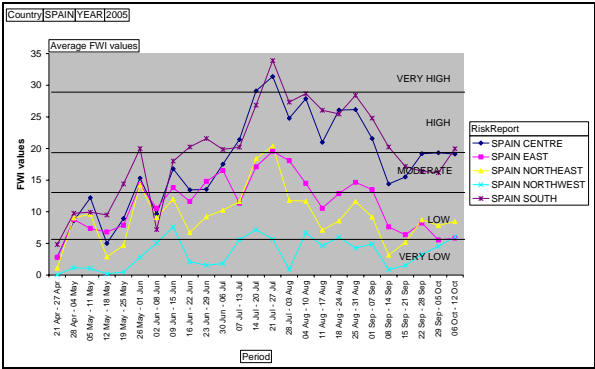


Figure 30. Fire risk trends in 2005 as determined by the Fire Weather Index (FWI) in the regions identified for Spain

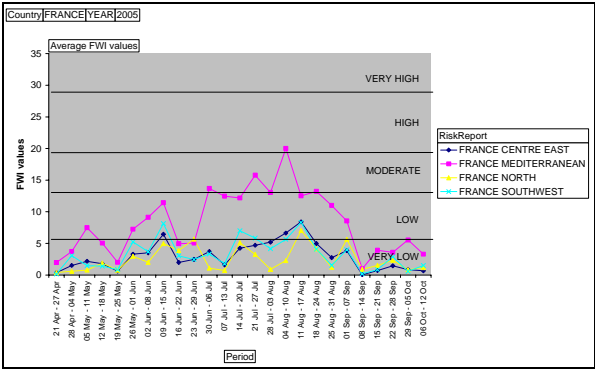


Figure 33. Fire risk trends in 2005 as determined by the Fire Weather Index (FWI) in the regions identified for France.

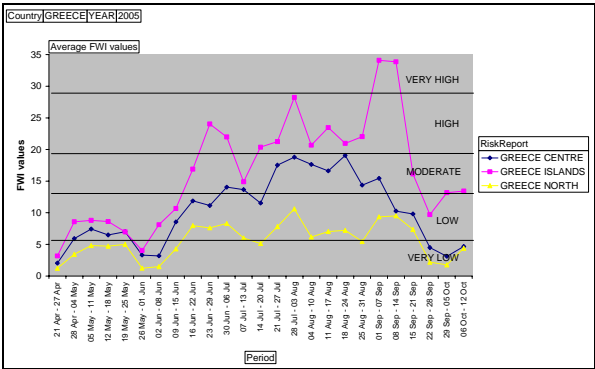


Figure 31. Fire risk trends in 2005 as determined by the Fire Weather Index (FWI) in the regions identified for Greece

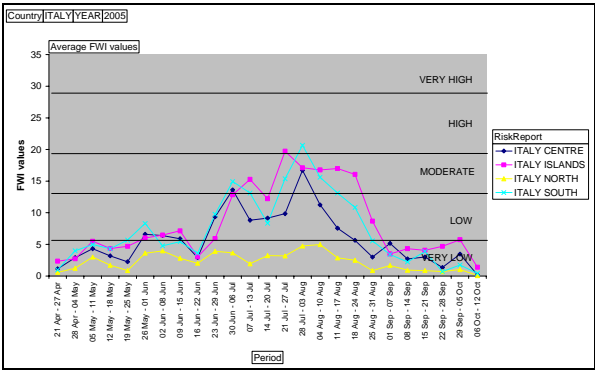


Figure 32. Fire risk trends in 2005 as determined by the Fire Weather Index (FWI) in the regions identified for Italy

Figure 34 shows fire risk trends in 2005 as determined by FWI in some EU temperate countries, while Figure 35 shows trends for some EU boreal countries and Figure 36 for EU candidate countries. In all cases 2005 is compared with 2002, 2003 and 2004.

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.

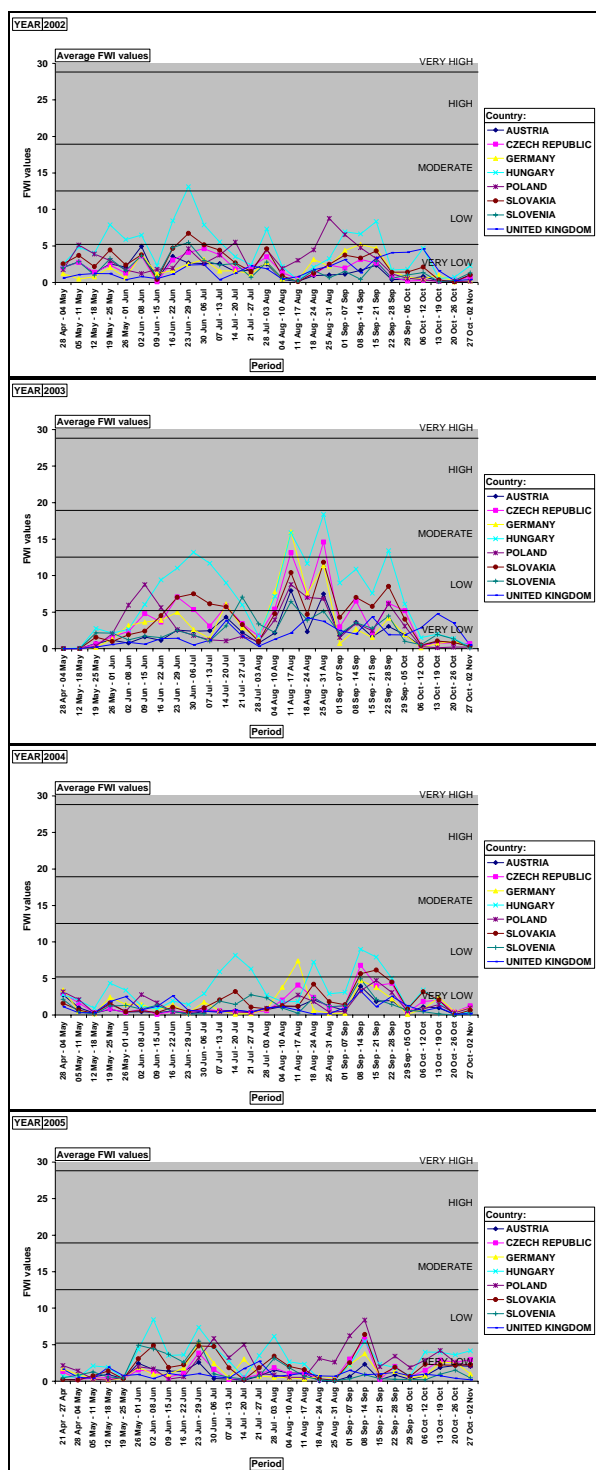


Figure 34. Fire risk trends as determined by the Canadian Fire Weather Index (FWI) in the last four years (2002 to 2005) in some EU temperate countries.

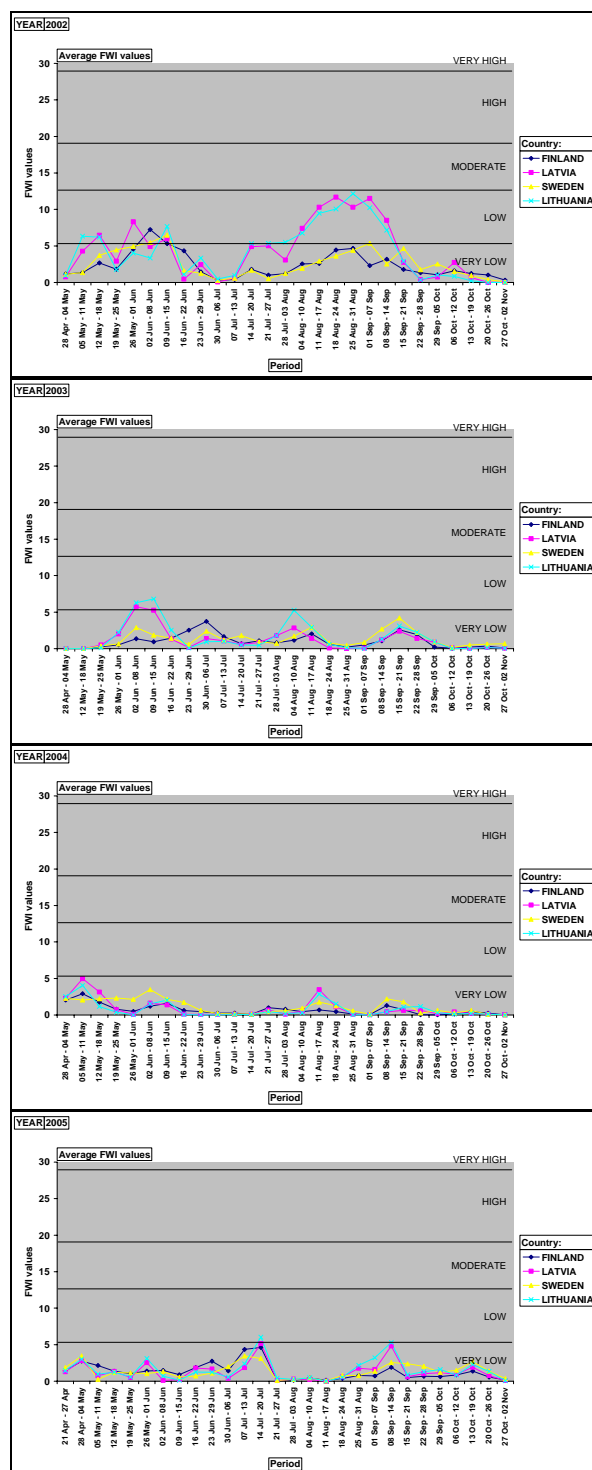


Figure 35. Fire risk trends as determined by the Canadian Fire Weather Index (FWI) in the last four years (2002 to 2005) in some EU boreal countries.

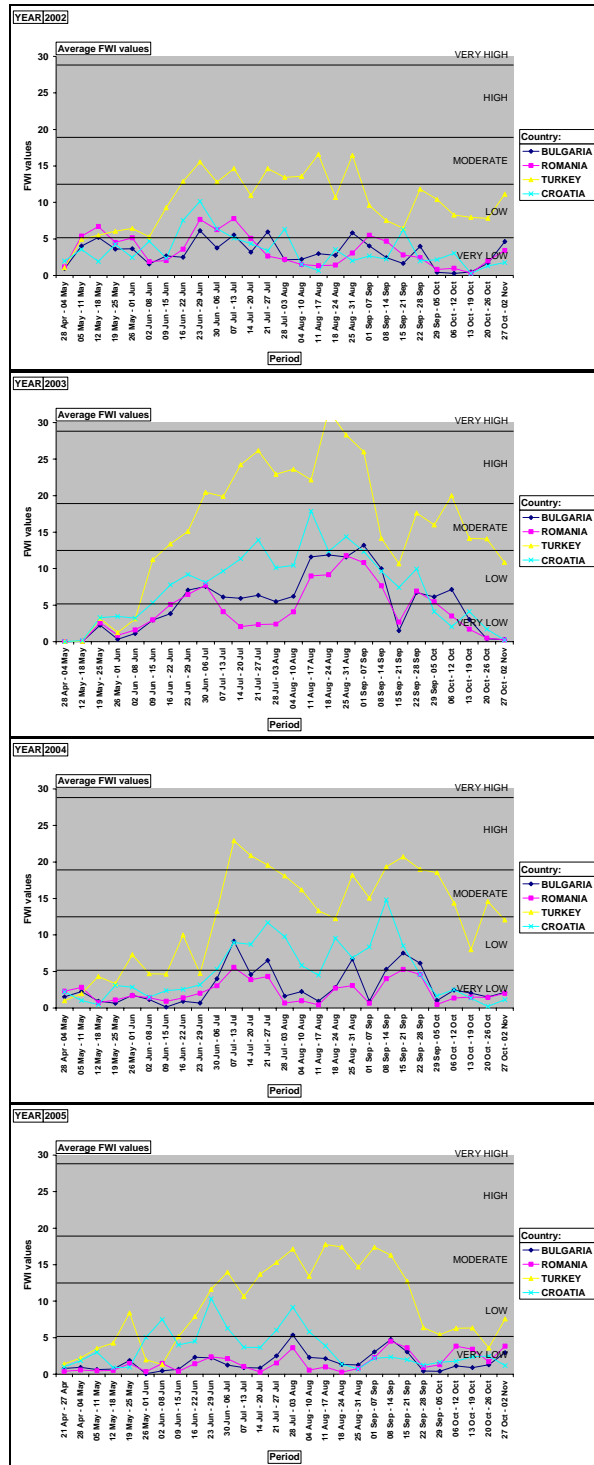


Figure 36. Fire risk trends as determined by the Canadian Fire Weather Index (FWI) in the last four years (2002 to 2005) in EU candidate countries.

## 4.2. EFFIS RAPID DAMAGE ASSESSMENT: 2005 RESULTS.

In order to improve the harmonization of burnt area data and statistics, maps of burnt areas were produced during the year through EFFIS Damage Assessment module. These maps were then used in conjunction with the EU-CORINE2000 land cover (CLC2000) database to estimate the damage to forests and other land cover types..

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.

In 2005, 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.

The total area burned in 2005 by fires larger than 50 ha, as shown by analysis of satellite imagery, was 426 222 ha (Table 19).

Modelling historical fire data (time series 1985-2001, 1985-2003 for Portugal, 1985-1997 for Greece), equations have been set up for the different countries, 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 540 996 ha.

Table 19. Areas burned by fires of at least 50 ha in 2005.

Country	Burnt area (ha)
Portugal	278 589
Spain	112 483
France	10 474
Italy	20 159
Greece	4 517
TOTAL	426 222

### 4.2.1. Portugal

Analysis of satellite imagery mapped an area of 278 589 ha burnt by fires larger than 50 hectares in 2005. From a statistical model based on data from 1985 until 2003, the total area burned could be estimated as 307 616 ha. This figure is the second worst year in terms of burned areas and reminds the dramatic summer of 2003.

Combining this map with the CLC2000 database provided information on the types of land cover damaged. Table 20 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 shrublands, was burned in a total of 248 906 ha. The remaining burned area was distributed by agriculture (25 191 ha), artificial surfaces (408 ha), and wetlands (1 118ha). Figure 17 shows a combination of satellite images with all the fires mapped until the 5 October.

Table 20. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Portugal in 2005.

Land cover	Area burned (ha)	% of total burned
Forest land	248 906	90.3
Agriculture	25 191	9.1
Wetlands	1 118	0.4
Artificial surfaces	408	0.2
Total	275 622	100.0

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

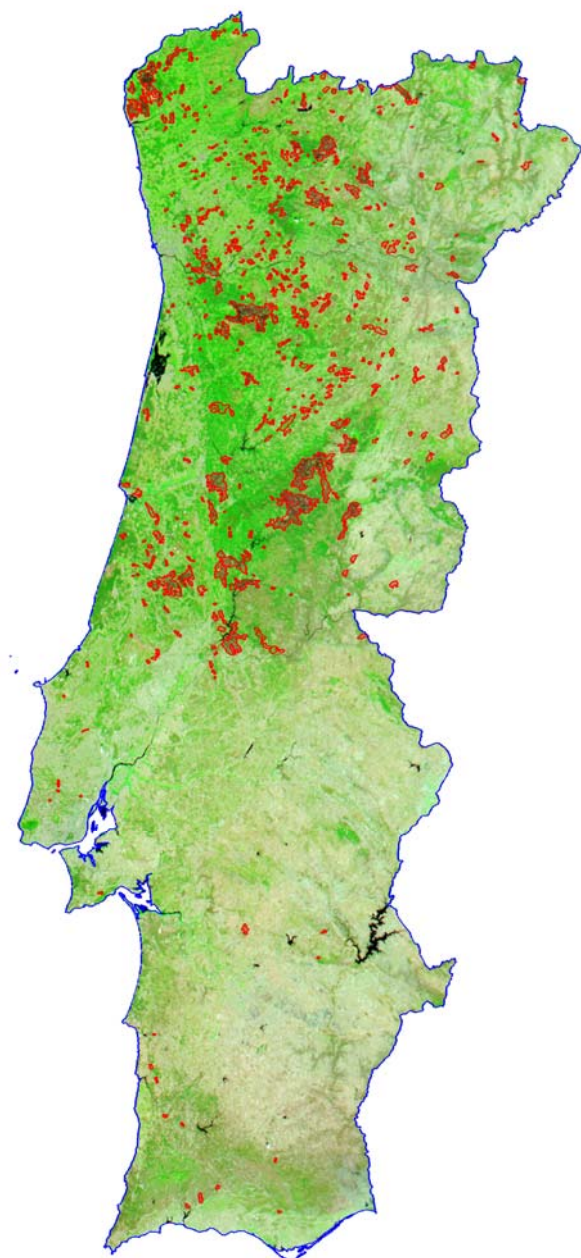


Figure 37. Area burned by forest fires in 2005 in Portugal.

#### 4.2.2. Spain

Spain has been the second country in terms of burned area. The total area burned by fires of at least 50 hectares in Spain measured from satellite imagery was 112 483 ha. Based on the mentioned statistical model built using the Spanish fire data, the total area burned was estimated as 159 055 ha.

Figure 38 shows a combination of MODIS satellite images with all the fires mapped.



Figure 38. Forest fires mapped in Spain in 2005.

Table 21 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 100 241 ha of burnt area mapped, 100 579 ha were forest land, 11 262 ha were agricultural area, 486 ha were wetlands, and 155 ha were artificial areas (urban, industrial or social areas).

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

Land cover	Area burned (ha)	% of total burned
Forest land	100 579	89.5
Agriculture	11 262	10.0
Wetlands	486	0.4
Artificial surfaces	155	0.1
Total	112 483	100.0

#### 4.2.3. France

The total area burned mapped in France in year 2005 measured from MODIS satellite imagery was 10 474 ha. Based on the mentioned statistical model built using the fire data for France, the total area burned was estimated as 16 377 ha.

Table 22 presents the distribution of the mapped burnt area by land use type using the CLC 2000 map. From a total of 10 474 ha of burnt area mapped, 8 858 ha were forest land, 1 540 ha were agricultural area, 20 ha were artificial areas (urban, industrial or social areas), and 56 ha were wetlands.



Table 22. Distribution of burnt areas (fires of at least 50 ha) by land cover class in France in 2005.

Land cover	Area burned (ha)	% of total burned
Forest land	8 858	84.6
Agriculture	1540	14.7
Wetlands	56	0.2
Artificial surfaces	20	0.5
Total	10 474	100.0

The area with the highest number of large forest fires was South-east France. Figure 39 shows the fires detected by MODIS satellite imagery.



Figure 39. Surface burned by forest fires in South-east France in 2005.

#### 4.2.4. Italy

Unlike the other Mediterranean countries, the average area burned by fires of at least 50 ha in Italy is only around 52%. Because of this, the lack of good cloud-free images and the quick recovery of vegetation in pasture fires, there is a significant underestimate of the burnt areas detected by satellite imagery when this is done at the end of the fire season. However, the use of MODIS time series tends to minimize the problems of cloud cover as well as the rapid re-growth of vegetation. The total burned area mapped in Italy until the 5 October 2005 was 20 159 ha. Based on the mentioned statistical model built using the Italian fire data, the total area burned in 2005 was

Table 23 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 20 159 ha of burnt area mapped, 6 919 ha of land have been burnt in forest, 13 116 ha in agricultural land, 108 ha in artificial areas (urban, industrial and social areas), and 16 ha in wetlands.

Table 23. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Italy in 2005.

Land cover	Area burned (ha)	% of total burned
Forest land	6 919	34.3
Agriculture	13 116	65.1
Artificial surfaces	108	0.5
Wetlands	16	0.1
Total	20 159	100.0

Figure 40 shows a combination of a satellite images with all the fires mapped in 2005.



Figure 40. Surface burned by forest fires in Italy in 2005.

#### 4.2.5. Greece

The area burned by forest fires of at least 50 ha in Greece in 2005 was estimated from satellite imagery as 4 517 ha. Based on the mentioned statistical model built using the Greek fire data, the total area burned was estimated as 10 678 ha.

Table 24 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 4 493 ha of burnt area mapped, 2 292 ha were forest land, 2011 ha were agricultural area, and 214 ha were in artificial areas (urban, industrial and social areas).

Figure 41 s shows a combination of a satellite images with all the fires mapped until the 5 October 2005.

Table 24. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Greece in 2005.

Land cover	Area burned (ha)	% of total burned
Forest land	2 292	50.8
Agriculture	2011	44.5
Artificial surfaces	214	4.7
Total	4 517	100.0



Figure 41. Surface burned by forest fires in Greece in 2005.



## **5. BACKGROUND DOCUMENTATION**

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

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

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

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

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

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

## 6. ANNEX I

**Table 25. Burnt area in the five Southern Member States (period 1980 – 2005) in hectares.**

Year	PORTUGAL [ha]	SPAIN [ha]	FRANCE [ha]	ITALY [ha]	GREECE [ha]	TOTAL [ha]
1980	44 260	263 017	22 176	144 302	32 965	506 720
1981	89 798	298 288	27 711	229 850	81 417	727 064
1982	39 557	152 903	55 145	130 239	27 372	405 216
1983	47 812	108 100	53 729	223 728	19 613	452 982
1984	52 713	165 119	27 202	78 326	33 655	357 015
1985	146 255	484 476	57 368	189 898	105 450	983 447
1986	99 522	264 887	51 860	86 240	24 514	527 023
1987	76 268	146 662	14 108	120 697	46 315	404 050
1988	22 435	137 734	6 701	186 405	110 501	463 776
1989	126 235	426 693	75 566	95 161	42 363	766 018
1990	137 252	203 032	72 625	195 319	38 594	646 822
1991	182 486	260 306	10 130	99 860	13 046	565 828
1992	57 012	105 277	16 607	105 695	71 410	356 001
1993	49 963	89 331	16 695	209 314	54 049	419 352
1994	77 323	437 635	25 872	68 828	57 908	667 566
1995	169 612	143 468	18 118	46 466	27 202	404 866
1996	88 867	59 814	11 210	57 986	25 310	243 187
1997	30 535	98 503	20 500	103 015	52 373	304 926
1998	158 369	133 643	19 282	140 432	92 901	544 627
1999	70 613	82 217	15 906	61 989	8 289	239 014
2000	159 553	188 586	24 078	114 648	145 033	631 898
2001	107 057	92 386	20 642	76 427	18 221	314 733
2002	124 365	107 464	30 159	40 768	6 013	308 769
2003	425 658	148 172	73 275	91 803	3 517	742 425
2004	128 937	134 193	13 709	60 176	10 267	347 282
2005	338 262	(*)179 929	(**)17 356	47 575	6 437	589 559
% of total in 2005	57%	31%	3%	8%	1%	100%
Average(1980-1989)	74 486	244 788	39 157	148 485	52 417	559 331
Average(1990-1999)	102 203	161 323	22 695	108 890	44 108	439 219
Average (2000-2005)	213 972	141 788	29 870	71 900	31 581	489 111
Average (1980-2005)	117 335	188 917	30 682	115 583	44 413	496 930
TOTAL	3 050 719	4 911 835	797 731	3 005 147	1 154 735	12 920 167

(\*) provisional data for 2005

(\*\*) for Mediterranean France only

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.

## 7. ANNEX II

**Table 26. Number of forest fires in the five Southern Member States (1980-2005)**

Year	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
1980	2 349	7 190	5 040	11 963	1 207	27 749
1981	6 640	10 878	5 173	14 503	1 159	38 353
1982	3 567	6 545	5 308	9 557	1 045	26 022
1983	4 503	4 791	4 659	7 956	968	22 877
1984	6 377	7 203	5 672	8 482	1 284	29 018
1985	7 218	12 238	6 249	18 664	1 442	45 811
1986	4 348	7 570	4 353	9 388	1 082	26 741
1987	6 977	8 670	3 043	11 972	1 266	31 928
1988	5 643	9 247	2 837	13 558	1 898	33 183
1989	20 155	20 811	6 763	9 669	1 284	58 682
1990	10 745	12 913	5 881	14 477	1 322	45 338
1991	14 327	13 530	3 888	11 965	858	44 568
1992	14 954	15 955	4 008	14 641	2 582	52 140
1993	16 101	14 253	4 765	15 380	2 406	52 905
1994	19 983	19 263	4 633	11 588	1 763	57 230
1995	34 116	25 828	6 545	7 378	1 438	75 305
1996	28 626	16 771	6 400	9 093	1 508	62 398
1997	23 497	22 320	8 000	11 612	2 273	67 702
1998	34 676	22 448	6 289	10 155	1 842	75 410
1999	25 477	18 237	4 960	7 235	1 486	57 395
2000	34 109	24 118	4 603	10 629	2 581	76 040
2001	26 942	19 099	4 309	7 134	2 535	60 019
2002	26 492	19 929	4 097	4 594	1 141	56 253
2003	26 195	18 616	7 023	9 697	1 452	62 983
2004	21 970	21 396	3 767	6 428	1 748	55 309
2005	35 698	(*)26 261	(**)1 871	7 951	1 544	73 325
% of total in 2005	49%	36%	3%	11%	2%	100%
Average 1980-1989	6 778	9 514	4 910	11 571	1 264	34 036
Average 1990-1999	22 250	18 152	5 537	11 352	1 748	59 039
Average 2000-2005	28 568	21 570	4 278	7 739	1 834	63 988
Average 1980-2005	17 757	15 618	5 005	10 603	1 581	50 565
TOTAL	461 685	406 080	130 136	275 669	41 114	1 314 684

(\*) provisional data for 2005      (\*\*) for Mediterranean France only

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



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

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