

# Forest Fires in Europe

## 2001 fire campaign

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#### MEMBER STATES

Sources for data and comments are cited in the text.

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## INTRODUCTION

The first report entitled 'Forest fires in Southern Europe 2000' was well received by the national competent authorities, by their civil protection services including their operational forest fire fighting centres, by the European Parliament and by non governmental organisations. Under the circumstances, the European Commission's expert group for forest fires decided at its meeting of October 2001 to continue the publication of the report on a yearly basis.

The present second report on forest fires in Southern Europe builds upon statistical data provided by the Member States, i.e. data for the burnt area and numbers of forest fires occurred in the period 1980 to 2001. Its objective is to provide an overview on the latest evolution of forest fires in the Southern Member States of the European Community. Moreover, it reflects the preventive actions as well as the reactions undertaken at national level when being exposed to particular situations like extreme hot weather or planning of dispatching fire fighting equipment in periods of very high fire risks in the whole country.

The daily notification of the forest fire risk levels (European Forest Fire Risk Forecasting System EFFRFS) in the Community represents another part of the present report. Also the mapping of fires larger than 50 hectares accounting for over 75% of the burnt area in Southern Europe is an important tool developed by the Joint Research Centre, this mapping being the core of the European Forest Fire Damage Assessment System (EFFDAS).

Several suggestions made by the experts have been taken into consideration. This is the case for the inclusion of a separate chapter for the forest fire evolution in Northern and Central Europe, the change of the satellite images scales in order to allow the reader detecting easily the location of the burnt areas.

Regulation (EEC) No 2158/92 expires in December 2002 and the Community "common core database" on forest fires under the responsibility of the Directorate-general Agriculture will fall under the competence of Directorate-general Environment. In that context it has been decided to establish the European Forest Fire Information System (EFFIS) together with the Institute for Environment and Sustainability of Directorate-general Joint Research Centre (JRC) in Ispra, Italy. It is foreseen that EFFIS will incorporate the information provided by the Member States next to that generated by the JRC and make it available to the relevant services in the European Commission and Member States.

## 1. LOSS OF HUMAN LIVES DURING THE 2001 FIRE SEASON

The 2001 forest fire season caused in the Southern Member States less mortal accidents than the previous fire season.

In Spain, a fire fighter died in Barcelona on April 8, 2001. In France, four persons died during fire-fighting operations. Two of them were elderly people living in the middle of a forest, and two were fire fighters that died in a truck accident. In Italy, the 2001 fire campaign ended with 23 people injured and three killed. These figures are under the average for the last 24 years. A total of

1,298 injuries and 159 deaths have been reported in Italy since 1978. In Portugal, provisional reports show that one civilian died in a fire occurred in May, in the Viseu district. There were also 150 people injured (intoxications, burns, wounds, etc.) of which 90% were fire-fighters, 9% civilians and 1% forest guards. Four persons died during fire fighting operations in Greece. The number of victims was however smaller than that of 2000, in which 13 people died during the fire campaign.

A summary of the damages in terms of number of lives lost is presented in Table 1.

Table 1: Loss of human lives as a result of forest fires (comparison 2000/2001)

Number of dead people 2001	P	E	F	I	GR	TOTAL
Fire fighters (staff on the ground)	0	1	2	0	0	2
Pilots	0	0	0	0	0	0
Other persons	1	0	2	3	4	10
<b>Total</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>12</b>

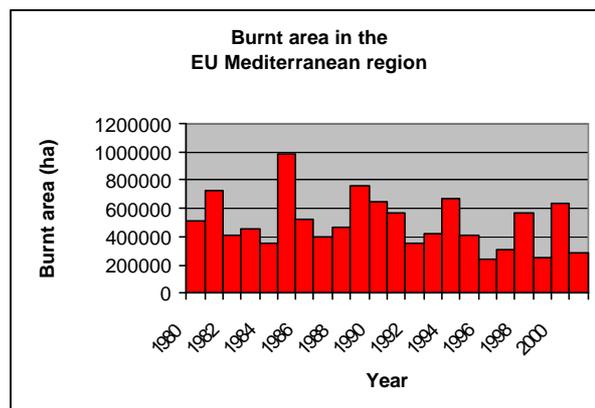
Source: DG Environment and Member States

## 2. FIRES AND BURNT AREA IN THE SOUTHERN STATES

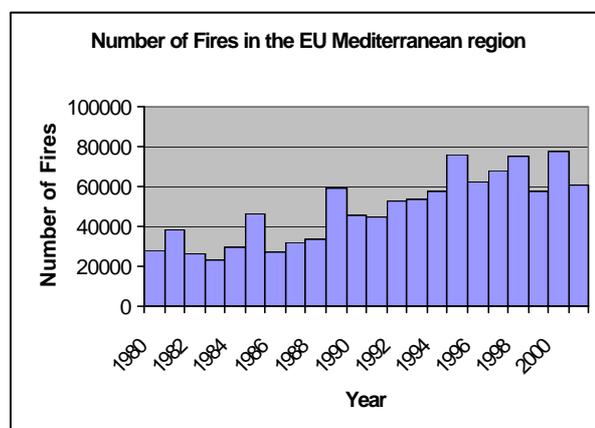
### 2.1 Southern Member States (1980 – 2001)

The comparison of the burnt area data in the recent years with that of the last two decades shows a slightly decreasing trend. This decrease occurs mainly in the last decade, that is, from 1990 to 2001. This trend can be observed in Figure 1a, which shows the evolution of burnt areas in the EU Mediterranean region in the last 22 years. Throughout the past decade we can observe a noticeable decrease in the total amount of burnt wooded areas in Southern Europe. The comparison with the decade 1980-1990 shows a decrease in burnt areas of more than one million hectares which, in average terms, means a decrease of around 116.000 ha per year during the past decade. Despite the punctual increase of forest fire damage in 2000, the general trend of decreasing burnt area is maintained. However the burnt wooded area of the five Southern Member States is still nearly eleven million hectares for the period of 1980 to 2001 (see Table 2).

An opposite trend is clearly noticeable when analyzing the number of forest fires. Figure 1b shows the evolution of the number of fires in the EU Mediterranean region for the last 22 years.



(b)



(a)

Figure 1. Number of fires and burnt areas from 1980 to 2001 in the five EU Mediterranean Member States

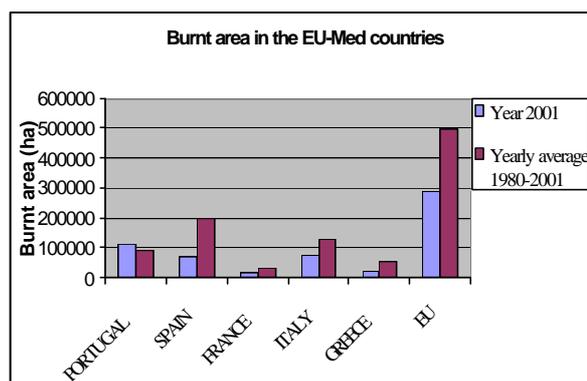
Provisional data provided by: Direcção Geral das Florestas, Portugal; Dirección General de Conservación de la Naturaleza, Spain; Ministère de l'Agriculture, France; Corpo Forestale dello Stato, Italy;) General Secretariate for Forests and the Natural Environment, Greece.

This figure shows a clear increasing trend, especially in the mentioned decade 1990-2001 in which the burnt area is decreasing. It should be kept in mind that there are areas that burnt several times. This is often due to local habit of burning shrub areas to gain terrain for grazing or agricultural purposes. Some of these areas have been recovered to forest land by natural regeneration or reforestation.

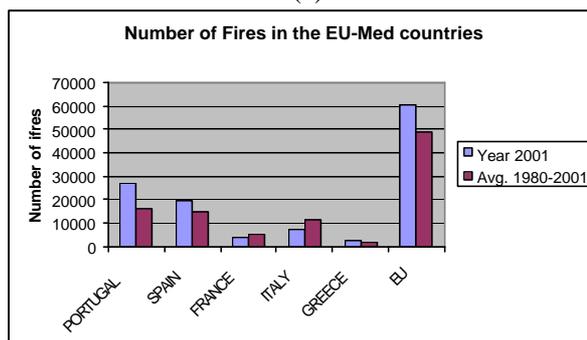
Figure 2a compares the yearly average burnt area and number of fires for the period 1980 to 2001. This comparison is performed for each Member State (MS) and for the overall EU. Figure 2a shows that the burnt area in the year 2001 was in all the MS below the average for the last 22 years. A total of 310911 ha were burnt in the year 2001 whereas an average 499957 ha were burnt in the last 22 years. As mentioned above, this relative low figure for burnt areas seems to confirm the decreasing trend in the area burned in the EU Mediterranean region in the last years.

On the contrary, the number of fires in the EU Mediterranean countries in 2001 was higher than the average of the last decades. Figure 2b shows the comparison between the 22-year average number of fires and the 2001 figure for each MS and the overall EU. Particularly, the number of fires in Greece, Spain and Portugal was higher than the 22-year average, while in France and Italy the number of fires was below this average. However, in all countries the number of fires decreased with respect to last year. The number of forest fires in the year 2001 was 68148, which is well above the 49762 average for the last 22 years.

Numbers for the average burnt area and the number of fires in the last two decades in addition to the 22-year average are presented in Table 2. Figures for the year 2001 are also presented in the same table.



(a)



(b)

Figure 2. Burnt area and number of fires in the EU Mediterranean countries in the year 2001 as compared to average values for the last 22 years.

Comparison of the contribution of each Member State to the total burnt area in the year 2001 is presented in Figure 3. However, the comparisons made between Member States are purely indicative since the area of each country is different. In addition, the area at risk of fire and the wooded and non-wooded areas are also different in each country. Because of the different conditions within the Member States, a more appropriate comparison could be established by the fire severity index. If available, this concept will be presented in the last version of this report.

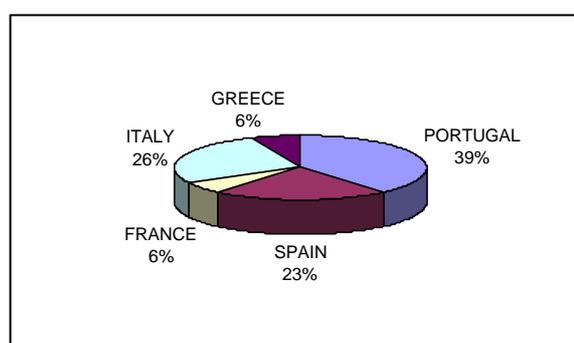


Figure 3. Percentage of the total burnt area in each of the EU Mediterranean countries.

Table 2. Number of fires and burnt area in the Member States and the European Union in the last decades

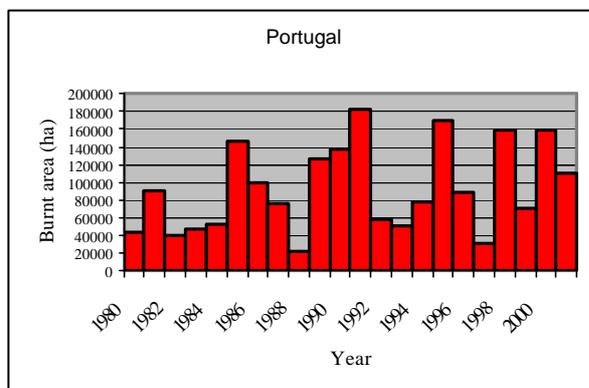
Number of fires	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
2001	27067	19631	4103	7134	2535	60470
Average 1980-1989	6778	9514	4910	11571	1264	34036
Average 1990-1999	22250	18151	5489	11352	1748	58991
Average 1980-2001	15975	14573	5168	11227	1601	48544
TOTAL	351455	320600	113690	246999	35229	1067973

Burnt Area (ha)	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
2001	111165	66075	17000	76427	18221	288888
Yearly Average(1980- 1989)	74486	244788	39157	148485	52417	559331
Yearly Average(1990- 1999)	102203	161323	23024	108890	44108	442529
Yearly Average 1980-2001	92621	196171	30114	125674	51296	497230
Percentage of total (2001)	38	23	6	26	6	100
TOTAL	2037656	4315766	662508	2764825	1128501	10939062

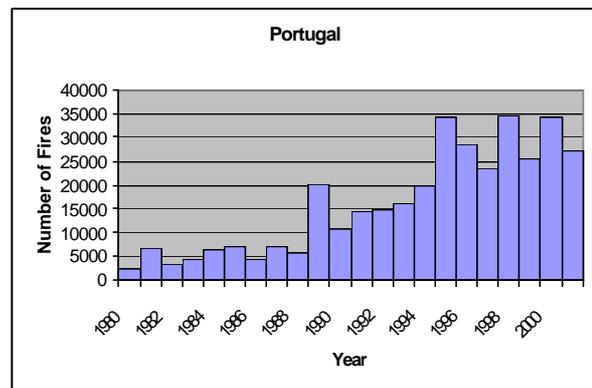
The overall tendency for the EU Mediterranean regions is towards increasing number of fires. This is probably due to the extensive use of wildland areas for recreation and the increase in population density in the regions. However, this increasing tendency in the number of fires is accompanied by a decreasing trend in the burnt area. A plausible explanation for a decrement in burnt area, with an increased number of fires, is the improvement in prevention and fire-fighting capacity of the EU Mediterranean member states.

## 2.2. Portugal

Portugal's forest area is about 3.3 million ha of which 87% corresponds to private property. Forest patch size goes from less than 2 ha in the north to 100 ha in the south. The North of Portugal has the highest number of forest fires. It contributes with 59% to the total annual number of fires (see Fig.4).



(a)



(b)

Figure 4. Burnt area and number of fires in Portugal in the last 22 years.

In Portugal, a total of 111.165 ha were burnt during the year 2001. It represents 45.209 ha of wooded land and 65.956 ha of shrublands. This value is above the averages of the last 22 years and also of the last decade figure, but 33 % lower than the 2000 burnt area. There were 162 fires larger than 100 ha which burnt 68.084 ha, the equivalent to 61 % of the total burnt area in the year.

Table 3. Fires in Portugal during the year 2001.

	Number of Fires		Burnt area (ha)		
	Forest fires	Small fires (<1 ha)	Forests	Shrubs	Total
2001(*)	6971	20096	45209	65956	111165

(\*) 31.12.2001 Provisional data

Looking into the last decade, years such as 1991, 1995, 1998 and 2000 were remarkably bad in terms of burnt area, which lead to the high average in this last decade. In 2001, there were 27.067 forest fires, 20.096 of which were small fires with less than 1 ha. This also represents a decrease, related with 2000 value, but it's above the average of the last decade and the last 22-year average. This increase in the number of fires agrees with the overall increase in forest fires for the EU Mediterranean region.

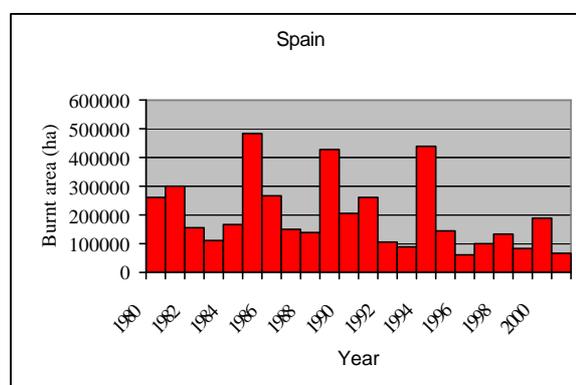
Most of fires occurred in the North Region with 65 % (17.539) of the Portugal overall value for 2001, 74 % (12.959) of those representing fires less than 1 hectare. From the overall number of fires 68 % (18.283) took place between July and September. They were responsible for 85 % (94.560 ha) of the total burned area. Nevertheless, the highest value of burned area occurred in the inland of the Center Region, with 47 % (52.151 ha) of the total burned area. There were, in this region, 19 fires larger than 500 ha, which were responsible for 57 % of the total region burned area. At the end of August, some of those large fires where caused by lightning. Other causes such as pasture renewal, arson and burning of litter, where responsible for large fires.

Due to very unfavourable conditions, with high temperatures associated with very strong East winds, September was the worst month in terms of number of forest fires with 32 % (8.585) and also responsible for the highest monthly burned area (43.028 ha) in 2001. This value corresponds to more than 2/3 (40%) of the total burned surface in the Portugal, for this year. The largest fire occurred in Portugal in 2001 with 8.904 ha of burned area, was precisely in this month. In 2001, the Autumn and beginning of the Winter seasons were abnormally dry, which lead to very favourable conditions to fire ignition and propagation. In December, this conditions associated again with very strong and dry winds, where responsible for the 1.484 fires that burned 3.598 ha. On the 17<sup>th</sup> of December one single fire burnt 1.742 ha.

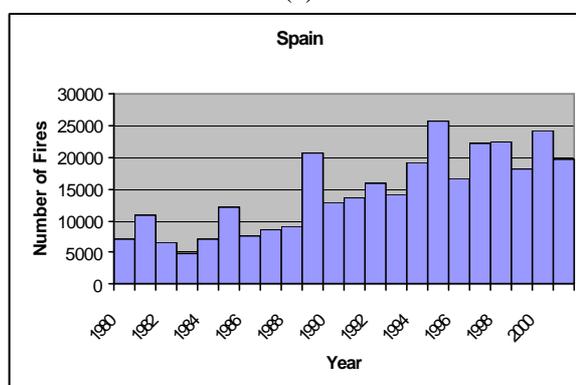
### 2.3. Spain

The trend in the overall burnt area in Spain is decreasing since 1991, especially after the 1994 peak, although the year 2000 represented a peak in this overall trend (see Fig. 5). Since the recording of fire statistics, Spain reached in 2001 the lowest figure for the burnt area. It should be mentioned that figures for burnt areas in Spain include wooded surfaces and grazing lands, that is, forests, shrublands and grasslands when they are not agricultural surfaces.

The number of forest fires in 2001 was 19631, which is above the average for the last 22-years. This increase agrees with the increasing trend of the number of forest fires in the EU Mediterranean region. This increasing trend can be observed in Figure 5b.



(a)



(b)

Figure 5. Burnt area and number of fires in Spain in the last 22 years.

Only four forest fires needed the intervention of amphibian planes of the Ministry of Environment (DGCN, Direccion General de Conservacion de la Naturaleza) during the first four months. Precipitation falling on the major part of the Spanish territory during that period prevented greater damage. In the second half of May however, the herbaceous vegetation was endangered due to higher temperatures and missing precipitation. The Ministry of Environment undertook 18 amphibian plane interventions, which was unusual for this month. Nevertheless, the burnt area and the number of fires remained clearly below the figures registered in that period during former years.

During June 2001, the first three fires bigger than 500 ha occurred in Cataluna, Extremadura and Castilla-La-Mancha. The fire statistics for the first six months were still lower than the average of the complete precedent decade 1991-2000. Since July 2001, the DGCN continued dispatching its aerial means with the exception of the bases of Rosinos (Zamora), Tineo and La Morgal (Asturias). As in former years, these bases started their activity on 16 July. The absence of wind and the maintaining humidity in the forest fuel in the North-East led to less important fires compared to previous years. On July 31<sup>st</sup> strong winds provoked a rapid spreading of several fires. In the evening of that day, the DGCN activated simultaneously 12 amphibian planes. During this month, three major fires occurred: two in Andalucia and another one in Castilla y Leon.

August started with storms and lightning. One lightning caused a 2.500 ha fire during four days near Ayerbe-Riglos, in Huesca. Several fires occurred during August and the most important, in Chert (Castellón) also caused by lightning, started on August, 29<sup>th</sup> and was extinguished on September, 2<sup>nd</sup>. Only for this fire, 34 aircrafts intervened, out of which 16 from the DGCN. The aerial means of the DGCN were 469 hours flying and transported 258 specialised fire-fighters to the Chert fire. They threw 2.400.000 l of water and flame retardants on this single fire. This strong support was only possible because there were no other important fires in Spain in this period. During August, 6 fires bigger than 500 ha were registered in Spain.

During September 2001 the fire risk decreased in Central Spain and in the Mediterranean region, but in the North-West, in particular in Galicia,

Léon and Zamora the risk increased. From September, 20<sup>th</sup> on, there was practically no risk any more due to precipitation falling all over the Peninsula. Fire risk in October was low in the Mediterranean region because of the rainfall and the mild temperatures. On the contrary Southern winds blowing in the Northern provinces increased the danger because of agricultural and bush burnings. An amphibian plane had to be based in Santander from 17 to 31 October to fight fires all along the Cantabrian Mountains. Fire risk was again low in the whole country until the middle of December. Thereafter winter burnings by farmers and shepherds started mainly in the Northwest from 17 to 25 December when the lack of rainfall and the frost desiccated fine fuels along the woodlands. The DGCN amphibians had to attack many small fires with a maximum of five planes working simultaneously on December 18.

The DGCN resources helping the Autonomous Regions were 20 amphibian planes, 13 fixed-wing aircrafts and 13 helicopters, all for water bombing. Four aircrafts were devoted to capture video and infrared images to be sent by TMA to the operation centers. Eleven specialized heli crews (BRIF) were available for intervention against the big fires all around the country. In addition, 13 Mobile Units for Meteorology and Communications (UMMT) were distributed to help the Field Directors of Operations. During the 2001 campaign the DGCN aircrafts made a total of 4587 flight hours. On their side the Autonomous Regions operated 35 fixed-wing aircrafts, 119 helicopters and 20.000 workers, including firemen and forest fire fighters.

Regarding burnt areas, the total figure for the year 2001 was 66075 ha. This figure is below the average for the last 22 years (196171 ha), which reflects the decreasing trend of the burnt areas in Spain during the last decade. This trend can be observed in Figure 5a.

*(Source: Ministerio de Medio Ambiente, Secretaria General de Medio Ambiente, Direccion General de Conservacion de la Naturaleza: Incendios Forestales en España. Año 2001, avance informativo).*

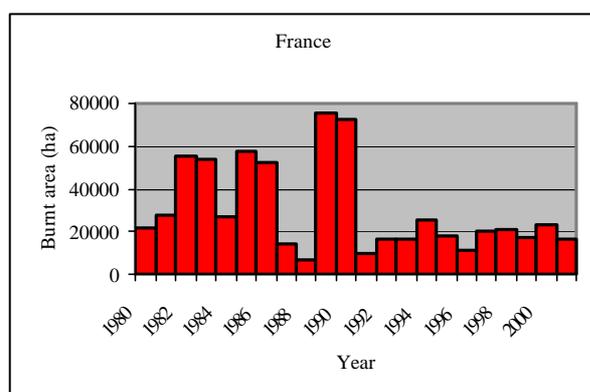
#### **2.4. France**

The number of forest fires in France in the last decade does not show an increasing trend, as it happens in most of the EU Mediterranean countries. Figure 6b shows that the number of

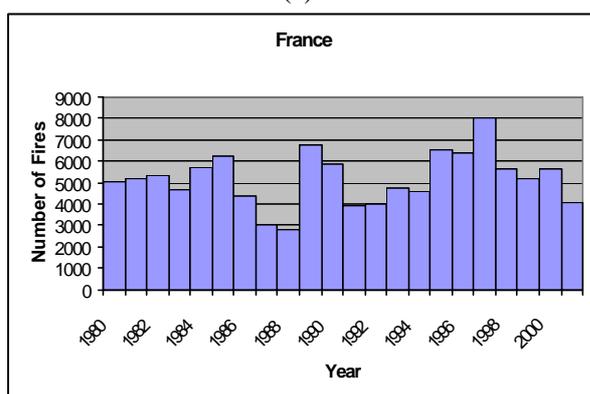
fires had increased from 1991 onwards, and again decreased after 1996. The number of forest fires during 2001 was 4103 burning a surface of 17000 ha (see Table 2). This number of fires is near the minimum for last decade (3888 fires) in 1991.

At the end of November 2001, the burnt area in the Mediterranean departments amounted to 17.000 ha. This figure was higher than the average of the last ten years (12.200 ha), but it still clearly below the figure for the areas affected by fires before the late 80s (35.000 ha), when the strategy for initial attack started to be applied.

It is necessary to analyse the areas burnt in 2001 taking into account the particular weather conditions in the Southern zone of France between the end of August and Mid-September, when 750 fires burnt 11.400 ha.



(a)



(b)

Figure 6. Burnt area and number of fires in France in the last 22 years.

During this period, forest fires affected numerous Southern departments causing an uninterrupted operational support activity during three weeks. Weather conditions were dryer than average during the second half of July. These conditions worsen in the second half of August and beginning of September with the presence of

strong winds that increased the level of risk in southern France to very high and extreme risk. The cumulative number of areas classified at extreme risk during the 2001 campaign (582) had not been so high since 1989 (800).

At the end of August, when fire risk was exceptionally high, the area burnt by fires was 5600 ha, which could be regarded as satisfactory, since the average value at this date for the decade 1991-2000 was 10300 ha, and the number of large fires (>100 ha) was 7 below the average 10 for the mentioned decade. However, these favourable figures changed after the 30<sup>th</sup> of August. Between August 30<sup>th</sup> and September 17<sup>th</sup>, 750 fires, of which 25 were larger than 100 ha, took place burning 11400 ha.

Despite this high risk period and unlike in previous years (28.000 ha during 2 days in 1990, 29.500 ha during 3 days in 1989, 16.000 ha during 2 days in 1986 and 13.000 ha within 3 days in 1985) the situation was never out of control. The important effort of the French government to reinforce the action of the territorial services and to allow the application of a large set of measures of operational prevention led to the control of the situation.

The State support was crucial in 2001. Water-dropping planes had 4.900 operational flight hours during summer time. A large part of their activity, 1.800 flight hours, was dedicated to 'armed surveillance activities'. Planes participated in the extinction of more than 650 fires, i.e. one third of the summer fires, which is above the 28% average of the ten last years. In order to improve the impact of the water-dropping planes, fire-retardants were used systematically reaching 2.850 t (above the average 2250). In addition to aerial means, the UIISC (unités d'instruction et d'intervention de la Sécurité civile) intervened in 260 fires. Though these units became smaller in size, they intervened more often than in the last 10 years average. Also the mobilisation of supporting teams of firemen by COGIC was extremely high, reaching levels that had not been seen since 1990. The military means put at disposal by the préfet de zone Sud pursuant to an agreement with the Ministry of Defence allowed for a mobilisation of 200 surveillance units, which means 4.000 men per day.

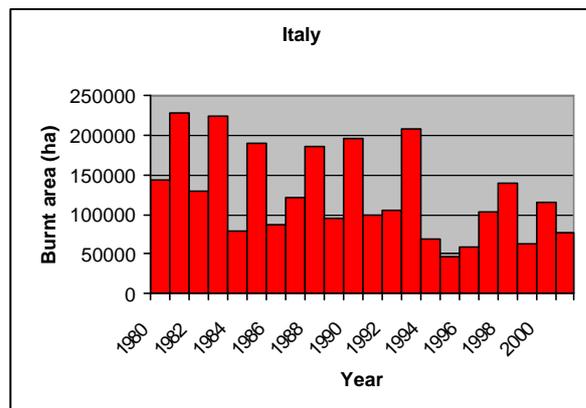
This difficult campaign has made evident the need to increase the efforts leading to limiting the number of fires and to continue the measures

implemented by the Ministry of Agriculture towards reducing fuel load and those of the Ministry of Environment to seeking the establishment of forest fire risk prevention plans on inhabited areas affected by forest fires.

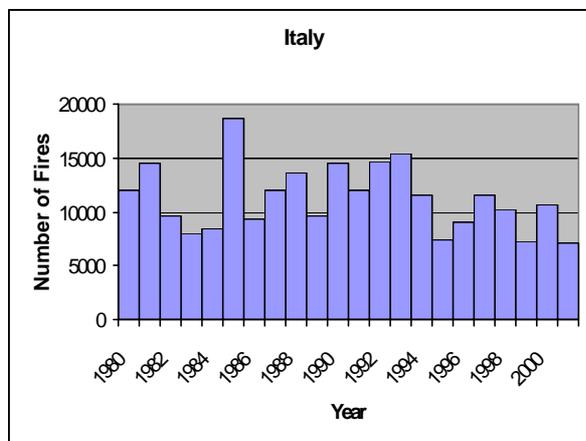
(Source: *Direction de la Defense et de la Securite Civilés (Sous-Direction de L'Organisation des Secours et de la Cooperation Civilo-Militaire, Bureau de Coordination Interministerielle de Defense et de Securite Civiles: Elements sur la Campagne feuz de forests 2001 dans les departments Mediterraneens)*).

## 2.5. Italy

In 2001, 7134 fires occurred in Italy burning a total surface of 76427 ha. This comprised 38186 of wooded area and 38241 ha of non-wooded area. This figure implies a decrease of 17% in the number of fires and a 33% reduction in the burnt area with respect to the previous year (34% reduction in the wooded area). Fire damage decreased due to improved risk preventive measures and fire-fighting interventions.



(a)



(b)

Figure 7. Burnt area and number of fires in Italy in the last 22 years.

The number of fires in 2001 is below the average for last 22 years. It is in fact the smallest number of fires in the 22-year period. As shown in Figure 7b, there is a decreasing trend in the number of fires in Italy in the last decade. Both, the burnt area and the number of fires show a decreasing trend when compared to the values in the last two decades (see Table 2).

The total burnt area for the year 2001 is way below the average for the last two decades (125674 ha) shown in Table 2. The decreasing trend in burnt surface is noticeable on Figure 7a.

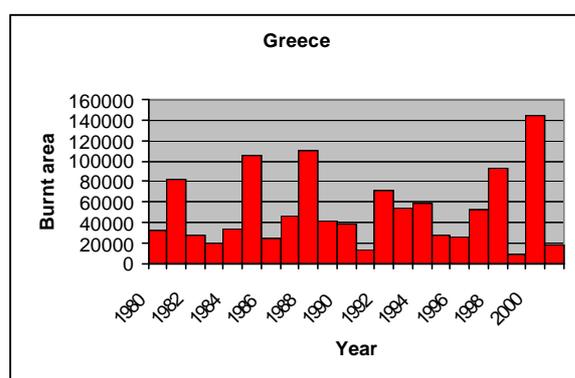
The highest number of fires occurred in Calabria (1442), Campania (870) and Sardinia (859). The regions that were most affected in terms of burnt area were Calabria with 5458 ha, Sardinia with 5386 ha, and Sicily with 4888 ha. Number of fires was 7134, of which over 75% occurred between June and September. The highest peak in number of fires was August when 2627 fires occurred burning 29113 ha, which corresponds to 38% of the total burnt area in the country for 2001. On average, during the months of July and August, 750 ha were burnt every day. Dangerous conditions continued in September when 859 fires took place to burn 9175 ha or 12% of the total burnt surface in the country in 2001. This conditions persisted in October and November leading to critical end of the year with 365 fires in December. In general, autumn was extremely dry all over Italy, especially in the northern regions of Liguria and Lombardia where 185 fires occurred. Aircrafts and helicopters coordinated by the Unified Air Operations Centre (UAOC) flew a total 7993 hours in fire fighting operations. On its side, the State Forestry Corps, which takes part in preventive and fire fighting operations, contributed with 3733 flight hours of its helicopters participating in 1600 operations.

(Source: *Ministry of Agricultural and Forestry Policy, State Forestry Corps, Forest Fire Service, Italy: Forest Fires in 2001*).

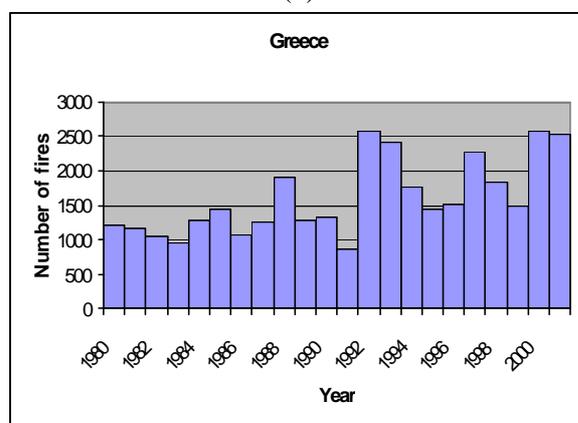
## 2.6. Greece

The number of fires in Greece shows the overall increasing trend of the EU Mediterranean region, particularly during the last decade, which shows a steady but low increase in the last 9 years. This tendency is noticeable in Figure 8a. However, the burnt area in the country in the last years does not show a clear correlation with the number of fires.

For instance, in 1998 and 2000 the numbers of fires were 1842 and 2581, respectively. These years correspond to large amounts of burnt areas, 92901 ha in 1998, and 145033 ha in 2000. Both figures, number of fires and burnt areas, are above the average 1640 fires and 51296 burnt hectares of the last 22 years (see Table 2). However, the year 2001 was particular anomalous in terms of number of fires and burnt area. The year 2001 shows a high number of fires with 2535 fire events. However, the area burnt this year, i.e. 40252 ha, is below the average of the last decades and comparatively small taking into account the large number of fires occurred in the country.



(b)



(a)

Figure 8.—Burnt area and number of fires in Greece in the last 22 years.

In summary it could be said that in the last 22 years in Greece the number of fire has increasing trend, while the burnt area has a slightly decreasing one, especially until 1997. In the year 1998 Fire Brigade undertook the forest fire suppression duties that were until then a task of the Forest Service, in which the Fire Brigade collaborated. In recent years the number of aerial means (State owned and hired) has increased (almost doubled). The last four years Greece has experienced two

years with severe fire catastrophes (2000 and 1998) and two other (2001 and 1999) very little fire damage.

The burnt wooded area in 2000 exceeded any other in the last 45 years and it was more than 2.5 times the average of the previous decade. More than 50% of the burnt area was result of only 7 major fires during the July – August period. In 2000, a long drought period from spring to fall contributed to high fire risk in broad areas of Greece, including high elevations and northern parts of Greece where the fire risk is usually low.

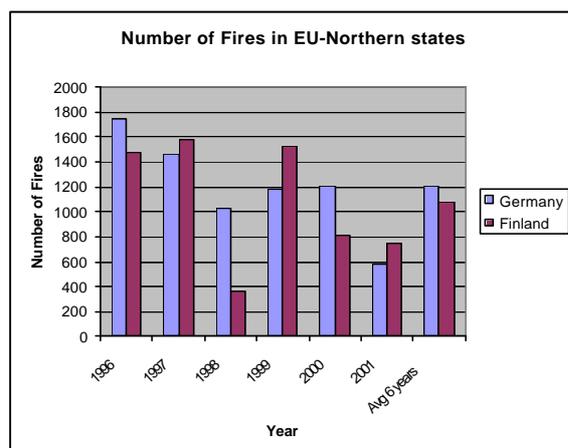
On the contrary, the 2001 fire period was characterized by mild fire weather conditions including periodic precipitation during the summer in many parts of Greece which contributed lower fire risk than that of 2000. This fact can explain how, despite a similar number of forest fires in 2000 (2581 forest fires) and 2001( 2535 forest fires), the area burnt in 2000 (145033 ha) was nearly nine times higher than that of 2001 (18221). This is mostly because fire suppression efforts became more effective due to milder fire weather conditions. This example also shows the limitations of suppression efforts during very high or extreme fire weather conditions. It is therefore essential to bring the attention of the public on the fire problem by focusing on sensibilization campaigns such as the one launched in Greece in the year 2002.

(Source: Ministry of Agriculture, General Secretariat for Forest and Natural Environment, Protection of Forest and Natural Environment Directorate, Forest Prevention and Suppression Department).

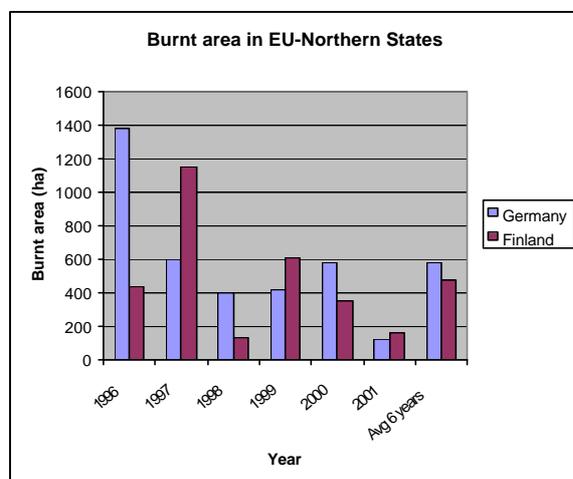
### 3. FIRES AND BURNT AREA IN THE NORTHERN STATES

The analysis of the situation of Northern States is presented in a separate chapter because the fire figures in terms of number of fires and area burnt differ largely from those of the southern states that were presented in the previous chapter. Until now, two countries are participating actively in the activities coordinated by the Civil Protection Unit of Directorate-General Environment

regarding forest fires. These are Germany and Finland.



(b)



(a)

Figure 9. Number of fires and burnt area in EU-Northern states

Table 4. Number of fires and burnt area in Northern states

Year	Number of Fires GERMANY	Number of Fires FINLAND	Burnt area (ha) GERMANY	Burnt area (ha) FINLAND
1991	1846		920	
1992	3012		4908	
1993	1694		1493	
1994	1696		1114	
1995	1237		592	
1996	1748	1475	1381	433
1997	1467	1585	599	1146
1998	1032	370	397	131
1999	1178	1528	415	609
2000	1210	805	581	352
2001	587	751	122	161
Avg 6 years	1204	1086	583	472
Total	16707	6514	12522	2832

Source: Ministerium des Innern des Landes Brandenburg, Referat III/4, Germany; Ministry of Interior, Finland

Information on forest fires, similar to that provided by the southern states, was received from Germany and Finland, although the time series for Germany was 11 years whereas it was only 6 years for Finland. This information is presented in Table 4. In order to provide a comparison of averages and total figures, the last 6 years are used for the joint analysis. Figure 9a and 9b present the evolution of the number of fires and the burnt area in Germany and Finland during the last 6 years.

As show in Figure 9a, there is slight tendency towards a smaller number of fires in both countries from the mid-nineties. This tendency is accompanied by a decrease in the number of burnt areas. The numbers of fires during the year 2001 in Germany and Finland were 587 and 751, respectively. These figures are both below their respective averages of 1204 and 1086 fires for the last 6 years. Regarding the burnt areas, we also find that in both countries the burnt area for the year 2001 (122 ha for Germany and 161 ha for Finland) is below the average figures for the last 6 years. The burnt areas in 2001 were 583 ha and 472 ha for Germany and Finland, respectively.

#### 4. OPERATIONS OF MUTUAL ASSISTANCE BETWEEN THE MEMBER STATES

No operations of mutual assistance were reported during 2001.

## 5. INFORMATION TO THE PUBLIC

In Portugal, during the year 2001 the National Commission for Forest Fires (CNEFF) launched a national initiative to integrate students during their summer holidays in actions of monitoring of the operational conditions of infrastructures of fire prevention, in special houses, watch tours, and water points. This work was carried out in cooperation with the forest owners associations, municipalities, the National Institute for Youth, and the National Institute for Geographic Information, and resulted in an updated database of preventive infrastructures. Also, the National Forest Rangers Corps, carried out a sensibilisation campaign on the defence of forest against fires targeting the school population in priority municipalities. This action took place during January and February in 250 Elementary Schools and reached 10.000 students

Also in Portugal, the Ministries of Internal Affairs and Agriculture carried out several initiatives, including the publication of leaflets, for adults and children, containing recommendations for fire prevention that were distributed by the district and local structures of Civil Protection. In addition, Civil Protection and the National Fire-fighters Service organized a large information campaign named “Protecção é conosco” (“Protection is with us”). Although this campaign was not developed exclusively for forest fires issues, it involved distribution of leaflets and other divulgation actions.

In some districts with usually large burned areas, Civil Protection, Forest Services, Natural Parks and local authorities developed a campaign in which farmers and shepherds were warned of the dangers brought by soil renovation burnings during summer time (this is frequently one important cause for forest fires). In those regions, before and during summer, there were also some *workshops* about forest fires and information campaigns in local newspapers and radio stations. The local Civil Protection Services also took part, spreading self-protection advices in case of forest fires.

But information concerning forest fires was not only for general public. For instance, National Civil Protection provided to local Civil Protection services and to Civil Protection agents, information concerning probability of forest fires. This information was especially interesting in periods of high fire probability, such as those

occurred in some days of August and September, due to a coincidence of severe atmospheric conditions (high temperatures; low moisture) with critical socio-economic factors (increase in occupation of forest and mountain areas due to holidays; religious celebrations with high use of pyrotechnical devices).

Finally, it should be remarked that, in order to provide meteorological support to forest fire prevention, the Portuguese Meteorological Institute created a *web* page (available to all national entities involved in forest fire prevention) providing information about forest fire danger index and its tendency, forest fire risk classes and 48 hours weather forecasts, among other data. In addition to the *web* page, the Portuguese National Service for Civil Protection created a short memorandum with explanations about how to use that information. This memo was distributed through out district and local structures of Civil Protection in order to achieve better results in interpretation of meteorological forecasts

In Spain, the Ministry of Environment undertook several actions in the field of forest fire prevention.

The urban population was the target of a sensibilisation campaign that was carried out through national and local radio stations, video spots in train and buses, and the distribution of leaflets containing recommendations for fire prevention. The rural population has been sensibilised by theatre performances. The information campaign launched in September 2000 to the schools reached 100.000 pupils in April 2001. Moreover, 300 environmental groups (Grupos Activos Medioambientales, GAM) were created by voluntary pupils.

In order to improve vigilance, infrastructure, silviculture and to provide donations to the volunteers through Prevention Integral Plans (PIP) of the Autonomous Communities, 10205185 Euro were transferred to the Autonomous Communities.

The experience started in 1999 of the Integral Prevention Teams (EPRIF) was operated again in the Northern provinces, where fire is caused mainly by farmers and shepherds burnings. Four EPRIF were working in the provinces of Orense, Asturias, Cantabria and Burgos investigating fire causes and promoting controlled burnings with the local population in close cooperation with the

Autonomous Authorities. Because these teams are made of well experienced staff they helped the provincial services in fire suppression when necessary.

In Greece several sensibilisation campaigns were launched on television through special magazines that contained recommendations for preventing fires. These tv programs targeted special interest groups such as elementary and high school children, volunteers. They were also addressing the general public. It is foreseen that the 2002 sensibilization campaigns will focus on actions of negligence that can

## 6. APPLICATIONS OF ADVANCED METHODS

The European Commission set up in 1997 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 (DG JRC). Since 1998, collaboration has been established with the relevant services of Member States, and under the coordination of DG ENV Civil Protection, aiming to the development of a European system for the harmonized evaluation of fire risk in Europe.

Indicators of forest fire risk were normally developed at the local or national levels. Until recently no mechanisms existed to estimate the risk of forest fires at the EU scale. This was due to the lack of regional data sets for the estimation of fire risk and to the lack of regional information of forest fires that would necessarily be used for the calibration and validation of the proposed fire risk indices. The work at DG JRC has focused both on the development of systems to provide forest fire risk forecast on the basis of existing fire risk indices, and on the development of new integrated forest fire risk indicators. Five types of forest fire risk indices, from long-term (static) risk indicators to short-term (dynamic) risk indicators have been implemented. All these indices permit the harmonized assessment of forest fire risk at the European scale. They may be used as tools for the assessment of risk situations in those cases in which international cooperation in the field of civil protection is needed. The indices are computed and distributed to the Member States

through the so-called European Forest Fire Risk Forecasting System (EFFRFS).

In Europe there is recurrence in the forest fire phenomenon, i.e. fires tend to occur where they have historically taken place. However, the impact of recurrent forest fires on the EU Mediterranean regions has never been evaluated. European data on burnt areas come from the aggregation of heterogeneous local and national databases in which data are collected in different ways with very diverse methods. Although these data permit observing some insights of the fire phenomenon in the EU, they do not permit a harmonized assessment of forest fire impact. Therefore, in addition to the evaluation of fire risk, DG JRC initiated an activity to estimate the annual damage caused by forest fires in the south of the EU. Modern methods based on satellite remote sensing and geographic information analysis are used for this purpose. This activity produced the first cartography of forest fire damages in the south of the EU in 2000. Since then, cartography of all the burned areas larger than 50 ha is produced every year through the processing of satellite imagery. These areas account on average for 75 % of the yearly total burnt area in Europe. 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 system referred to as the European Forest Fire Damage Assessment System (EFFDAS).

### 6.1. The European Forest Fire Risk Forecasting System (EFFRFS): Evaluation of the 2001 Campaign

The European Forest Fire Risk Forecasting System (EFFRFS) was developed in support of the EC Directorate General Environment and the relevant forest fire-fighting services in the EU Member States. Nowadays the EFFRFS covers all Europe and predicts fire risk using seven different methods to cover requirements of the different services.

The EFFRFS was expanded in the year 2000 to cover all Europe. In addition, the system included in 2001 the computation of a new index referred to as the Fire Potential Index (FPI). This index differs from the meteorological indices in the fact that it is computed from three layers of information: vegetation type (fuel type), vegetation greenness (vegetation stress), and meteorological information. During the 2001 fire

campaign (June to September), the EFFRFS predicted the evolution of the forest fire risk forecast as follows:

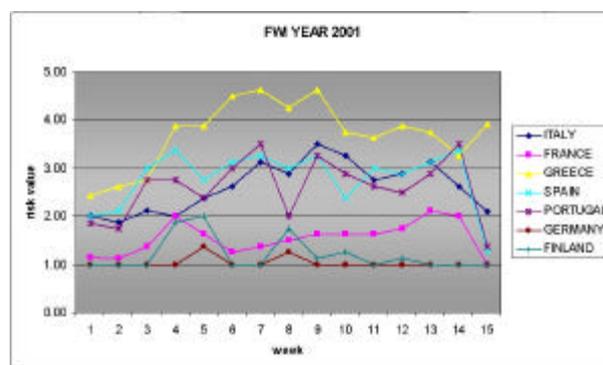
As a whole, lower fire risk levels than the previous years characterized the fire campaign of 2001. This resulted in a lower number of fires and less fire affected areas than in 2000. Despite the lower risk for 2001, already in June a number of important fires had taken place in north-eastern Spain, Portugal and Greece. The fire season started with low fire risk in most of the EU territory. This low-risk situation continued during most of June due to below-average temperatures and scattered showers. However, the situation changed in July, when very few rains occurred, especially in the EU Mediterranean region. The fire risk in this region increased steadily, with very high risk in southern Portugal, eastern Spain, south-eastern France and the south of Italy and Greece increase from June to July, reaching the overall maximum for the EU in July. The trends of fire risk levels for the Fire Weather Index in the years 2000 and 2001 is presented in the Figures 10a and 10b.

The maximum risk was reached in July in Portugal, Spain, Greece, and Germany, while fire risk was the highest in August in France and Italy. Although the overall risk for the EU decreased in the month of September, high fire risk was still present in some regions of Portugal, southern France and Greece. The fire risk trend, as in the year 2000, showed an In fact, a large number of the fires that occurred in Portugal, southeastern France, and Greece took place at the end of August and beginning of September.

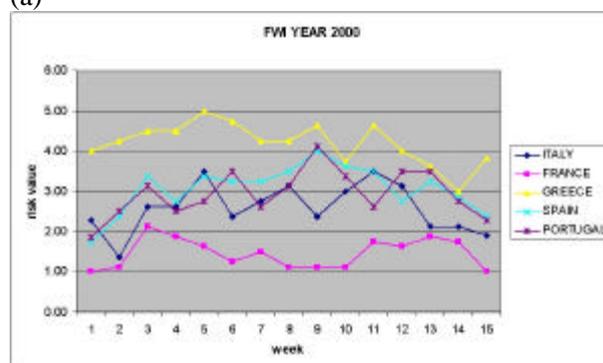
The levels of risk range from very low (risk value=1) to very high (risk value=5). For instance, the levels of risk for Greece in 2000 were almost always above 4, which corresponds to high risk, while in the year 2001 the same risk level was only reached from mid-July to mid-August (weeks 6<sup>th</sup> to the 9<sup>th</sup> on the graph). A similar pattern can also be observed for the rest of the countries.

Monthly averages of the fire risk situation in the EU are presented in Figure 11. High and very high fire risk are coded in red and maroon on

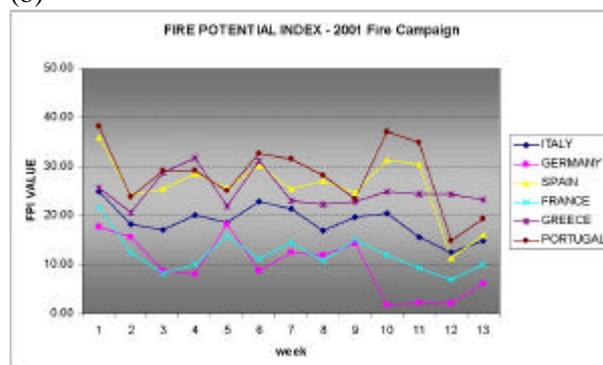
these figures. It is noticeable how this extreme risk situation predominates in the months of July and August on many EU Mediterranean regions.



(a)



(b)



(c)

Figure 10. Evaluation of fire risk evolution in 2001 (a) compared to the 2000 campaign (b) as determined by the Canadian Fire Weather Index (FWI). (c) Evolution of fire risk in 2001 estimated by the Fire Potential Index (FPI).

As mentioned above, the computation of a new index started in the year 2001. This new index is referred to as Fire Potential Index (FPI) and is computed from three sources of information: fuel types, vegetation greenness (vegetation water stress), and fuel moisture estimates. The index, which presents an improved 4.4 km resolution when compared to the meteorological indices, is

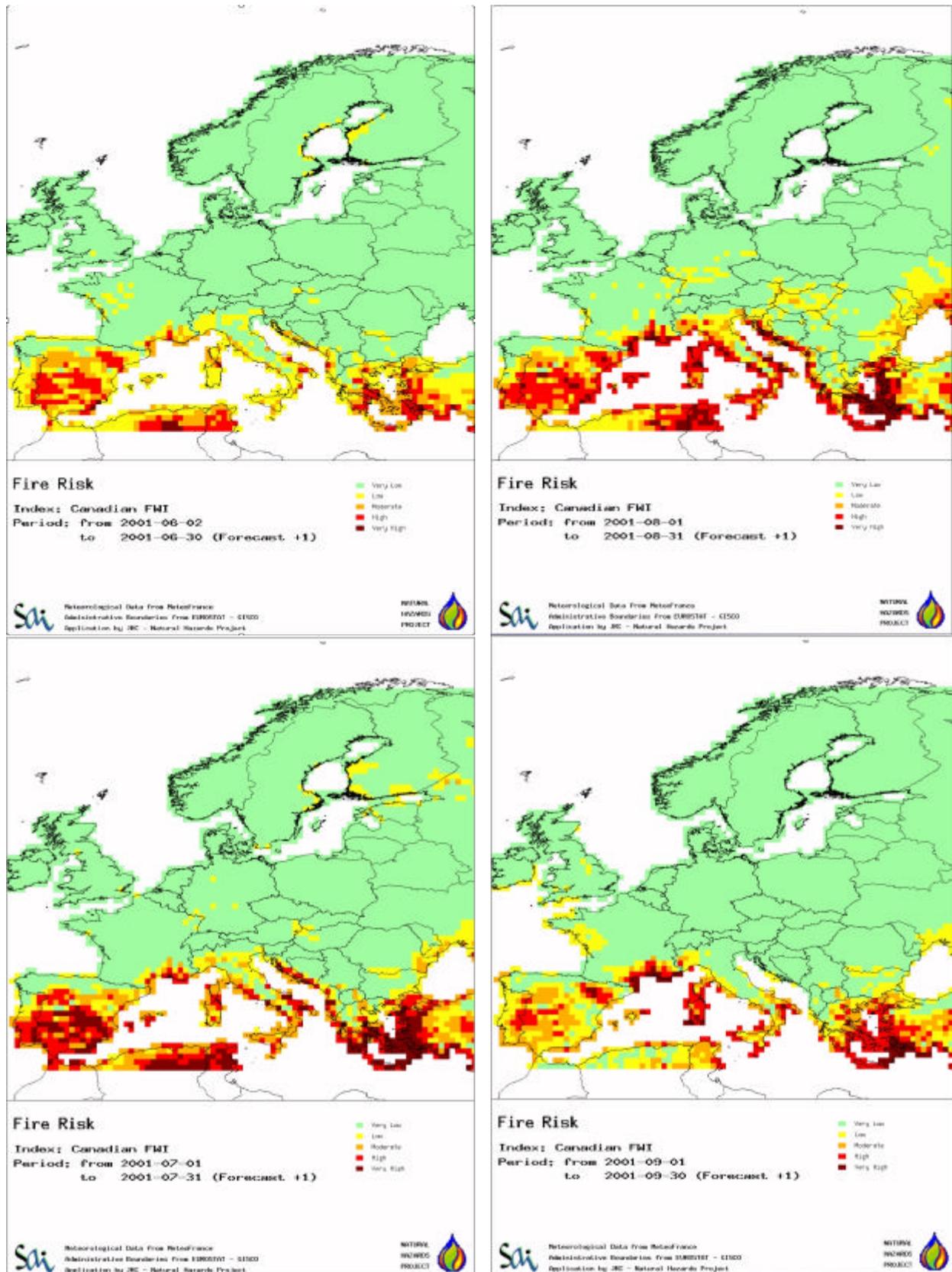


Figure 11. Evolution of the monthly fire risk in the European Union as determined by the Canadian Fire Weather Index.

computed only over natural and semi-natural areas of the EU.

It has initially been implemented only in the EU Mediterranean region, but it will be extended to the whole EU. The fire risk trend showed by this index during the 2001 campaign is presented in the figure 10c, while an example of a FPI map in Figure 12.

The EFFRFS, which started in the year 2000 covering only the Mediterranean region, operates during the peak of the forest fire season, i.e. from June to September. It has been expanded in 2001 to cover other EU countries that requested the provision of fire risk maps such as Austria, Finland, Germany, and Ireland, and some EC pre-accession countries such as Bulgaria. The EFFRFS provides a user driven service that was created on demand from Member States to DG ENV.

Very positive feedback has been received from the Member States asking for the continuation and the improvement of the EFFRFS towards a European Forest Fire Information System. This is a clear example of establishing a structured dialogue with users and other stakeholders that can lead to an operational service for civil protection and forest fire services across EU. This JRC contribution is in line with the EU role to provide environmental information and services that can be aggregated to other existing global environmental information products in support of the Global Monitoring for Environment and Security (GMES) initiative.

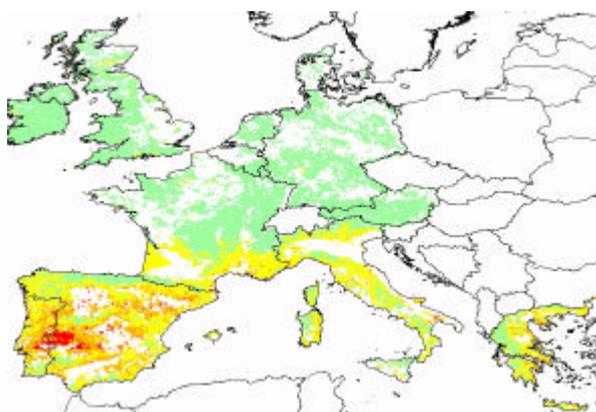


Figure 12. Example of the Fire Potential Index coded in the same risk levels as the Meteorological indices above.

## References:

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

European Communities (b), 2001, Forest fires in southern Europe: Report No. 1, July 2001, SPI 01.95, p. 40.

Van Wagner CE (1987) Development and structure of the Canadian Forest Fire Weather Index System. Canadian Forestry Service, Technical Report 35, pp 37.

## 6.2. The European Forest Fire Damage Assessment System (EFFDAS): Evaluation of the 2001 Campaign.

The information on areas burned by fire at the European level is normally aggregated at administrative level and ignores the exact spatial location and extent of fires. There are two facts that prevent a thorough analysis of the impact of forest fires in the EU. On the one hand each country has its own methodology to assess burned areas, which leads to the lack of harmonization of the burned area statistics and the impossibility to compare fire damages from region to region. On the other hand, although the extent of burnt areas is estimated, no cartography of these is produced. Only the mapping of very large fires is carried out in some countries.

In order to improve the harmonization of burnt area data and statistics a map of burnt areas is derived from the classification of satellite images acquired at the end of the fire season (usually, end of September or October every year). This burnt area map is further used in conjunction with the EU-CORINE land cover (CLC) database to estimate the damage to forests and other land cover types.

The methodology has the advantage of giving fast up to date evaluations of the burned areas just after the end of the fire season. It also provides a harmonized system that permits the comparison of fire damages between the different regions of the European Union. The satellite imagery used is acquired by the Indian IRS satellite. These type of satellite images present a ground resolution of 180 meters which permits detailed mapping of fairly small fires. Traditionally, mapping of burnt areas has been performed with low spatial resolution satellite imagery acquired by the

NOAA Satellites, which only permitted the mapping of burnt areas larger than 1000 ha. However, in the case of the EU, fires larger than 1000 ha represent only the 15% of the area that is burnt every year. Therefore, in order to derive accurate maps of burnt areas, up to the spatial resolution of 50 ha, the medium spatial resolution provided by the IRS satellite (180 meters) was selected for this application. Burned areas larger than 50 ha account, in whole Mediterranean region, for 75 % of the total area burnt every year. The EFFDAS produced the first cartography of forest fire damages in the south of the EU for the year 2000. Figure 13 shows, for the year 2000, the number of fires larger than 50 ha mapped from satellite imagery.

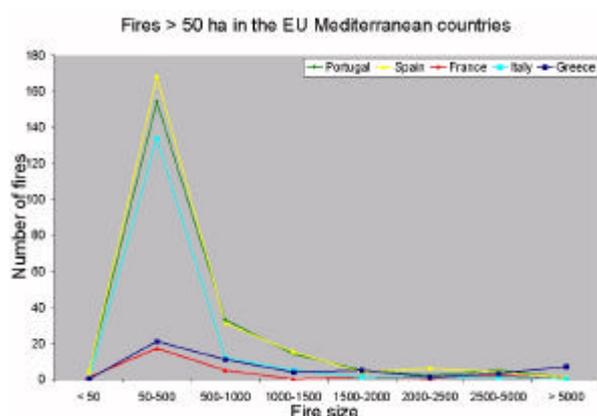


Figure 13. Number of fires larger than 50 ha mapped in the EU Mediterranean countries in 2000.

Also in the year 2001, all fires larger than 50 hectares were mapped. The evaluation of each of the five Mediterranean countries is presented in the following paragraphs. It should be mentioned that in the year 2001, the months of September and October, i.e. those when images for burnt area mapping are selected, presented high cloud coverage over most of the EU Mediterranean region. The presence of clouds in some of the images may have lead to the underestimation of the total burnt area in some of the EU Mediterranean countries. The area burned by fires larger than 50 ha, as detected by the analysis of the satellite imagery, resulted in a total surface of 137597 hectares. Assuming that this figure represents the 75% of the total burnt area, it is possible to estimate the total burnt surface in 183462 ha.

Country	Surface burned (hectares)
Portugal	74505
Spain	38452
France	5136
Italy	14842
Greece	4662
<b>Total</b>	<b>137597</b>

## PORTUGAL

Forest fire damages in Portugal decreased from the year 2000. The damages are above the average of the last two decades. As it is common in Portugal, the fire damage concentrated in the north and center part of the country. Preliminary data from Portuguese sources provide an estimate of 27067 fires with an area burnt of 111165 ha.

The analysis performed on satellite imagery at the JRC has resulted in an estimate of 74505 ha burnt by fires larger than 50 hectares. The intersection of the burned area map with the CORINE land cover database provided the information on the land cover classes that burned. The table below presents the damage assessment. It can be observed on this table that the burnt areas was mostly forest and semi-natural areas.

CORINE land-cover class	Burned area (ha)	(%) of total burned area
Artificial Surfaces	5	0.07
Agricultural Areas	6955	5.17
Forests and Semi-natural Areas	67516	94.72
Wetlands	28	0.04
<b>Total</b>	<b>74505</b>	<b>100</b>

According to statistics by country from previous years, it can be inferred that the total burnt area in the year 2001, i.e. including all fires, was approximately 99340 hectares. This figure is larger than the average for the last 22 years (92621 ha).

The image below presents the fires that were detected on the satellite imagery. Burnt areas are shown in red over a color-composite of the satellite images. As shown on the image, fires in Portugal concentrate on the center and northern regions.

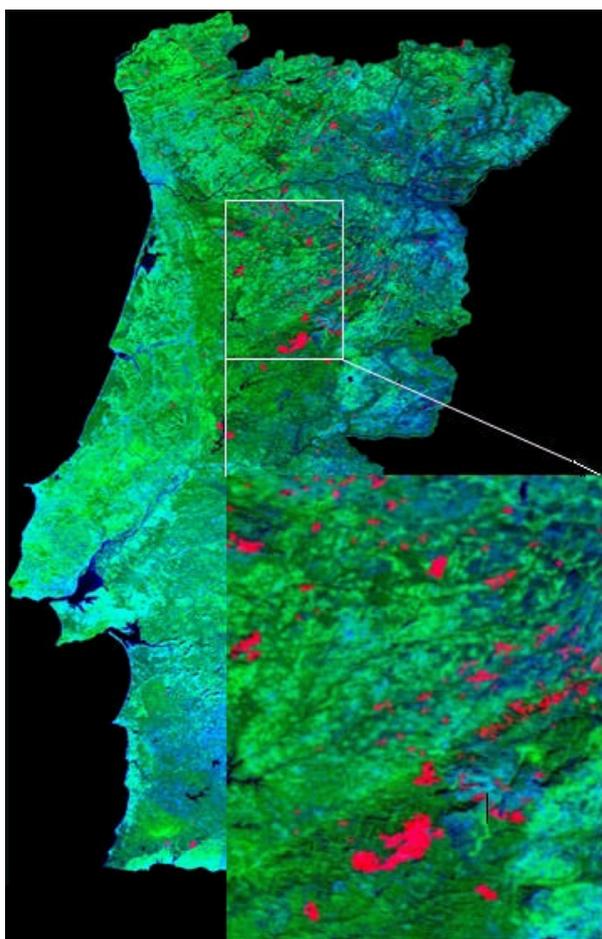


Figure 14. Surface burned by forest fires in 2001.

## SPAIN

Forest fire damages in Spain decreased largely from the year 2000. Provisional data provided by the Direcccion General de Conservacion de la Naturaleza estimate the burnt area in 66075 ha. The damages are below the average of the last decade and the average of the last 22 years (196171 ha). As it generally happens most of the fire damage concentrated in the north and center part of the country.

The analysis performed on satellite imagery at the JRC has resulted in an estimate of 38452 ha burnt by fires larger than 50 hectares. Considering that that, on average, these fires constitute 75% of the total burnt area, the overall estimate for the burn surface in Spain from the analysis of satellite imagery is of 51270 ha.

The intersection of the burned area map with the CORINE land cover database provided the information on the land cover classes that burned.

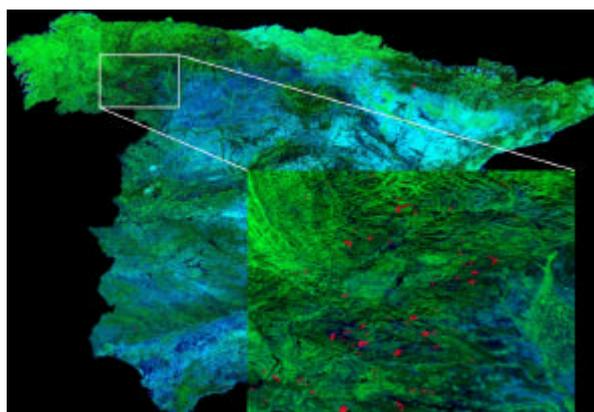


Figure 15. Burnt damage analysis in Spain.

This distribution is shown in the table below:

CORINE land-cover class	Burned area (ha)	(%) of total burned area
Artificial Surfaces	27	0.07
Agricultural Areas	1988	5.17
Forests and Semi-natural Areas	36423	94.72
Wetlands	14	0.04
<b>Total</b>	<b>38452</b>	<b>100</b>

One of the regions that presented high forest fire damage was northern Spain, as show on Figure 5. However, largest fires took place in other regions, such a Andalusia or Castilla-La Mancha. The image in Figure 15 presents the fires that were detected on the satellite imagery. Burnt areas are shown in red over a color-composite of the satellite images.

## FRANCE

The damage caused by forest fires in France in 2001 (17000 ha) was below the average for the last 22 years (30114 ha). These damages were caused by the 4103 fires that occurred in France during 2001. As in previous years, most of the fires took place in the south of the country. For this reason, the analysis of satellite imagery was restricted to this part of France.

The analysis performed on satellite imagery at the JRC has resulted in an estimate of 5136 ha burnt by fires larger than 50 hectares. The damage assessment performed using the CORINE landcover database produced the table that is presented below. It can be observed on this table that the burnt area was mostly forest and semi-natural areas, although nearly 4% of the burnt areas corresponded to agriculture.

CORINE land-cover class	Burned area (ha)	(%) of total burned area
Artificial Surfaces	0	0.01
Agricultural Areas	200	3.90
Forests and Semi-natural Areas	4929	95.97
Wetlands	6	0.12
<b>Total</b>	<b>5136</b>	<b>100.00</b>

One of the regions that presented high forest fire damage was Corsica. The image below presents the fires that were detected on the satellite imagery. Burnt areas are shown in red over a color-composite of the satellite images.

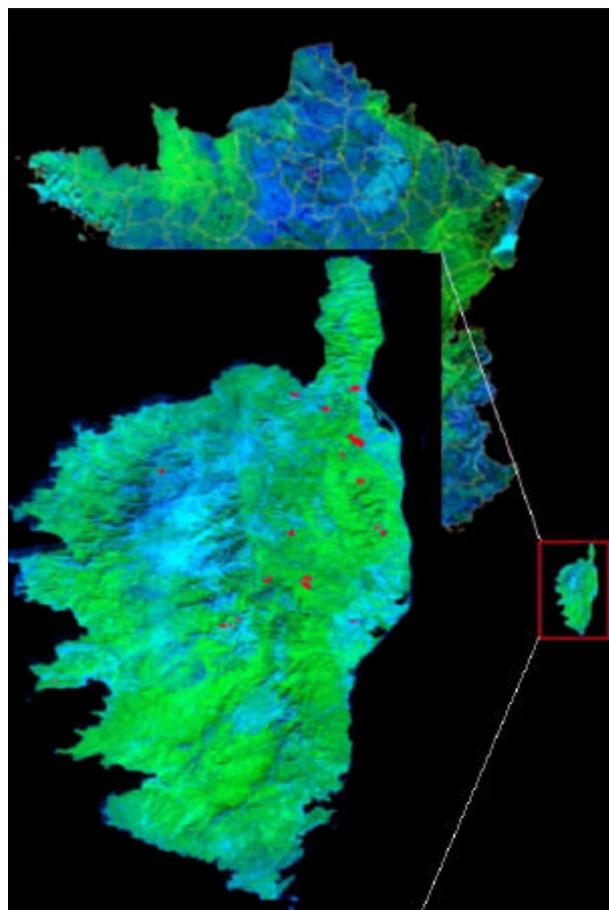


Figure 16. Forest fire damage in southern France

## ITALY

As in other Mediterranean countries, most of the fires that take place in Italy are of a small dimension. It is therefore difficult to map them from satellite imagery. This fact next to the presence of clouds lead to the underestimation of burnt areas as detected from satellite imagery. The burnt area in Italy in 2001 decrease from the previous year and was by far below the average of

the last 22 years. Fires in 2001 were spread all over the country, with a large number of fires in northern regions (Liguria) and also in the south of Italy. The analysis of burnt area through the use of satellite images resulted in 14842 ha, which is way below the figure reported by the Corpo Forestale dello Stato of 76427 ha. These results are in part due to the small number of forest fires larger than 50 ha, that on average are only the 52% of the total number of fires, and, as mentioned before, the presence of clouds over numerous regions of Italy that prevented the detection of burnt areas by the satellite sensor.

A region that suffered a fairly large number of fires was Puglia in southern Italy. This is the area shown in Figure 17.

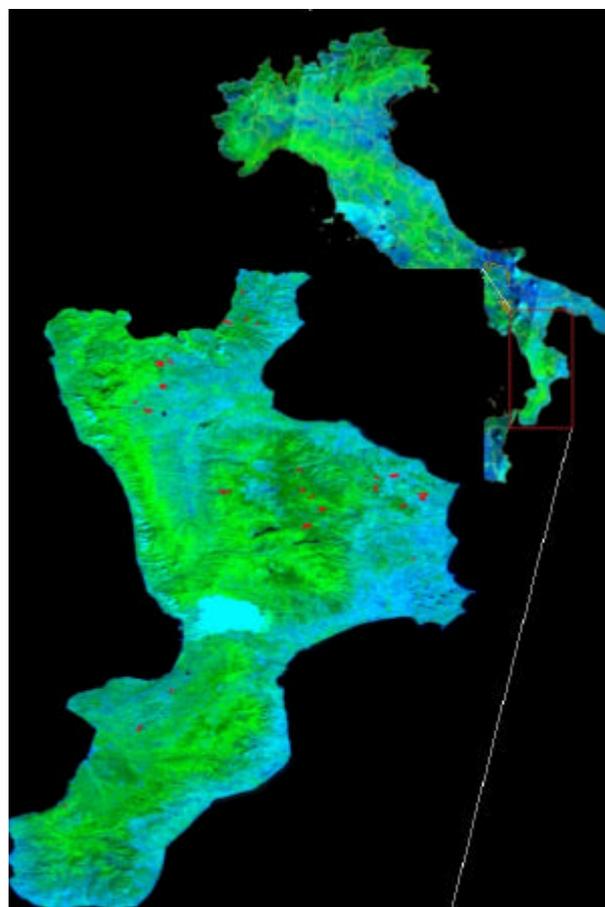


Figure 17. Surface burned by forest fires per year.

The damage assessment was performed using the CORINE land cover database. This analysis is presented in the table below. It can be observed on this table that the burnt areas were mostly forests and semi-natural areas. It is interesting to mentioned that there is a noticeable percentage of burnt area on artificial surfaces, which correspond in most cases to urban or peri-urban areas.

CORINE land-cover class	Burned area (ha)	(%) of total burned area
Artificial Surfaces	108	0.73
Agricultural Areas	3359	22.63
Forests and Semi-natural Areas	11372	76.62
Wetlands	2	0.01
<b>Total</b>	<b>14842</b>	<b>100.00</b>

area corresponded to the forest and semi-natural areas.

CORINE land-cover class	Burned area (ha)	(%) of total burned area
Artificial Surfaces	4	0.09
Agricultural Areas	728	15.61
Forests and Semi-natural Areas	3916	84.00
Wetlands	14	0.30
<b>Total</b>	<b>4662</b>	<b>100.00</b>

## GREECE

Although the number of forest fires in Greece was above the average of the last decades, the damage caused by them was relatively small. The analysis of satellite imagery for the detection of burnt scars for those fires larger than 50 ha resulted in an estimate of 4666 ha. According to statistics by country from previous years, it can be inferred that the total burnt area in the year 2001, i.e. including all fires, was approximately 6216 hectares. This estimate is bay far below the estimate provided by the General Secretariat for Forest and the Natural Environment of Greece. As mentioned in previous chapters, mild weather conditions helped in the early extinction of forest fires, which may have resulted in many fires of small size that are hardly detectable from satellite imagery. Some of the most noticeable burnt in northeastern Greece are presented in Figure 18.

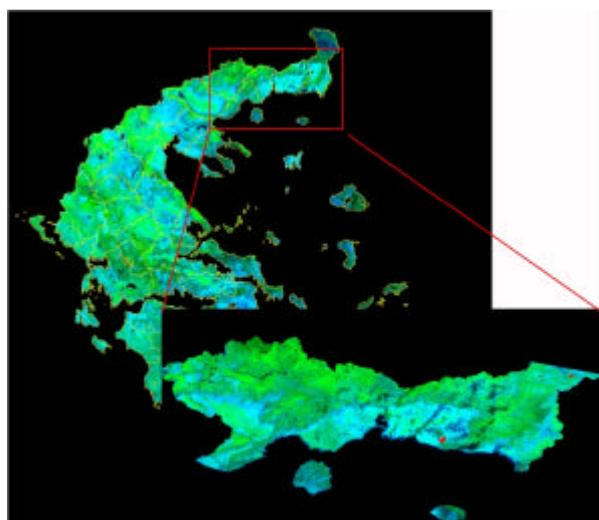


Figure 18. Burnt areas in northeastern Greece.

The damage assessment performed by the intersection of the burnt area maps obtained from satellite images and the CORINE landcover database produced the table that is presented below. As in other countries, most of the burnt

## 7. ANNEX

7.1. Table 5.: Burnt wooded area in the Southern Member States (period 1980 - 2001)

Burnt Area (ha)	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
1980	44260	263017	22176	144302	32965	<b>506720</b>
1981	89798	298288	27711	229850	81417	<b>727064</b>
1982	39557	152903	55145	130239	27372	<b>405216</b>
1983	47812	108100	53729	223728	19613	<b>452982</b>
1984	52713	165119	27202	78326	33655	<b>357015</b>
1985	146255	484476	57368	189898	105450	<b>983447</b>
1986	99522	264887	51860	86240	24514	<b>527023</b>
1987	76268	146662	14108	120697	46315	<b>404050</b>
1988	22435	137734	6701	186405	110501	<b>463776</b>
1989	126235	426693	75566	95161	42363	<b>766018</b>
1990	137252	203032	72625	195319	38594	<b>646822</b>
1991	182486	260306	10130	99860	13046	<b>565840</b>
1992	57012	105277	16607	105695	71410	<b>356001</b>
1993	49963	89331	16695	209314	54049	<b>419288</b>
1994	77323	437635	25872	68828	57908	<b>667566</b>
1995	169612	143468	18118	46466	27202	<b>404882</b>
1996	88867	59814	11210	57986	25310	<b>243198</b>
1997	30535	98503	20500	103015	52373	<b>304926</b>
1998	158369	133643	20880	140432	92901	<b>565296</b>
1999	70613	82217	17605	61989	8289	<b>251473</b>
2000	159604	188586	23700	114648	145033	631571
2001	111165	66075	17000	76427	18221	288888

Burnt Area (ha)	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
2001	111165	66075	17000	76427	18221	288888
Average(1980-1989)	74486	244788	39157	148485	52417	559331
Average(1990-1999)	102203	161323	23024	108890	44108	442529
Average 1980-2001	92621	196171	30114	125674	51296	497230
Percentage of total (2001)	38	23	6	26	6	100
TOTAL	2037656	4315766	662508	2764825	1128501	10939062

Source: European Commission, DG Agriculture and Member States For 2001: (1): 31.10.2001 Direcção Geral das Florestas, Portugal; (2) 31.12.2001 Dirección General de Conservación de la Naturaleza, Ministerio de Medio Ambiente, Spain; (3) 31.11.2001 Ministère de l'Agriculture, France; (4) 01.07.2001 Corpo Forestale dello Stato, Div XII, Italy; (5) 30.09.2001 General Secretariate for Forests and the Natural Environment, Greece.

(\*) Provisional data

7.2. Table 6. Number of forest fires in the Southern Member States (1980-2001) (updated 13/05/2002):

Number of fires	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
1980	2349	7190	5040	11963	1207	27749
1981	6640	10878	5173	14503	1159	38353
1982	3567	6545	5308	9557	1045	26022
1983	4503	4791	4659	7956	968	22877
1984	6377	7203	5672	8482	1284	29018
1985	7218	12238	6249	18664	1442	45811
1986	4348	7570	4353	9388	1082	26741
1987	6977	8670	3043	11972	1266	31928
1988	5643	9247	2837	13558	1898	33183
1989	20155	20811	6763	9669	1284	58682
1990	10745	12913	5881	14477	1322	45338
1991	14327	13530	3888	11965	858	44568
1992	14954	15955	4008	14641	2582	52140
1993	16101	14253	4765	15380	2406	52905
1994	19983	19263	4633	11588	1763	57230
1995	34116	25828	6545	7378	1438	75305
1996	28626	16771	6400	9093	1508	62398
1997	23497	22319	8000	11612	2273	67701
1998	34676	22445	5600	10155	1842	74718
1999	25477	18237	5170	7235	1486	57605
2000	34109	24312	5600	10629	2581	77231
2001	27067	19631	4103	7134	2535	60470

Number of fires	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
2001	27067	19631	4103	7134	2535	60470
Average 1980-1989	6778	9514	4910	11571	1264	34036
Average 1990-1999	22250	18151	5489	11352	1748	58991
Average 1980-2001	15975	14573	5168	11227	1601	48544
TOTAL	351455	320600	113690	246999	35229	1067973

Source: European Commission, DG Agriculture and Member States For 2001: (1) 31.10.2001 Direcção Geral das Florestas, Portugal; (2) 31.12.2001 Dirección General de Conservación de la Naturaleza, Ministerio de Medio Ambiente, Spain; (3) 15.09.2001 Ministère de l'Agriculture, France; (4) 01.07.2001 Corpo Forestale dello Stato, Div XII, Italy; (5) 30.09.2001 General Secretariate for Forests and the Natural Environment, Greece.

(\*) Provisional data



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In the frame of the Natural Hazards project, the Institute for Environment and Sustainability of the Joint Research Centre (JRC) of the European Commission is working to the creation of the European Forest Fire Information System (EFFIS). Together with the relevant services of the Member States, and coordinated by the Civil Protection and Environmental Accidents Unit of the European Commission Directorate General of Environment, the JRC edits the yearly report of each fire campaign. It is not the scope of the report to make comparison among the different data sources, but to provide a comprehensive overview of the forest fire situation in Europe.

Further information on advanced methods can be found in the prototype site of the EFFIS at:

<http://natural-hazards.jrc.it/fires>