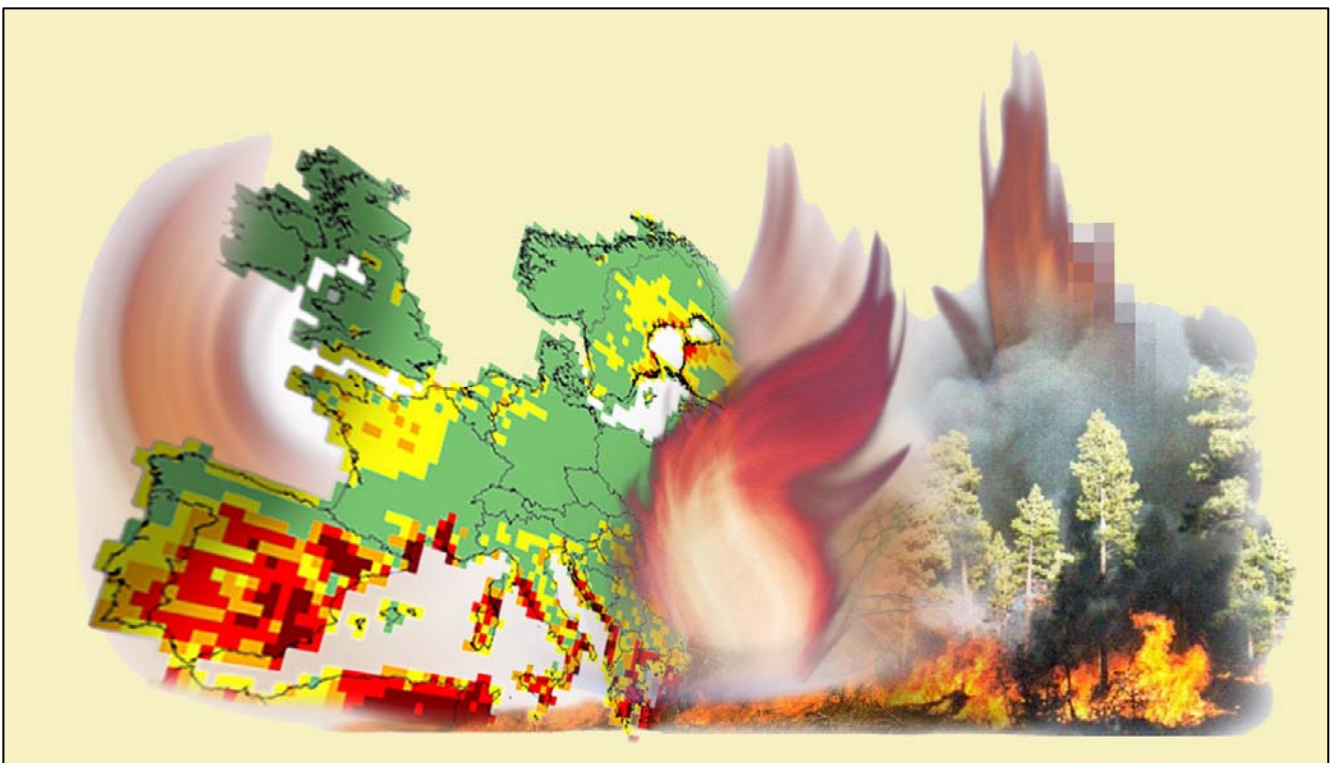


Report No 8

# Forest Fires in Europe 2007



EUR 23492 EN - 2008



# Forest Fires in Europe 2007

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## **1. AN URGENT NEED FOR PROTECTING FORESTS AGAINST FIRES AT EUROPEAN LEVEL**

Although this year's (2008) fire season is not yet over, it looks as though Europe has escaped relatively unscathed. But we still bear the scars of the devastation and loss of life brought by the events of last and previous summer periods, in particular in the Mediterranean region.

We should seriously ask ourselves what is going wrong after decades of investigation in fire causes, after having put so many efforts in fire prevention and fighting, at local, regional, national and Community level. Something is apparently going wrong and we need to investigate in the reasons for that rather than spending efforts in un-coordinated actions realised here and there.

Hot countries are naturally vulnerable to fires, but there is much we can do to prevent them. The simple fact is that most of these fires have a human origin. The European Union and its Member States are requested to make society aware of the value of our forests and their resources and the benefits of their conservation. This can be done by promoting the involvement of civil society through organised volunteering or by other methods. A first step could be raising awareness of local population and tourists, of local to national decision-makers.

As individuals, and as a society, we must take responsibility for our forests and ensure that appropriate fire prevention measures are taken. This means creating watchtowers, water reservoirs and the respect of an adequate distance between houses and forests. On the preparedness side, this means the creation of effective civil protection networks with actors who are well trained and equipped, and not to forget the active involvement of the Member States' and third countries' authorities in the European Forest Fire Information System network.

Less hot countries are to a lesser extent exposed to forest fires, but the effects may also be disastrous. As a Community we need to be aware that large parts of the European forests are protected sites, be it NATURA 2000 areas or national parks or lesser protected sites. The citizen (and not only the forest fire experts) should know about the fire risks and the damage caused by fires. They should know about the hundreds of millions of tax payer's euro at stake that has been and is spent to protect forests as pools of biodiversity richness, as water retention and climate change regulators, as landscape building elements, as conservers of our cultural heritage and as fuel providers. The issue concerns all of us and we all should have a serious interest in establishing a coherent approach against the destruction wrought by forest fires and why not to show the world that Europe is able to do so?

The European Commission is currently examining in depth the issue of forest fires and forest protection in a wider context. It is well aware that there is potential to face the vulnerability of forests. On the other hand, it has limited influence on forest fire management at Member State's level because adequate provisions are missing in the Treaty. In some cases, its co-funding of some of the fire prevention projects is even not subject to notification to the Commission. However, where the Member States are not capable to handle forest fires at their own, the principle of subsidiarity leaves room for doing it at Community level. It is therefore vital that all the parties involved are committed to cooperation and mutual assistance, bearing in mind that this is all but simply an altruistic approach.

As the previous forest fire reports did, the present report N° 8 gives a detailed overview on the forest fire situation in Europe. It is the basis for any decision-making and serves as a reference for all those committed to find efficient solutions to solve the problem.

## 2. FOREST FIRES 2007 IN THE EUROPEAN COUNTRIES

### 2.1. SOUTHERN MOST AFFECTED MEMBER STATES (1980 – 2007)

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

During 2007, fires in these 5 countries burned a total area of 574 361 hectares, which is well above the average for the last 28 years. On the other hand, the number of fires that occurred (42 259) is below the average for the last 28 years (see Table 1 for details).

Figure 1a shows the total burnt area per year in the five Southern Member States since 1980. The statistics vary considerably from one year to the next, which clearly indicates how much the burnt area depends on seasonal meteorological conditions. Overall the 2007 was among the worse years of last decades, but if we look at the spatial distribution, it was significantly below the average for western countries (Portugal, Spain, France) and a disastrous year for Italy and Greece (Table 1). In these two countries the burnt area reached record values for the time series considered, with a significant level of damage.

Figure 1b shows the yearly number of fires in the five southern Member States since 1980. After the increasing trend during the 1990s, which was likely also due to the improvement in the recording procedures, the number of fires was stabilized for around one decade. During the last years there seem to be the start of a trend to decrease, but this will have to be confirmed in the next years.

Figure 1c shows the yearly average fire size in the 5 countries since 1980. There is a clear difference in average fire size before the '90 and after. This is roughly corresponding to the increase in number of fires after that period, and it is also partly due to the same reasons (the additional fires that are recorded thanks to the improvements in the statistical systems are the smallest ones). But it is also largely due to the improvements of the fire protection services of the countries. Again, there seem to be visible a trend during the last years, this time to a slight increase, but it is a too short period to draw conclusions.

Figure 2 compares the yearly averages for burnt areas, number of fires and average fires size for

the periods 1980-89; 1990-1999 and 2000-07 with the figures for 2007. It allows a comparison for each of the 5 countries and for the sum of them, and it clearly indicates how critical the 2007 was for Italy and Greece in terms of burned area and average fire size. The overall figure for the five southern Member States is above the averages of previous periods due to the extreme fire activities in these two countries.

Figure 3 shows the contribution of each Member State in terms of burnt areas and numbers of fires to the overall figures for the five Southern Member States in 2007.

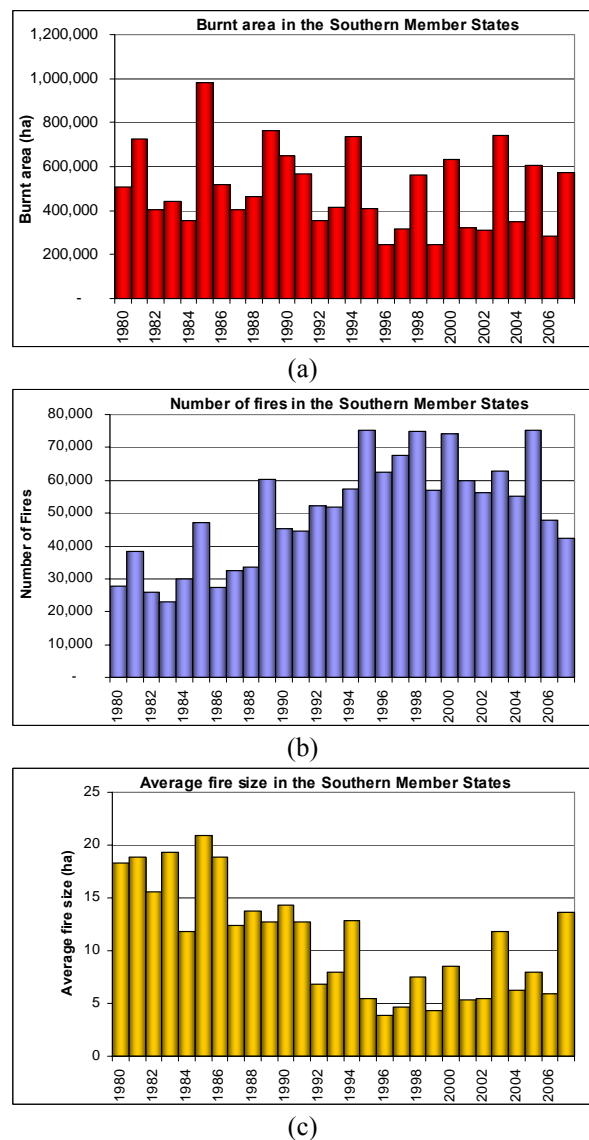


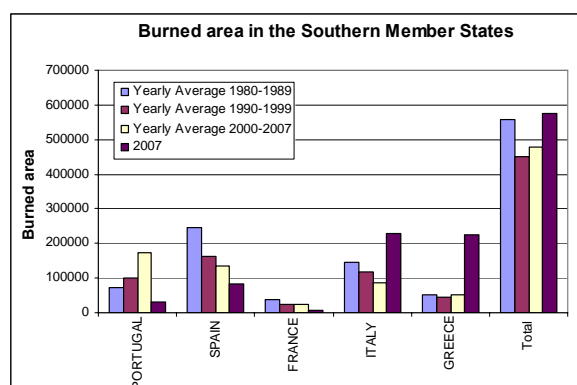
Figure 1. Burnt area (a) number of fires (b) and average fire size (c) in the five Southern Member States for the last 28 years.

Table 1 provides a summary of the burnt areas and number of fires for the last 28 years, the average for the 1980s and 1990s, and the average for the last 8 years, together with the figures for 2007.

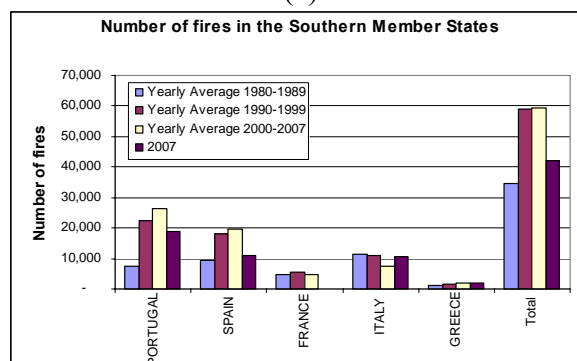
As mentioned, a total of 574 361 ha were burnt in the five southern Member States in 2007, which is above the average for the last 28 years (495 471 ha). However, the number of fires in these countries in 2007 was 42 259, which is below the average for the last 28 years (50 324).

Since the area of each country is different, and the area at risk within each country is also different, the comparisons among countries cannot be absolute. During 2007, about 30% of the fires occurred in Italy and Greece, accounting for approximately 79% of the total burnt area in the five southern Member States. Therefore the number of fires was not as unbalanced as the burned area. It indicates in fact that the extreme fire conditions were concentrated in specific periods of the fire season when some catastrophic events occurred, which burnt a major part of the affected area in the season.

Over the last 8 years, the previous tendency of the five southern Member States towards an increase in the number of fires seems to be stabilized or even starting to decrease. This may possibly be due to the positive effect of the public information campaigns carried out in all the countries and the improvements in the prevention and fire-fighting capacities.



(a)



(b)

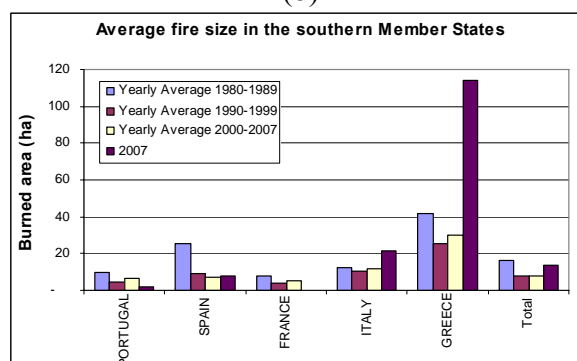


Figure 2. Burnt areas (a), number of fires (b) and average fire size (c) in the five Southern Member States in the year 2007 as compared with average values for previous decades.

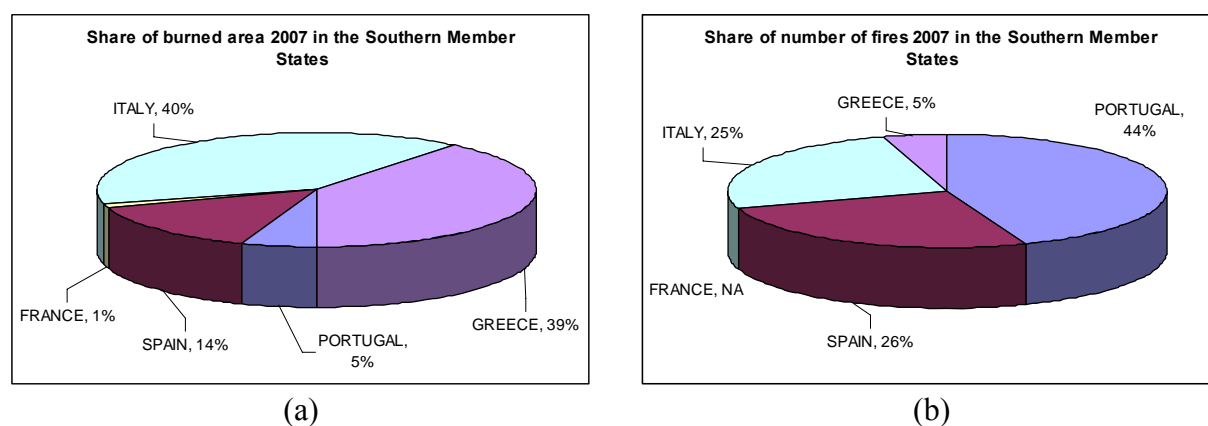


Figure 3. Share of the total burnt area (a) and the total number of fires (b) in each of the Southern Member State for 2007.

Table 1. Number of fires and burnt area in the five Southern Member States in the last 28 years.

| Number of fires    | PORTUGAL | SPAIN  | FRANCE <sup>(*)</sup> | ITALY  | GREECE <sup>(**)</sup> | TOTAL   |
|--------------------|----------|--------|-----------------------|--------|------------------------|---------|
| 2007               | 18722    | 10915  | -                     | 10639  | 1983                   | 42259   |
| % of total in 2007 | 44%      | 26%    | -                     | 25%    | 5%                     | 100%    |
| Average 1980-1989  | 7381     | 9515   | 4910                  | 11575  | 1264                   | 34645   |
| Average 1990-1999  | 22250    | 18152  | 5538                  | 11164  | 1748                   | 58851   |
| Average 2000-2007  | 26193    | 19546  | 4730                  | 7585   | 1800                   | 59263   |
| Average 1980-2007  | 18066    | 15466  | 5096                  | 10288  | 1590                   | 50324   |
| TOTAL (1980-2007)  | 505854   | 433035 | 137586                | 288069 | 44514                  | 1409058 |

| Burnt areas (ha)   | PORTUGAL | SPAIN   | FRANCE <sup>(**)</sup> | ITALY   | GREECE <sup>(**)</sup> | TOTAL    |
|--------------------|----------|---------|------------------------|---------|------------------------|----------|
| 2007               | 31450    | 82048   | 7400                   | 227729  | 225734                 | 574361   |
| % of total in 2007 | 5%       | 14%     | 1%                     | 40%     | 39%                    | 100%     |
| Average 1980-1989  | 73484    | 244788  | 39157                  | 147150  | 52417                  | 556995   |
| Average 1990-1999  | 102203   | 161319  | 22735                  | 118573  | 44108                  | 448938   |
| Average 2000-2007  | 174544   | 136411  | 24906                  | 87387   | 53485                  | 476733   |
| Average 1980-2007  | 112615   | 184013  | 29220                  | 119869  | 49755                  | 495471   |
| TOTAL (1980-2007)  | 3153226  | 5152353 | 818161                 | 3356321 | 1393130                | 13873191 |

<sup>(\*)</sup>Number of fires not available for 2007; <sup>(\*\*)</sup>Provisional data for 2007.

### 2.1.1. Portugal

#### *Fire danger in the 2007*

One year after the policy measures adopted in 2006 (National Fire Plan, the National System of Forest Fires Protection and the National Strategy for the Forests), some important reforms were made in the National Authority of Civil Protection, Forest Services (Directorate-General of Forest Resources – DGRF) and Nature and Biodiversity Conservancy Institute. Also, a new Penal Law was approved by the Portuguese Parliament.

Portugal shown a decrease in the burned area – 31 450 ha (14% of the average in the last five years), less pronounced in number of forest fires – 18 722 (73% of the average in the last five years). These figures find justification in the combination of a cooler and rainy summer period with the adoption of policy and operational measures and an effort in coordination and effective use of the available fire fighting resources.

In autumn (mid-November), Portugal faced a drought event that affected specially the mountainous areas of the Northwest. During that period, the meteorological risk increased and a significant number of forest fires occurred, affecting mostly shrubland areas used for extensive livestock production.

Accordingly to the information provided by the National Meteorological Institute, Portugal faced some rainy periods during the fire season. This contributed to increase the fuels humidity, decreasing the condition of flammability.

The meteorological daily severity index (DSR), derived from the Fire Weather Index expresses it, for the analysed period – 15th May to 15th October (2002 – 2007), showing lower values in 2007 when compared with the last five years period (Figure 4).

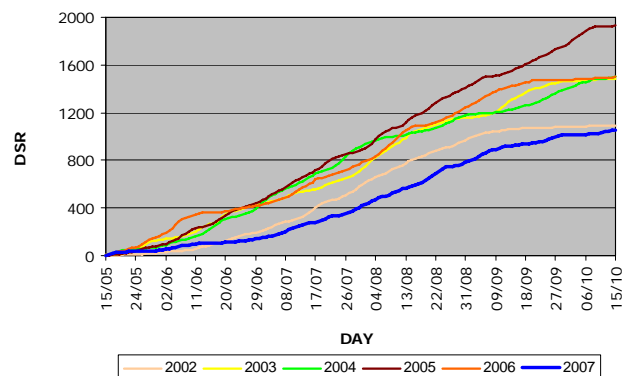


Figure 4. DSR variation (2002 – 2007 period)

#### *Fire occurrence and affected surfaces*

The year 2007 followed the decreasing trend in the number of fire occurrence and burned areas observed in 2006. Portugal registered a total number of 18 722 forest fires (of which 81% <1 ha), responsible for the burning of 31 450 ha (Figure 5). *Eucalyptus globulus* plantations and *Pinus pinaster* stands were the forest cover most affected by fires.

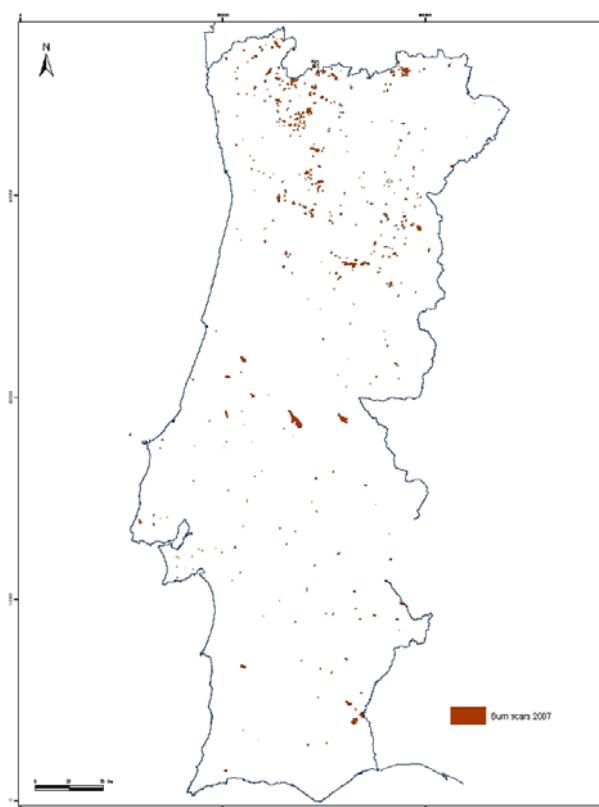


Figure 5. Burned areas in 2007 in Portugal.  
Source: ISA/DEF (2007); DGRF(2007)

Between January and June, 2 983 forest fires occurred, burning approximately 1 400 ha (4.5% total burned area).

In the summer period (July-September, corresponding to the most critical period of forest fires) 39.1% of the occurrences were reported that burned 17 600 ha (55.9% of the total burned area). The most critical forest fires occurred during August.

In the month of November, due to an anomalous increase in the meteorological fire risk, there were a significant number of forest fires, 4 964 (26.4% of total) and a significant burnt area, 9 203 ha (29.3% of total) – Table 2.

Fire occurrence prevailed mostly in the urban districts, such as Porto, Braga, Aveiro and Lisboa, which registered 52% of the total number of fires. Nevertheless, in these districts there was less than 25% of the total amount of burned area (Table 3).

Table 2. Forest fires in Portugal by month

| <i>Month</i>     | <i>number of fires</i> | <i>Burned area (ha)</i> |                    |              |
|------------------|------------------------|-------------------------|--------------------|--------------|
|                  |                        | <i>Shrub land</i>       | <i>wooded land</i> | <i>Total</i> |
| <i>January</i>   | 148                    | 42                      | 64                 | 106          |
| <i>February</i>  | 81                     | 2                       | 5                  | 7            |
| <i>March</i>     | 847                    | 175                     | 412                | 587          |
| <i>April</i>     | 675                    | 91                      | 173                | 264          |
| <i>May</i>       | 588                    | 65                      | 90                 | 155          |
| <i>June</i>      | 644                    | 164                     | 114                | 278          |
| <i>July</i>      | 1373                   | 2145                    | 975                | 3120         |
| <i>August</i>    | 2620                   | 3169                    | 4663               | 7832         |
| <i>September</i> | 3330                   | 1109                    | 5532               | 6641         |
| <i>October</i>   | 2944                   | 512                     | 2386               | 2898         |
| <i>November</i>  | 4964                   | 2131                    | 7072               | 9203         |
| <i>December</i>  | 508                    | 33                      | 326                | 359          |
| <i>TOTAL</i>     | 18722                  | 9638                    | 21812              | 31450        |

The districts most affected by forest fires were Braga (4 808 ha – 15.3% total), Guarda (4 338 ha – 13.8%) and Vila Real (3 207 ha – 10.2%); these are mountainous districts where the usage of fire for pasture renewal has a strong impact.

Table 3. Number of fires and burned area in Portugal by District

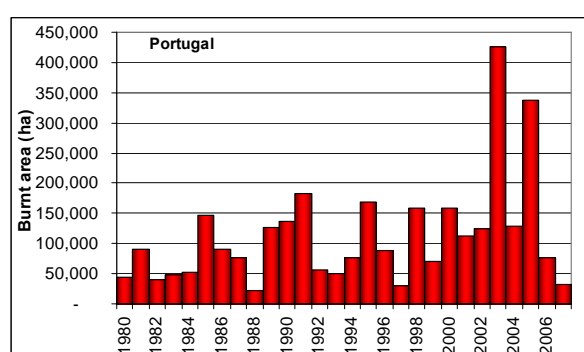
| <i>District</i>         | <i>Number of fires</i> |         |              | <i>Burned Area (ha)</i> |                    |              |
|-------------------------|------------------------|---------|--------------|-------------------------|--------------------|--------------|
|                         | $\geq 1ha$             | $< 1ha$ | <i>Total</i> | <i>Shrub land</i>       | <i>wooded land</i> | <i>Total</i> |
| <i>Aveiro</i>           | 76                     | 1552    | 1628         | 295                     | 40                 | 335          |
| <i>Beja</i>             | 23                     | 54      | 77           | 513                     | 1432               | 1945         |
| <i>Braga</i>            | 481                    | 2052    | 2533         | 1267                    | 3541               | 4808         |
| <i>Bragança</i>         | 337                    | 493     | 830          | 138                     | 1381               | 1519         |
| <i>Castelo Branco</i>   | 65                     | 253     | 318          | 107                     | 141                | 248          |
| <i>Coimbra</i>          | 22                     | 329     | 351          | 123                     | 18                 | 141          |
| <i>Évora</i>            | 27                     | 45      | 72           | 669                     | 29                 | 698          |
| <i>Faro</i>             | 57                     | 561     | 618          | 4                       | 247                | 251          |
| <i>Guarda</i>           | 322                    | 490     | 812          | 222                     | 4116               | 4338         |
| <i>Leiria</i>           | 69                     | 371     | 440          | 297                     | 2374               | 2671         |
| <i>Lisboa</i>           | 344                    | 1756    | 2100         | 157                     | 910                | 1067         |
| <i>Portalegre</i>       | 23                     | 47      | 70           | 790                     | 41                 | 831          |
| <i>Porto</i>            | 335                    | 3132    | 3467         | 631                     | 773                | 1404         |
| <i>Santarém</i>         | 63                     | 473     | 536          | 2010                    | 928                | 2938         |
| <i>Setúbal</i>          | 79                     | 709     | 788          | 629                     | 202                | 831          |
| <i>Viana do Castelo</i> | 337                    | 823     | 1160         | 368                     | 1586               | 1954         |
| <i>Vila Real</i>        | 498                    | 813     | 1311         | 729                     | 2478               | 3207         |
| <i>Viseu</i>            | 398                    | 1213    | 1611         | 689                     | 1575               | 2264         |
| <i>TOTAL</i>            | 3556                   | 15166   | 18722        | 9638                    | 21812              | 31450        |

Portugal registered 36 large fires (>100 ha), which corresponded to 43% of the total burned area. There were recorded six fires larger than 500 ha, which burned 7 150 ha. The largest fire of 2007 occurred in Santarém district, with 1 864 ha, between 20<sup>th</sup> and 23<sup>rd</sup> August.

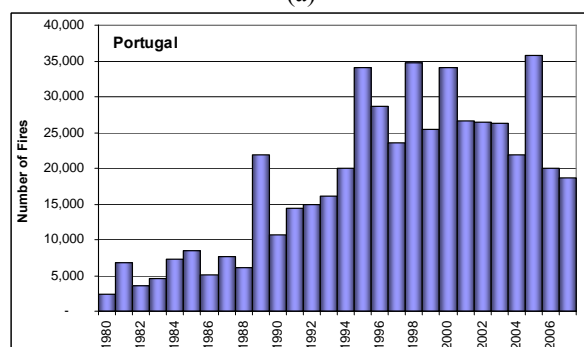
In 2007, under DGRF, a specialized team named Fire Analysis and Usage Group (GAUF) was formed to study and analyse large wildfires, and provide advisory to the Command Unit in fire behaviour and combat strategy. This team made of 18 technicians is also prepared to seek opportunities to suppress fire with fire itself,

supported by aerial monitoring - especially equipped aircrafts to photograph the fire progression and transmit useful information about fire behaviour in real time. The operational units of this specialized team, made of 3 elements each, are coordinated by the Forest Services and deployed upon request by Civil Protection's Command centre (intervened for 31 occasions). The GAUF team has also protocols with abroad organizations (Argentina and GRAF/Spain).

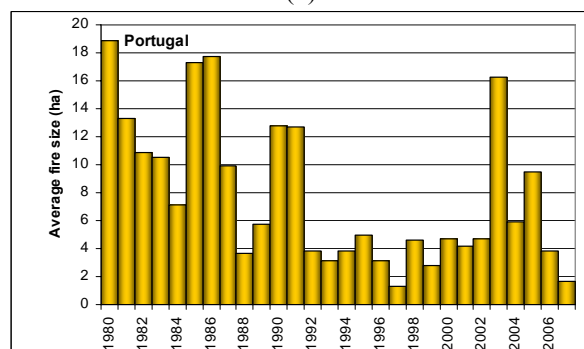
The analysis of the yearly trends in the number of fires and burned areas in Portugal shows a decrease in the last two years in both parameters, after a strong increase, especially in the burned area in the first years of this decade (Figure 6).



(a)



(b)



(c)

Figure 6. Burnt areas (a), number of fires (b) and average fire size (c) in Portugal for the last 28 years.

### Fire fighting means and information campaigns

In 2007 forest fire season, the Portuguese Authorities significantly increased the number of means available for surveillance, detection and fire-fighting operations.

The distribution of these means along the year was made into phases. The number of means applied in each phase depended, amongst other factors, upon the forest fire risk expected for a given period. For example, during the most critical period, Charlie Phase (1JUL-30SEP), there were around 8 836 human resources, 1 886 vehicles and 52 aerial means available.

In the table shown below, there is a summary of all the fire-fighting means distributed by phase:

| Phases                      | Elements                  | Vehicles | Aerial Means |
|-----------------------------|---------------------------|----------|--------------|
| <i>Alfa (&lt;15MAY)</i>     | Means available on demand |          |              |
| <i>Bravo (15MAY-30JUN)</i>  | 6 065                     | 1 271    | 24           |
| <i>Charlie (1JUL-30SEP)</i> | 8 836                     | 1 886    | 52           |
| <i>Delta (1OCT-15OCT)</i>   | 1 244                     | 232      | 14           |
| <i>Delta(&gt;15OCT)</i>     | Means available on demand |          |              |

The aerial means were of the following types:

- 34 Helicopters;
- 14 Aircrafts;
- 4 Amphibious aircrafts.

All means were granted by different organizations such as the National Authority for Civil Protection (ANPC), Fire Fighter Units, National Guard (GNR), General-Directorate for Forest Resources (DGRF), Biodiversity and Environmental Conservation Institute (ICNB), Police (PSP), Army and Forest Producers Associations (AFOCELCA).

Among those entities there were a group of special teams that developed a sort of missions related mainly to surveillance, detection and initial attack actions. It has to be highlighted their performance in the scope of the Special Structure to Fight Forest Fires (DECIF) as they contributed to the decrease of the number of fires and the total burnt area during the year of 2007. Their actions allowed the surveillance of suspicious activities, the early detection of forest fires and the on time development of initial attack actions. They were the Relief, Protection and Intervention Group (GIPS), the Special Fire Brigade Force (FEB) and Fire Analysis and Usage Group (GAUF).

In the case of the GIPS, dependent on the National Guard, this Force had around 576 elements, distributed along 9 districts. They performed around 1 330 airborne initial attack missions, as well as around 3 660 terrestrial patrols.

With reference to the FEB, dependent on ANPC, it had around 140 elements distributed along 4 districts, and they had developed approximately 540 initial attack airborne missions, as well as around 320 terrestrial patrols.

#### *Loss of human lives in the 2007 fire campaign.*

Forest fires in Portugal caused, during 2007, the death of 6 people, two of them being airplane/heli pilots and four being civilians.

The death of an airplane pilot occurred during a fire fighting operation in Torres Novas (district of Santarém). A Dromader airplane crashed, causing the death of the Portuguese pilot.

The death of a heli pilot occurred during a fire fighting operation in Montalegre (district of Vila Real). An Ecureil helibomber crashed, causing the death of the Portuguese pilot.

The four civilian victims were caught by fire when performing soil renewal actions of agricultural burnings. It should be noted that only two deaths occurred during the critical forest fire season (summer months). The other four victims occurred in spring and autumn.

#### *Operations of mutual assistance*

During 2007 Portugal did not required assistance through the EU-Mechanism for Civil Protection. However, during the season it was activated the bilateral agreement with Spain for reinforcement of aerial fire-fighting in and outside the border area (15 km to each side of the border).

On the other hand, Portugal assisted Greece during the fires that took place in June and in August, in reply to the request of assistance made by Greece through the Mechanism, after the blaze of several forest fires in that country. In both situations it was sent one fire fighting team, based on a Canadair CL-215 airplane and a crew of six people. The Portuguese team cooperated with the Greek Authorities for two weeks in June and one in August. This cooperation resulted in 8 combat missions and 45 water discharges, involving a total of 17h10m flight hours.

#### *Forest fire prevention and information campaigns*

##### **(a) Information and Public awareness campaigns**

Portugal developed a public awareness campaign for forest fires prevention under the slogan “*Portugal without forest fires depends on all of us*”. Several actions were put in place, following five main strategic axes:

- 1) National awareness campaign in the media, warning for risky behaviours, promoted by the National Authority for Civil Protection and Directorate-General of Forest Resources;
- 2) Information sessions to target-groups, developed by the Directorate-General of Forest Resources in cooperation with forest owners and farmers organisations, to farmers, forest owners and shepherds;
- 3) Forest education, through information sessions and activities in schools (PROSEPE);
- 4) “Tree parade 2007”, a national contest for schools promoted by the General Directorate of Forest Resources in collaboration with Education Ministry, that involved 77 schools and the exhibition of the works in Lisboa, Porto and Castelo de Vide;
- 5) “Florestarte” itinerant exhibition was set in several cities. This exhibition shows a large stand with 1000 posters (national and international) with information about the importance of forest conservation.

In the public information domain, the National Authority of Civil Protection and the Directorate-General of Forest Resources made significant efforts on the availability of on-line information. To reach that goal, the DGRF published on-line eight reports, between 2<sup>nd</sup> July and 15<sup>th</sup> October and the Civil Protection services displayed on-line information of the most relevant forest fires incidents. Also, the Meteorological Institute provides on-line information concerning FWI and its forecast.

##### **(b) Forest Fire Prevention**

###### **(b).1 Forest fire planning**

The General Directorate of Forest Resources is promoting the forest fire planning at the local, municipal and regional levels.

The municipal planning objective is pursued by the technical support to the municipalities forest



offices, based in the Municipal Plans for Forest Fire Prevention (5 years planning) and the Municipal Operational Plans, which are part of the previous plans and are yearly updated.

The municipalities' forest offices provide technical support the Municipal Commission for forest fires prevention and suppression. By the end of 2007 there were established 204 forest offices (189 municipal and 15 inter-municipal) and 239 Municipal Plans for Forest Fire Prevention and 228 Municipal Operational Plans approved. In the Country, 86% of municipalities are covered with Forest Fire Prevention Municipal Plans.

The regional level planning is assured by the Regional Forest Plans (for the entire continental land) and by regional maps of fire pre-suppression, updated each summer in cooperation with municipalities and Civil Protection Agency.

### **(b).2. Forest fuel management**

Forest fuel management is one of the key actions in the forest fire prevention domain. A total area of 12 244 ha was managed: 10 677 ha by specialized hand-crews and 1 567 ha with prescribed burning (26 ha forest stands and 1 541 ha shrubland).

In 2007, the Forest Services in collaboration with the FORESTIS (National Forest Owners Association) provided training courses to 80 foresters and 100 personnel of the specialized hand-crews in prescribed burning.

### **(c). Forest fires operational prevention**

The National Guard is responsible for the coordination of the surveillance of critical forest areas, detection of forest fires and for the law enforcement and the initial criminal investigation of forest fires.

#### **(c). 1. Surveillance and detection**

The National Guard settled the "Secured Forest Operation", between 15<sup>th</sup> May and 30<sup>th</sup> September, which promoted the realization of over 750 000 patrolling hours in the most critical forest areas.

In 2007, it was promoted the modernization of the Lookout Towers National Network, with the replacement of some of the old metallic structures by new towers. The detection of forest fires, in 2007, was made especially by the population, using their mobile phones to contact the emergency numbers 112 and 117 (national emergency number for forest fires alert).

### **(b).3. Law enforcement**

The control over the application of the preventive measures foreseen in the Decree-Law 124/2006 was the main activity of the National Guard. A total of 5 176 infractions were detected, mostly related to illegal agricultural burnings and the lack of vegetation clearance around houses.

### **(b).4. Fire fighting strategy**

In order to cope with forest fires and to define an integrated fire-fighting strategy, the Portuguese National Authority for Civil Protection (ANPC) established an Operational Directive for the forest fire season of 2007, with the following main purposes:

- Define a unique structure for Direction, Command and Control, and a Special Structure to Fight Forest Fires (DECIF);
- Regulate the institutional coordination and the cooperation and involvement of the organizations belonging to the Portuguese Integrated System for Relief Operations (SIOPS).

The Operational Directive was applied to all organizations and institutions which play a role in this field and was used as a base to elaborate both district and municipal emergency plans. It was also used as a reference to elaborate all directives, plans and orders that were applied to organizations involved in the Special Structure to Fight Forest Fires (DECIF).

The Directive defined an operational concept based on the following principles:

- Unique command structure;
- Anticipation ability;
- Integrated response;
- Permanent safety;

And it had the following objectives:

- Dissuasive surveillance;
- Timely detection;
- Immediate dispatch;
- Strong initial attack;
- Unity of command;
- Operation maintenance.

In order to accomplish all the above-mentioned objectives it was defined a time-line for operational response with the following main steps:

- **Anticipation**, which involves pre-positioning of surveillance and initial attack teams, as well as fire-fighting, back

up and specialized teams; aircrafts were employed in armed monitoring operations;

- **Initial Attack**, which implies immediate dispatch of the initial attack resources, especially the aerial ones. Other foreseen activities were reconnaissance and initial evaluation of the situation, transfer of command so that the operations may be correctly organized and permanent guarantee of recovering the structure's initial attack capacity. Therefore, this phase consists in a first organized and integrated intervention.
- **Enlarged Attack**, which implies immediate reinforcement of operations, in accordance with the principle of subsidiarity but also of anticipation, ensuring the necessary tactical decisions to defend forest and houses, and activation of different teams like fire analysis or/and tactical restraint fire teams. The activation of an **Enlarged Attack** depends on the following: if after 90 minutes, the fire is not extinguished or declared circumscribed by the incident commander, the District Coordination Centre dispatches reinforcement groups.
- **Post-Fire Operations and Active Surveillance**, which implies the elimination of all living embers and isolation of the material in smouldering combustion, so as to avoid the restarting of the fire.

*(Sources: Ministry of Agriculture, Rural Development and Fisheries Directorate-General of Forest Resources and National Authority for Civil Protection, Portugal)*

### 2.1.2. Spain

#### *Fire danger in the 2007 fire season*

Fire danger levels were low in January in most of the country; only some areas in Andalucia, Alicante and Murcia presented drier conditions than normal due to the lack of precipitation. Rainfall was low in the whole country, although dense fogs helped in maintaining low danger in the continental Spain. Frequent precipitations and snowfall in northern Spain took place at the end of the month. Moderate fire danger only occurred in the mountain areas of northern Spain due to

windy conditions. No intervention of the aerial means of the Spanish government took place in this month. The available means consisted of two CL-215 T planes in Torrejon de Ardoz (Madrid) and two CL-215 planes in Mataban (Salamanca).

Several storms arrived in February and left abundant precipitations in most of peninsular Spain. This month was wet in Baleares, while precipitations were below average in the Canary Islands. The fire danger was low overall, with the exception of some windy days in Cantabria and the Mediterranean coast. The Ministry of Environment (MMA) increased the availability of aerial means with respect to January as the BRIF base for winter (BRIF-i) were opened in Pinofranqueado (Caceres), Tabuyo del Monte (Leon) and Tineo (Asturias). A Kamov helicopter was positioned in each of the latter bases, as support to the fire campaign in the North. Aerial means took part in the extinction of four fires in Asturias and one in Baleares.

Fire danger was initially low in March and it increased gradually, first on the Mediterranean region and then the rest of the peninsula, with the exception of Galicia and north-western Castilla-Leon. Rainfalls occurred in the high Ebro region, Baleares, Asturias and the Iberian mountain range; precipitations above average took place in the Canary Islands. Sporadic situations of high fire danger took place in the north and on the Mediterranean coast due to northern winds. The MMA increased the forest fighting means through the opening of the BRIF-i bases of Laza (Ourense) and Riente (Cantabria). A Kamov helicopter was position in Laza, to complete the foreseen plan for the winter-spring fighting campaign, which consisted on 5 aircrafts, 4 helicopters Kamov and 5 BRIF-I bases. MMA means participated in the extinction of 60 fires, mainly in Asturias and Cantabria with over 130 flight hours. The largest forest fire (over 1 000 ha) started on March 7<sup>th</sup> in Gaibiel (Castellon) with very strong winds that posed many difficulties for its extinction.

Abundant precipitations took place in April, mainly in the west of the peninsula. These helped in maintaining low fire danger in the peninsula and Baleares. Precipitation varied a lot among the Canary Islands. Fire danger was moderated only in Cantabria due to the lack of precipitations during the second week of the month. MMA means participated in the extinction of 30 fires, all of them of small final size. Accumulated statistics for the winter-spring fire season (Jan 1<sup>st</sup> to April 30<sup>th</sup>) were very favourable in comparison with the

previous decade. The number of fires was one third of that in the previous decade, and the area affected by fires one fifth of the one in the previous decade.

May was also a wet month all over Spain. Fire danger was low in the whole Country except for some days of moderated danger in Galicia and Levante due to dry windy conditions. Precipitations were also frequent in the Canary Islands which lead to low fire danger levels. MMA means collaborated with the Autonomous regions in the extinction of 6 fires located in Galicia (3), Asturias (2) and Valencia, which were of small dimension.

Rainfalls continued in June in western Spain, while there was a lack of precipitation in the South, the Mediterranean region, Baleares and Canary Islands. This led to low fire danger in western Spain and moderated fire danger in the rest of the territory. MMA means for the summer campaign started to be deployed, including BRIF bases, aircraft bases and 6 Kamov helicopters. MMA means collaborated in the extinction of 26 fires across 12 provinces in 7 Autonomous Communities. Most of them occurred in Andalucia, south of Extremadura and Castilla-La Mancha. Two CL-215T planes were dispatched to Greece on June 29<sup>th</sup>, to help fire fighting in that Country, and they returned on July 3<sup>rd</sup>. Flight hours, including the support to Greece, summed to more than 120. Fire figures at the end of June were the lowest in the last decade, both in terms of number of fires and burnt areas.

July was characterized by low precipitation levels, except in the NW Spain. No strong winds were present in the peninsula and Baleares, which facilitated fire control in more favourable conditions than previous years. A heat wave hit the Canary Islands at the end of the month, which brought very high temperatures and strong winds. On July 27 a fire that started in Gomera was finally controlled, burning 200 ha. Simultaneously a fire broke up in Tejada (Gran Canaria) and MMA had to be dispatched to the island. The situation worsened in the following days with another fire in Los Realejos (Tenerife), which pushed by strong winds and high temperatures, reached large dimensions. Fires in the Canary Islands burnt over 14 000 ha; they have been the largest fires since the Spanish fire database was set-up in 1968. The following means collaborated in the fire fight: A Kamov helicopter based in Los Rodeas and the BRIF-A from la Palma; in addition to these, MMA means dispatched from the peninsula consisted in: 4

Komov helicopters, 3 aircrafts with ground-base loading, and 2 shifts of BRIF-A. Other large fire took place in Obejo (Cordoba), Niebla (Huelva) and Aldeadavial de la Ribera y Puestas (Salamanca) with substantial support of the MMA means.

August had more rainfall and was less hot than average, except in Andalucia and the Canary Islands. Fire danger has been moderated, with few situations of extreme fire danger. Due to this conditions and the lack of wind, it was possible to control forest fires in this period. However, 6 large fires took place in Torre de las Arcas (Teruel) burning over 1 000 ha and causing the death of fireman, Villanueva de San Carlos (Ciudad Real), Alcantara y Jaraiz de la Vera (Caceres), Spirido (Segovia) y Les Useres (Castellon), where 5 000 ha were burnt due to strong wind conditions. MMA means helped in the extinction of 224 forest fires on 44 provinces, with over 1 800 flight hours. This figure includes the hours of two CL-15T that were dispatched to Greece from August 26<sup>th</sup> to September 2<sup>nd</sup> to help in the disastrous fires that were burning there.

September was characterized by high variability of rainfall, both spatially and temporally. MMA means participated in 114 fire extinctions, with over 600 flight hours in 23 provinces. These figures are below the average of the last years and reflect the favourable conditions regarding fire danger during this period. There were no fires larger than 500 ha.

October has been warm all over Spain. It was rainy in Levante and south eastern Spain, and Baleares. Heavy rains took place along the Mediterranean coast, from Barcelona to Almeria. However, the weather was hot to very hot in Galicia. MMA means operated in 54 occasions in 12 provinces and collaborated in fire fighting in Portugal, where a CL-215 and a CL-215T were dispatched.

Only one intervention of MMA took place in December. This was in Zaragoza, where a CL-215 was dispatched. This month was cold across the country, with scarce precipitations.

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

The numbers of 2007, according to the data provided by the Autonomous Regions, are shown in Table 4.

Global figures of forest fires (10 915) and burnt area (82 048 ha) are amongst the lowest in the last years, and way below those of the last decade. Lower figures were only reached in 1988 for the

number of fires (9 247), and 1996 for the total burnt area (59 814). Of the total burnt area, 33 070 ha were dense forests, 35 425 ha were open forests and shrub areas, and 13 555 ha pastures and savanna areas.

At the level of Autonomous Communities, only Canary Islands and Valencia had worse figures in terms of burnt area than those of the last decade. In both cases, only two fires in each Community were responsible for most of the total burnt area.

#### Prevention Measures

1. Information and Awareness Campaigns aimed at the general public through the media included:

a) a general campaign through TV with advertising of forest fire prevention messages;

b) a rural campaign through theatre plays in local areas including educational messages on the fire prevention and the risks associated to forest fires;

c) school campaigns through conferences and presentations to students in the elementary and high schools.

2. Teams of integral prevention of forest fires (Equipos de prevencion integral de incendios forestales (EPRIF) are organized with the Autonomous Communities in areas at high risk of fire with the aim of raising public awareness about forest fires, promoting the use of prescribed fires and shrub removal, and increasing the knowledge about fire causes and fire suppression.

3. Use of satellite imagery for the location of active fires and for the mapping of burnt areas is carried out in collaboration with the EC Joint Research Centre.

4. Setting guidelines to determine required safety conditions of urban settlements within forested areas.

#### Injuries and loss of human lives

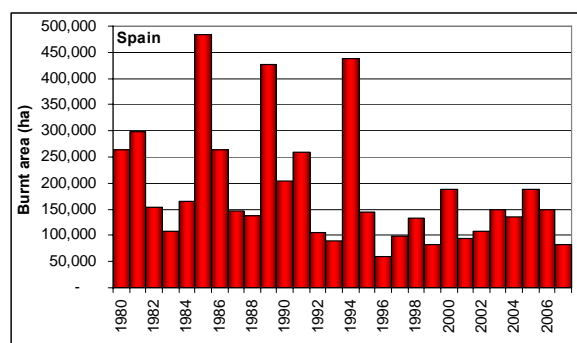
In August, a member of a fire brigade was killed by a tree that fell on him while fighting a fire in Torre de las Arcas (Aragon).

#### Operations of mutual assistance

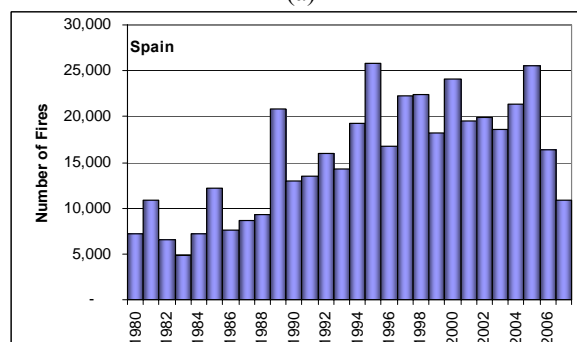
Spain provided support for forest fire fighting in Greece, Italy and Portugal. The following interventions with CL-215 aircrafts took place:

| Mission   | Country  | Days | Flight hh:mm | CL-215T |
|-----------|----------|------|--------------|---------|
| 29.06.08  | Greece   | 5    | 68:20        | 2       |
| 24.07.08  | Italy    | 4    | 37:00        | 2       |
| 26.08.08  | Greece   | 7    | 172:30       | 4       |
| 21.10.08e | Portugal | 1    | 10:30        | 1       |

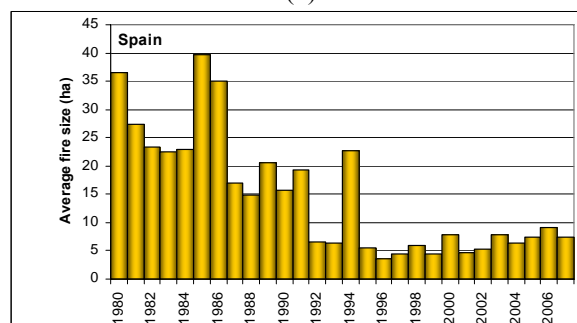
Figure 7 shows trends in the number of fires and burnt areas in Spain over the last 28 years.



(a)



(b)



(c)

Figure 7. Burnt areas (a), number of fires (b) and average fire size (c) in Spain for the last 28 years.

(Source: Ministerio de Medio Ambiente, Dirección General para la Biodiversidad, Área de Defensa Contra Incendios Forestales, Spain).

Table 4. Forest Fires from January 1st to December 31st provisional and definitive data (28.01.2008).

| PROVINCIA /<br>COM. AUTONOMA | Num. siniestros   |                     | SUPERFICIES      |                   |                  |                      | % SUPERFICIE<br>respecto a la existente |              |
|------------------------------|-------------------|---------------------|------------------|-------------------|------------------|----------------------|---|--------------|
|                              | Conatos<br>< 1 ha | Incendios<br>>=1 ha | Forestal Leñosa  |                   |                  | Forestal<br>Herbácea | % ARBOLADA                              | % FORESTAL   |
|                              |                   |                     | Arbolada         | Matorral y M.Bajo | Total            |                      |   |              |
| Alava                        | 19                | 5                   | 0,49             | 6,57              | 7,06             | 7,68                 | 0,000                                   | 0,008        |
| Guluzcoa                     | 9                 | 4                   | 10,04            | 5,38              | 15,42            | 11,50                | 0,009                                   | 0,019        |
| Vizcaya                      | 24                | 15                  | 37,25            | 39,60             | 76,85            | 0,65                 | 0,031                                   | 0,052        |
| <b>PAIS VASCO</b>            | <b>52</b>         | <b>24</b>           | <b>47,78</b>     | <b>51,55</b>      | <b>99,33</b>     | <b>19,83</b>         | <b>0,013</b>                            | <b>0,025</b> |
| Barcelona                    | 179               | 23                  | 298,90           | 65,03             | 363,93           | 1,68                 | 0,076                                   | 0,077        |
| Girona                       | 148               | 10                  | 71,16            | 87,23             | 158,39           | 1,24                 | 0,023                                   | 0,041        |
| Lleida                       | 75                | 20                  | 72,33            | 22,85             | 95,18            | 17,74                | 0,018                                   | 0,016        |
| Tarragona                    | 81                | 33                  | 196,96           | 797,57            | 994,53           | 0,03                 | 0,119                                   | 0,363        |
| <b>CATALUÑA</b>              | <b>483</b>        | <b>86</b>           | <b>639,35</b>    | <b>972,68</b>     | <b>1.612,02</b>  | <b>20,69</b>         | <b>0,051</b>                            | <b>0,088</b> |
| A Coruña                     | 497               | 83                  | 481,48           | 581,90            | 1.063,38         |                      | 0,119                                   | 0,209        |
| Lugo                         | 260               | 90                  | 114,37           | 354,03            | 468,40           |                      | 0,024                                   | 0,070        |
| Ourense                      | 973               | 493                 | 354,10           | 4.506,95          | 4.861,05         |                      | 0,109                                   | 0,836        |
| Pontevedra                   | 713               | 77                  | 237,45           | 445,46            | 682,91           |                      | 0,108                                   | 0,226        |
| <b>GALICIA (*)</b>           | <b>2.443</b>      | <b>743</b>          | <b>1.187,40</b>  | <b>5.888,34</b>   | <b>7.075,74</b>  |                      | <b>0,083</b>                            | <b>0,343</b> |
| Almería                      | 55                | 31                  | 52,40            | 264,70            | 317,10           |                      | 0,058                                   | 0,057        |
| Cádiz                        | 72                | 13                  | 48,40            | 63,00             | 111,40           |                      | 0,039                                   | 0,028        |
| Córdoba                      | 86                | 11                  | 612,60           | 1.267,90          | 1.880,50         |                      | 0,251                                   | 0,310        |
| Granada                      | 55                | 23                  | 74,80            | 83,50             | 158,30           |                      | 0,040                                   | 0,027        |
| Huelva                       | 110               | 29                  | 639,60           | 479,50            | 1.119,30         |                      | 0,136                                   | 0,145        |
| Jaeń                         | 138               | 19                  | 37,00            | 157,20            | 194,20           |                      | 0,015                                   | 0,031        |
| Málaga                       | 56                | 24                  | 93,60            | 124,40            | 218,00           |                      | 0,102                                   | 0,072        |
| Sevilla                      | 89                | 19                  | 243,00           | 159,70            | 402,70           |                      | 0,125                                   | 0,085        |
| <b>ANDALUCIA (**)</b>        | <b>661</b>        | <b>169</b>          | <b>1.801,60</b>  | <b>2.599,90</b>   | <b>4.401,50</b>  |                      | <b>0,109</b>                            | <b>0,102</b> |
| <b>ASTURIAS (*)</b>          | <b>636</b>        | <b>414</b>          | <b>175,12</b>    | <b>1.978,85</b>   | <b>2.153,97</b>  |                      | <b>0,054</b>                            | <b>0,323</b> |
| <b>CANTABRIA</b>             | <b>27</b>         | <b>202</b>          | <b>368,19</b>    | <b>975,80</b>     | <b>1.343,99</b>  | <b>72,50</b>         | <b>0,235</b>                            | <b>0,438</b> |
| <b>LA RIOJA (*)</b>          | <b>58</b>         | <b>26</b>           | <b>23,18</b>     | <b>73,15</b>      | <b>96,32</b>     |                      | <b>0,020</b>                            | <b>0,033</b> |
| <b>MURCIA (*)</b>            | <b>91</b>         | <b>20</b>           | <b>72,20</b>     | <b>90,72</b>      | <b>162,91</b>    |                      | <b>0,061</b>                            | <b>0,055</b> |
| Alicante                     | 77                | 15                  | 38,43            | 47,98             | 86,41            | 4,18                 | 0,062                                   | 0,037        |
| Castellón                    | 90                | 25                  | 1.363,96         | 6.381,84          | 7.735,80         | 48,60                | 0,916                                   | 1,950        |
| Valencia                     | 137               | 33                  | 242,16           | 47,58             | 289,74           | 43,58                | 0,085                                   | 0,059        |
| <b>COM. VALENCIANA</b>       | <b>304</b>        | <b>73</b>           | <b>1.634,55</b>  | <b>6.477,40</b>   | <b>8.111,95</b>  | <b>96,36</b>         | <b>0,331</b>                            | <b>0,676</b> |
| Huesca                       | 77                | 33                  | 78,02            | 68,39             | 146,41           |                      | 0,020                                   | 0,017        |
| Teruel                       | 93                | 26                  | 623,98           | 994,77            | 1.618,75         |                      | 0,154                                   | 0,180        |
| Zaragoza                     | 144               | 50                  | 33,60            | 154,47            | 188,07           |                      | 0,017                                   | 0,026        |
| <b>ARAGON (*)</b>            | <b>314</b>        | <b>109</b>          | <b>735,60</b>    | <b>1.217,63</b>   | <b>1.953,23</b>  |                      | <b>0,074</b>                            | <b>0,079</b> |
| Albacete                     | 58                | 6                   | 5,11             | 6,16              | 11,27            | 7,45                 | 0,002                                   | 0,003        |
| Ciudad Real                  | 55                | 53                  | 4,79             | 711,79            | 716,58           | 334,59               | 0,005                                   | 0,127        |
| Cuenca                       | 118               | 32                  | 34,24            | 27,03             | 61,27            | 114,99               | 0,007                                   | 0,021        |
| Guadalajara                  | 151               | 49                  | 10,96            | 118,21            | 129,17           | 103,63               | 0,004                                   | 0,031        |
| Toledo                       | 109               | 71                  | 48,30            | 107,85            | 156,15           | 387,36               | 0,090                                   | 0,128        |
| <b>CASTILLA LA MANCHA</b>    | <b>491</b>        | <b>211</b>          | <b>103,40</b>    | <b>971,04</b>     | <b>1.074,44</b>  | <b>948,02</b>        | <b>0,009</b>                            | <b>0,058</b> |
| Las Palmas de Gran Canaria   | 62                | 9                   | 7.701,28         | 3.603,24          | 11.304,52        | 7.503,90             | 49,119                                  | 7,783        |
| S.C. de Tenerife             | 80                | 20                  | 16.939,63        | 2.487,69          | 19.427,32        | 1.701,90             | 21,225                                  | 8,648        |
| <b>CANARIAS</b>              | <b>142</b>        | <b>29</b>           | <b>24.640,91</b> | <b>6.090,93</b>   | <b>30.731,84</b> | <b>9.205,80</b>      | <b>25,805</b>                           | <b>8,218</b> |
| <b>NAVARRA</b>               | <b>402</b>        | <b>105</b>          | <b>147,75</b>    | <b>317,99</b>     | <b>465,74</b>    | <b>16,65</b>         | <b>0,043</b>                            | <b>0,091</b> |
| Badajoz                      | 165               | 160                 | 177,95           | 1.101,37          | 1.279,32         |                      | 0,076                                   | 0,129        |
| Cáceres                      | 307               | 160                 | 541,47           | 1.459,18          | 2.000,65         |                      | 0,107                                   | 0,155        |
| <b>EXTREMADURA (**)</b>      | <b>472</b>        | <b>320</b>          | <b>719,42</b>    | <b>2.560,55</b>   | <b>3.279,97</b>  |                      | <b>0,097</b>                            | <b>0,144</b> |
| <b>ILLES BALEARS</b>         | <b>107</b>        | <b>7</b>            | <b>22,18</b>     | <b>8,80</b>       | <b>30,98</b>     | <b>92,22</b>         | <b>0,020</b>                            | <b>0,060</b> |
| <b>MADRID</b>                | <b>162</b>        | <b>68</b>           | <b>10,15</b>     | <b>166,23</b>     | <b>176,38</b>    | <b>273,35</b>        | <b>0,007</b>                            | <b>0,114</b> |
| Ávila                        | 102               | 23                  | 57,88            | 314,84            | 372,72           | 477,56               | 0,045                                   | 0,078        |
| Burgos                       | 79                | 16                  | 67,85            | 47,09             | 114,94           | 5,29                 | 0,019                                   | 0,016        |
| León                         | 185               | 231                 | 227,23           | 2.248,95          | 2.476,18         | 134,59               | 0,136                                   | 0,288        |
| Palencia                     | 33                | 13                  | 13,01            | 13,94             | 26,95            | 22,06                | 0,018                                   | 0,011        |
| Salamanca                    | 234               | 65                  | 52,95            | 796,99            | 849,94           | 960,78               | 0,039                                   | 0,130        |
| Segovia                      | 53                | 19                  | 8,69             | 9,86              | 18,55            | 708,17               | 0,005                                   | 0,006        |
| Soria                        | 50                | 12                  | 15,13            | 49,01             | 64,14            | 15,60                | 0,005                                   | 0,010        |
| Valladolid                   | 41                | 6                   | 9,57             | 2,82              | 12,39            | 2,64                 | 0,009                                   | 0,008        |
| Zamora                       | 140               | 152                 | 288,98           | 1.498,65          | 1.787,63         | 482,89               | 0,238                                   | 0,390        |
| <b>CASTILLA Y LEÓN</b>       | <b>917</b>        | <b>547</b>          | <b>741,29</b>    | <b>4.982,15</b>   | <b>5.723,44</b>  | <b>2.809,58</b>      | <b>0,047</b>                            | <b>0,189</b> |
| <b>CEUTA</b>                 | <b>0</b>          | <b>0</b>            | <b>0,00</b>      | <b>0,00</b>       | <b>0,00</b>      | <b>0,00</b>          | <b>0,000</b>                            | <b>0,000</b> |
| <b>MELILLA</b>               | <b>0</b>          | <b>0</b>            | <b>0,00</b>      | <b>0,00</b>       | <b>0,00</b>      | <b>0,00</b>          | <b>0,000</b>                            | <b>0,000</b> |
| <b>TOTAL</b>                 | <b>7.762</b>      | <b>3.153</b>        | <b>33.070,06</b> | <b>35.423,70</b>  | <b>68.493,76</b> | <b>13.555,00</b>     | <b>0,299</b>                            | <b>0,317</b> |

(\*) Sin diferenciación entre superficie desarbolada herbácea y leñosa

(\*\*) Sin datos de superficie herbácea

### 2.1.3. France

#### *Fire danger in the 2007 fire season*

Precipitations during winter in the Mediterranean regions were up two times lower than the normal rainfalls in this period. Although rains may have diminished the fire danger level for some time, the water deficit increased since June, especially on the coastal area and in Corsica, affecting later on in August the rest of this territory. More specifically the water deficit started in Provence and Corsica at the beginning of the season, spreading later on due to drought conditions, to the rest of the Mediterranean departments.

Despite some irregular rains, the water deficit was very high at the end of July. This situation continued up to September. This situation was also evident by the analysis performed by the National Forest Service, The number of areas with extreme fire danger reached 700, which was higher than the average in the last decade (600), but did not reach the levels attained in 2003 (1300). In general, temperatures were not too high, which limited the negative effects of the drought and the wind. Extreme fire danger was reached specifically in Bouches-du-Rhone and Var, and it was slightly lower in Corsica.

#### *Fire occurrence and affected surfaces*

The area burnt by forest fires was 6 400 ha. This area is slightly higher than the one in 2006 (5 500) but it is still 40% below the average of 17 500 ha in the last decade.

Although not negligible, the economic and environmental damages were not very high.

The reinforcement of forest fire fighting means for the summer campaign started on June 18<sup>th</sup> and finished on September 20<sup>th</sup>. During this time 1 000 fires burnt 4 000 ha. National means participated in the extinction of 400 fires (that is 40% of fire interventions, versus the 30% average of previous years).

Most fires developed in the eastern part of the department of Var, where more than 45% of the affected surfaces by fire during summer were located. The causes of these fires were accidental. Other departments were also affected starting from the end of July.

The main fires are listed below:

- June 26<sup>th</sup>, La Motte (Var), 460 ha;
- July 4<sup>th</sup>, Mui (Var), 160 ha.

- July 4<sup>th</sup>, Tanneron (Var) and Mandelieu, (Alpes-Maritimes), 425 ha. This fire destroyed a house and damaged some other 12 dozen houses.
- July 16, Adrets-de-L'Esterel, 380 ha;
- July 24<sup>th</sup>, Verignon (Var), 380 ha (This fire was stopped within a military camp Canjuers). This fire became large because of its simultaneity with another fires in Ramatuelle, which took place in a densely populated area and burnt 30 ha,
- July 24<sup>th</sup>, Illonse (Alpes-Maritimes), 105 ha in mountain areas.
- July 25<sup>th</sup>, Vingrau (Pyrénées-Orientales) 210 ha of shrubs.
- August 5<sup>th</sup>, Vallerargues (Gard), 130 ha
- August 9<sup>th</sup>, Greoux (Alpes-de-Haute-Provence) and Saint-Julien Montagnier (Var), 170 ha
- August 16<sup>th</sup> (night) Armissan (Aude) : 160 ha.

In Corsica, the main intervention during the summer period was in Vivario (Haute-Corse) between July 9<sup>th</sup> and 14<sup>th</sup>. Due to the very difficult conditions of relief and accessibility to the fire it was contained after burning 50 ha. During this period 10 fires burnt 100 ha, versus the average (18) burning over 1 000 ha.

Four fires burnt over 100 ha after the means deployed in the summer period were removed:

- Noceta, 200 ha in Haute-Corse, 26.09.07
- Castellet-Les-Sausses, 120 ha, Alpes-de-Haute-Provence, 11.11.07
- Saint Maxime, 270 ha, Var, 14.11.07.
- Entrechaux, 100 ha, Vaucluses, 20.11.07

Of special concern was the situation in the Department of Var, where 1 850 ha were burnt, most of them (1 700 ha) in the eastern part of the Department.

During 5 of the main fires occurred in the Var Department, safety measures for the population and the infrastructure were put in place. This underlines once more the importance of developing the plans of forest fire risk prevention.

In the Var Department on average 2 500 ha burn during the summer, with a maximum reached in 2003 of 18 700 ha.

Figure 8 shows trends in the number of fires and burnt areas in France over the last 28 years (the

exact value of the total number of fires for 2007 is not available yet).

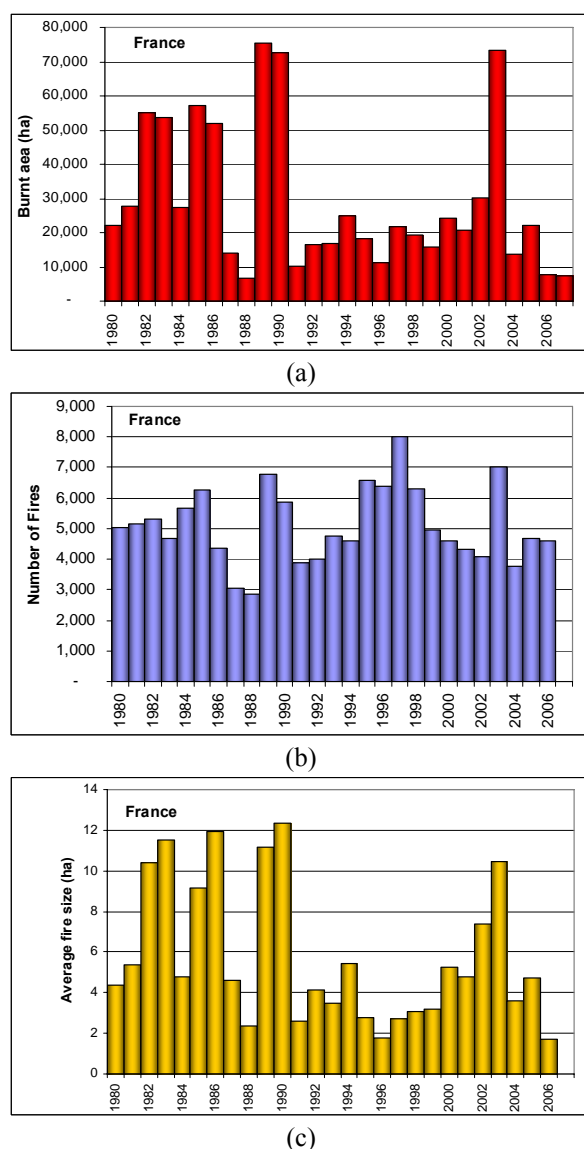


Figure 8. Burnt areas (a), number of fires (b) and average fire size (c) in France for the last 28 years. (Number of fires not yet available for 2007)

The number of fires (1 000 during summer) has been reduced, despite the persistent drought conditions that favoured ignition as compared to the 1300 average each summer, which could reach 1500 if September was a high danger month.

This reduction is particularly noticeable in Corsica (350 fires versus 530 average), but it is also substantial in Var and Hérault. This confirms the trend after 2004, which brought a deeper engagement of local authorities, police and gendarmerie in the fight against fires. This complements the efficient work on the ground of the FORMISC, fire brigades, the forest service and the military forces and the modules adopted

for fire watching in addition to the restriction of access to the forests during high risk periods.

This evolution facilitates the strategy to fight the fire at the start with large amounts of means, if necessary. In fact, the simultaneity of fire ignitions, exceptional in 2007, leads to the full engagement of the means, which prevents the fighting of the fire at its early stage, when it would be easier to extinguish it.

National means have a role of operational prevention through the quick attack to fires as soon as they start during high danger periods. More than 50% of the activity of the bombardiers and more 80% of the FORMISC (ground forces) are deployed for this purpose. Their contribution permits the quick attack to the fire as it starts.

In 2007, the rapid attack to fires has been very high during the summer, as 82% of the fires burnt less than 1 ha, and 95% burnt less than 5 ha. These are very high percentages, even considering other years when the risk of fire was not so high.

#### *Fire fighting means*

The intervention of the national aerial means was very important during the summer.

Water bomber airplanes participated in the extinction of 320 fires with 3900 hours of operations, which is above the average number of hours in the last ten summers. Of these, 220 times the intervention was for fire look out missions. Important to note that this type of missions consumed 2020 flight hours, which is more than 50% of the total flight time used.

Regarding the use of aerial means, it is worth mentioning:

The interest of the involvement of Dash is confirmed by several interventions, including in hilly areas (Vivario in High-Corsican: position of a line of retardant in crest, Saint-Sauveur-du-Tinée in Alpes-Maritimes: position of a line of support to the retardant at the fire front; in these two cases, dropping allowed to contain fire in inaccessible areas) the most important fires of Var. Dash performed since the beginning of the summer about sixty of intervention in the South.

The interventions of the water bomber helicopter EC725 as part of experimentation in Corsica were particularly appreciated by troops on the ground in High - Corsican and in Alpes-Maritimes, even though the operational activity was comparatively reduced in Corsica during its period, which restricted the use of the knowledge, gathered during this experimentation. On average, 8 drops



(24 tonnes) were made per hour in the presence of fire, that is, in Corsica, a performance close to that of CL415.

The military sections of the civil protection positioned in Corsica have performed since June 25<sup>th</sup> 500 missions of on the ground and about sixty interventions on fires. On the mainland, the intervention with retardant was used on 31 fires, among which there were the main of the mainland, the section provided support on 12 fires. The helicopter-borne group of intervention was mobilized in Alpes-Maritimes, in Lozère, in Hérault and in High-Corsican

Columns of reinforcement of fire department were constituted at the South zone, at the Southeast zone and at the zone of Paris to reinforce the local means for prevention or intervention. This deployment corresponds to a volume of 5 500 men - days and represents a 1 300 000-€ load for DDSC, taking into account the indemnity of equipments destroyed in intervention (notably 1 water truck made available at by Hautes-Alpes. 45% of the resources were provided by SDIS external to the South zone (Southeast zone and Paris zone).

The means of this deployment (1 800 man-days) correspond to the troupes mobilized on a provisional basis.

#### *Non-Mediterranean zone*

The operational activities have been limited outside the southern zone of France, as the meteorological conditions were not favourable to forest fires. In the South-West 1 000 ha have been affected by fires since the start of the year (as compared to 4 500 ha average), with less than 170 ha in the forest of le Landes (average 1 100). Only 170 ha of these were burnt during the summer. The use of national means was therefore not necessary in the non-Mediterranean departments.

#### *Operations of mutual assistance*

France provided assistance for the fight against the catastrophic fires in the summer of 2007 in south-eastern Europe with three interventions in Italy and three interventions in Greece.

The most important contribution was in Greece from August 25<sup>th</sup> to September 4<sup>th</sup>. 4 Canadair CL415 were deployed as well as a team of 27 fire fighters and another team of 33 civil protection and military personnel from UIISC7 (Brignoles).

France did not need to request international assistance.

*(Source: Ministère de l'Intérieur, Direction de la Défense et de la Sécurité Civiles, France)*

### **2.1.4. Italy**

#### *Forest fires in the 2007 fire season*

The 2007 fire toll was one of the heaviest ever recorded: 10 639 forest fires that affected an area of 227 729 hectares, of which 116 602 were wooded.

This is the most serious situation since 2000, the year when the Law n. 353 about forest fires was approved. Even the comparison with the period before 2000 is negative. There had not been a greater number of fires since 1997 (11 612), such an extensive wooded area hadn't burned since 1993 (116 378 ha), whereas we have to go back to 1981, the most dramatic period of Italy's fire history, to find a broader total fire-affected area (229 850 ha).

The number of fires has nearly doubled compared to 2006, the burnt forest area was seven times greater, and the total burnt land five times greater.

The average area per fire in 2007 was 21.4 hectares, the greatest ever recorded since 1970, the year when statistical data on forest fires began to be gathered.

The gravity of the situation registered is shown not only by the considerable number of fires and the enormous portions of affected land, but also by other parameters: compared to 2006 there has been an increase in the percentage of burnt forest area, the incidence of burned area falling within protected areas, the concentration of the phenomenon in summer months, arson.

During the summer high temperatures and strong winds favored exceptionally large fires, often concentrated in a few particular days, such as July 24<sup>th</sup> and August 22<sup>nd</sup>, that challenged the whole fire-fighting system.

There were several requests for airborne assistance: 100 requests for aircraft intervention were received by the National Civil Protection on July 24th alone.

The most dramatic toll was represented by human lives: 23 fire victims in 2007, among them the pilots Giovanni Baldi and Pierluigi Schiamone, who crashed in their helicopter at Marina di Camerota (SA) and the pilot Andrea Golferà, who



crashed in Abruzzo piloting a Civil Protection Canadair on a fire-fighting mission.

There is unanimous grief and recognition for them, as for all the other victims of this season of fires.

#### *Forest fires by region*

All regions were seriously affected by fires, registering increases correlated to the exceptional climate conditions, greater in the South and the islands and more contained in central and northern Italy.

The southern regions were hit violently by the summer emergency, whereas the northern regions registered lower increases, concentrated prevalently during winter. In this general situation, due to conditions of prolonged aridity, both in winter and summer, and to exceptionally high summer temperatures associated with strong winds, a few, particular circumstances stand out and deserve further analysis.

Liguria and Tuscany only minimally felt the general increase of the phenomenon, registering increases in the size of affected areas rather than in the number of events. The Marche and Abruzzo, contrary to their normal trend, suffered quite serious situations, with a few exceptionally broad fires. Among the regions in the south, Calabria was hit quite hard, whereas in Apulia damage was concentrated mainly in a few provinces such as Foggia.

The reasons for this must be looked for within each region, in the different land, vegetation and social aspects, as well as in the various composition of the fire prevention structure.

Liguria, highly exposed to the risk of fire due to climate and forest, mountainous characteristics and the "humanization" of the territory, reported in 2007 a reverse trend with respect to the national framework. In relationship to the previous five year period, the number of fires decreased by more than 40%, the surface area dropped by approx.70% and the average area per fire went from 4.2 to 2.1 hectares.

This situation reflects the summer climate conditions, not particularly favourable to fire risk, and more effective prevention work, carried out according to the intervention guidelines agreed with the Region. The role of volunteers was relevant, organized with mobile patrols provided with water tanks equipment already placed in the areas at risk, which contributed in limiting the

affected areas due to prompt reporting and reduced intervention times.

In Tuscany, in 2007, the number of fires increased by about 18%, while the total area concerned doubled, with increases not proportional to the national ones.

The region, above all in the provinces of Massa and Lucca, similarly to nearby Liguria, felt the effects of summer fires and late winter fires, often linked to scorching to renew grazing land. These events remained quite constant and, due to favourable factors, were not followed by the feared sudden summer rise. Among these was the climate trend that in this region, even though it has critical aspects, did not have the extremes experienced in other areas of the country. Furthermore, the fires that started did not overlap in the same provinces; therefore there was no collapse of the operational structure.

In Tuscany, in recent years the number of fires shows slight variations due to the effective, capillary organization of the regional fire-prevention structure that guarantees rapid sighting and intervention.

Another significant aspect is undoubtedly the investigative police work carried out by the Italian National Forest Corps which has a strong deterrent effect due to the positive results achieved, such as past arrests on the islands of Elba and Giglio, definitely mitigating the fire emergency in those areas.

It should also be mentioned out that Liguria and Tuscany are the regions that created the largest land register of burnt areas during the previous year – 2006 - making it possible to comply with law n. 353/2000. This tool has been established in 60% of the municipalities in Liguria, in 43% in Tuscany.

The situation in the Marche was particularly critical due to a sizeable increase  $\Delta$  in the number of fires and because some of the fires were exceptionally large, among them the fire that flared up in Acquasanta Terme in the province of Ascoli Piceno, which affected more than 2,800 hectares of forest area.

The Marche situation is due to a series of factors such as poor land management and the lack of suitable prevention, therefore the forest areas adjoin abandoned areas, coniferous woods with broad-leaved woods, which creates a widespread risk situation.

The fire prevention structure probably was prepared to handle smaller fire events.

Abruzzo suffered particularly serious events that made the ordinary parameters shoot up. The factor that aroused most alarm was the increase of the affected areas, rather than the increase of the number of fires taking place.

Such large expansions caused a considerable increase in the average area per fire. Each of the 274 fires in Abruzzo had an average expansion of 77 hectares, compared to a national average of 21 hectares.

The Abruzzo situation can be related mainly to two aspects: the unusual summer climate conditions and the concentration of fires in a short amount of time, between 25<sup>th</sup>-26<sup>th</sup> July and the end of August.

The effects of high temperatures, worsened by the previous drought, were added to the continuing strong irregular winds that made it difficult to contain fires often breaking out on the same days, favouring their revival even when they were considered under control.

Calabria was the region most devastated by fire: 1,880 fires, more than 43,126 hectares affected, 24,806 hectares of woodland damaged. Compared to 2006, the number of fires has doubled, the affected forest area increased eightfold, the total burnt area increased fivefold.

It has to be added damages to structures and infrastructures, the risks for built-up areas and road conditions, and the loss of human lives. The severity shown, unequalled by any other Italian region, and even though favoured by dryness, high temperatures, strong hot winds, cannot be evaluated without taking into account the drastic change in the regional fire prevention organization.

In effect, in compliance with the three-year fire prevention plan adopted for 2007-2009 by the Calabria region, the legal ownership of the ground intervention in the various phases of sighting, coordination and extinguishing has been attributed to the regional institution, leaving the Italian National Forest Corps the responsibility for coordinating national airborne assistance and identification and investigation work. The innovation introduced, obviously not perfect from an organizational point of view, caused a few deficiencies and sometimes operational delays, which contributed in determining serious damage in Calabria.

Apulia was particularly struck in the Foggia province, where more than 11,278 hectares were affected by fire, of which 6,651 wooded. In

addition to the high concentration of woods in the province (80% of the whole region), the serious toll recorded must be related to various factors, both environmental and social.

In the Gargano territory the limy aspect of the soil along with the high exposure of the promontories to both north and south winds creates very dry soil and vegetation conditions, often previously overrun by fires and winds.

The human factor must be added. The high pressure stock-breeding work, often carried out in wooded areas with low pasture productivity, can frequently cause conflict among shepherds due to competition for limited resources, and recourse to fire for spite, revenge, to encourage grass renewal or to disguise unlawful activities. And in this province there is a high index of environmental illegality, aimed at obtaining material advantages or just for simple vandalism.

The institution of the Gargano National Park and the application of constraints that took place later by law, in many cases encouraged the abandonment of woods and wood management that often became not profitable, with the consequence that there was an accumulation of biomass and a growth of widespread illegality in the use of forest resources.

Prevention works, even those required by the structures and tourist villages bordering wooded areas and contemplated by regional provisions to protect the interface areas, often are not carried out, causing high fire vulnerability to the whole district. The exception climate conditions in 2007 did the rest.

In the other regions, in addition to what has been briefly described here, in all its drama fire behaved more predictably. Aside from Calabria, mentioned above, most of the fires were in Campania (1,779), Sicily (1,254) and Sardinia (1,097).

The most extensive affected area was in Sicily (46,451 hectares), whereas the greatest damage to wooded patrimony, apart from Calabria, was in Campania (18,699 hectares).

Eleven provinces registered more than 200 fires in 2007: Latina, Frosinone, Salerno, Cosenza, Catanzaro, Reggio Calabria, Crotone, Agrigento, Sassari, Nuoro and Cagliari.

In 25 provinces more than 1000 hectares of wooded area were fire-affected: Savona, Ascoli Piceno, Latina, Frosinone, L'Aquila, Pescara, Chieti, Caserta, Benevento, Avellino, Salerno, Foggia, Bari, Taranto, Potenza, Cosenza,

Catanzaro, Reggio Calabria, Crotone, Palermo, Messina, Enna, Catania, Sassari, Nuoro and Cagliari.

#### *Major fires in 2007*

In 2007 there were a few exceptionally large fires.

- On July 23<sup>rd</sup>, in the province of Nuoro, comune of Sarule, a fire affected a total of 9,029 hectares, out of which 6,345 of woods made up of almost 4,000 hectares of broad leaved forest trees and nearly 2,000 hectares of Mediterranean bush. It was extinguished with the help of 344 persons and the intervention of 16 aircraft.
- The same day a fire broke out in the province of L'Aquila, comune of Acciano, and lasted for more than 5 days affecting 6,555 hectares of hilly terrain, of which 4,196 wooded. Among these were 1,380 hectares of broad leaved forest and 2,366 hectares of coppice. In the course of extinguishing operations the Civil Protection pilot Andrea Golferà lost his life.
- On September 18<sup>th</sup>, in the province of Enna, in the Nicosia countryside, a fire broke out affecting a total of 3,000 hectares, half of which was mixed high forest. The fire was extinguished with the help of 36 people and 4 aircrafts.
- On July 21<sup>st</sup>, in the province of Ascoli Piceno, in the municipality of Acquasanta Terme, a fire broke out and lasted 14 days, affecting a total area of 2,856 hectares of which 2,313 were broad leaved high forest. There was the intervention of 470 people, 16 fire-extinguishing vehicles, 14 tanker lorries, 11 Canadairs and 10 helicopters.
- On July 24<sup>th</sup> a large fire broke out in the municipality of Peschici, in the province of Foggia, which affected 500 hectares of Aleppo pinewood. The fire caused the death of 3 people who were overcome by the flames. The blaze lasted more than 5 days and was extinguished with the help of 148 people, 4 Canadairs and 10 helicopters.

#### *Forest fires by month*

The fire emergency was prevalently concentrated in July and August, with an important period in

September. July was the month with most fires (3,367), followed by August (3,242).

In July alone fire affected 108,917 hectares, out of which 56,234 wooded; in August it affected 72,681 hectares total of which 39,583 wooded.

The particularly critical periods were from the 16<sup>th</sup> to the 31<sup>st</sup> of July, when in only 15 days 2,337 fires had to be tackled, then from the 16<sup>th</sup> to the 31<sup>st</sup> of August, when there were 1,824 fires. For an idea of the increase of work for the fire-fighting structure in the two summer months of 2007, consider that the number of fires was about two and a half times greater than what was registered during the same months in 2006 and the territory concerned was eight times broader.

Two dates were particularly critical: the 24<sup>th</sup> of July and the 22<sup>nd</sup> of August. On the 24<sup>th</sup> of July alone there were 296 fires to cope with that affected 18,500 hectares, of which nearly 9,000 wooded; on the 22<sup>nd</sup> of August there were 147 fires and they burned more than 8,000 hectares, of which 4,500 wooded.

The month of September 2007, with 1,350 fires and 14,482 hectares affected, was the most dramatic for both July and August of last year.

The situation appeared critical as early as June, when there were 617 fires and a total of 16,711 hectares were burned, even more than those affected in September 2007.

The fires continued on into October, with 476 events and 4,876 hectares of affected area.

The increase in the number and affected area took place in all the months of 2007, with respect to 2006.

The values registered show a trend that is quite in line with the fire risk forecast index, elaborated by Ispra within the EFFIS, regarding the southern countries of the European Community. As far as Italy is concerned, the index highlights the flattening of fire risk in the second half of May and two peaks, one in the second half of July and one in the second half of August, which have been confirmed in the real situation.

#### *Forest fires by size class*

The 2007 fires increased not only numerically but they concerned larger areas, as is confirmed by the increase in average area per fire.

The distribution in the various extension classes shows a percentage decrease, with respect to the previous year, of fires affecting less than one hectare and those covering between one and five

hectares, but an increase start from the classes above five hectares.

Fires between 0 and 5 hectares were 64% of the total and affected 4% of the area, whereas in 2006 fires of the same extension were 75% and concerned 13% of the area. The number of fires between 5 and 100 hectares has increased, going from 24% to 33% of the total, which in terms of area is less incisive, since in the previous year they burned 57% of the overall extension, whereas in 2007 it was only 33%.

A critical element of 2007 was undoubtedly the very large dimension of fires, which were difficult to contain and caused serious emergencies. There were 400 fires of more than 100 hectares and affected 63% of total burned land. Out of these fires, 346 were between 100 and 500 hectares, 35 affected between 500 and 1,000 hectares, 12 fires burned an area of more than 1000 hectares and 7 fires affected more than 2,000 hectares.

The regions where there were the largest fires were Sardinia, Sicily and Abruzzo.

#### *Fire causes*

For every forest fire the Italian National Forest Corps makes an investigation that leads to attributing the event to one of five likely causes (natural, accidental, negligence, arson, doubtful) and the identification of a reason for each cause.

Fires due to arson have increased in 2007 compared to the previous year, going from 59.9% to 65.5%, whereas those due to negligence have dropped slightly, from 15.25% to 13.4%. Overall, large fires due to the work of man were, in 2007, 78.9%.

Fires due to natural events were 0.6% of the total, accidental fires were 0.7%. More than 2000 fires, 19.8% of them, were not assigned.

The most worrying aspect is the increase in arson that, in percentages, is the highest since 1998 and concerns the cause of nearly 7,000 fires; it more than doubled since last year.

Analyzing the causes within each region, the percentages of arson increase. In Calabria, voluntary fires were 79% of the regional total, in Lombardy 75%, in Campania 76%, in Sicily 72%.

Fires due to negligence were significant in Apulia, where they were 30.5%, for reasons mainly linked to agriculture. They were also substantial in Calabria, Campania and Tuscany. Natural fires became significant in Trentino Alto Adige, Piedmont and Friuli Venezia Giulia;

accidental fires above all in Tuscany and Piedmont.

Fires with no cause attribution are predominant in Sardinia, where doubtful events are 669, which is 61.2% of the total. Identifying the reasons behind arson is one of the investigational phases carried out at the place of the fire, which in itself is quite difficult since work is done in open and broad spaces, where any signs are temporary and easily alterable. Here too, in most of fires due to arson, i.e. 56.6% of cases, it was impossible to identify the motive that set the arsonists at work. In the remaining cases, the predominant motivations are found in a search for profit, where 31.1% of fires are due to arson. Interests are linked to renewing pastures, recovering land for crops, saving labor costs, construction speculation, jobs, poaching, obtaining advantages. In Sicily, Calabria and Lazio these motivations are very important. In Sicily half of all fires leads back to the search for profit.

Only 7.3% of fires due to arson are because of disturbs of behavior and pyromania (225 fires in Calabria, 87 in Sicily), whereas protests and revenge account for 5% of arson.

As far as fires due to negligence are concerned, the predominant motivations are agricultural and forest works, for 43.2% of such fires. In these cases the fires originate from fires put on to clean waste areas, renew pastures, burn stubble and to clean roadway and railway escarpments. Cigarette butts and burning matches dropped on inflammable materials are responsible for 24.7% of fires due to negligence. Other activities, such as recreation and tourism, as well as fires put on in unauthorized dumps, those deriving from the use of various kinds of equipment, are responsible for 11.5% of involuntary events.

In the remaining 20.7% of cases it wasn't possible to identify the negligence motivation. Sardinia is still the region where causes of undefined negligence prevail.

It is felt that future activities relative to crime prevention and repression should be aimed at implementing projects to improve the capability of knowledge and understanding of the phenomenon, above all concerning the knowledge of causes, considering that in 2007 the causes classified as doubtful (code 5001), "doubtful arson" (code 4201) and "doubtful negligence" (code 3207) are 56% of the total.

At present we are carrying on the following actions:

- organization of staff working on investigations, technical examination of the burned places and surveying the fire-affected areas, in connection with the personnel working in fire coordination in the 9 regions and 22 provinces where nearly 70% of forest fires occur;
- in depth study of the investigations aimed at associative contexts;
- coordination with the other Police Forces in prevention services, to be realized by the Provincial Committee for Public Order and Safety;
- improvement of prevention work by applying administrative sanctions and prohibitions provided for by law;
- professional improvement of personnel through training and extension courses;
- analysis of the phenomenon, aimed at defining the offender profile with reference to the various social and economic contexts where he operates;
- introduction of a specific modification of law that prosecutes detention, transport and manufacture of the incendiary devices used to set forest fires, with the collaboration of the Centre of Juridical and Technical Studies of the Italian National Forest Corps Environmental Police.

In particular:

- we are starting to strengthen the forest fire investigation structure establishing specific territorial groups to be established in the 22 provinces where 70% of forest fires break out;
- in Rieti we are completing the establishment of the analysis laboratory of devices, triggers, parts of them and combustion accelerants;
- the "land dossier" computer procedure has been defined for merging information of all the investigations carried out in Italy, the data will be processed and made available to the Italian National Forest Corps and the Judicial Authority for investigation work. This would allow better correlation of similar events that may take place in different regions; This

procedure includes cataloguing the devices and triggers used to start forest fires in a special data bank.

Considering the extent of the phenomenon and the major interests in protecting the national community, it would be useful to complete strengthening of investigation work by creating specific investigation divisions in order to satisfy more effectively and more efficiently the duties assigned to the Italian National Forest Corps on the topic of forest fire prevention and fighting by the decree of the Ministry of the Interior, 28<sup>th</sup> April 2006, regarding the "*Rearrangement of the Police Force's specialty sections*".

The results achieved by the groups created in 2007 in the pilot provinces of Latina, Matera and Genoa were quite satisfactory, achieving the mission aim, identified in improving the knowledge of the phenomenon (causes) and in strengthening crime contrast work (number of reports to the Judicial Authority against known persons).

The aim is to contain the number of events, prevent the phenomenon through deterrent punishment and an increase in security, in the perception of security and legality of the people living in the countryside and mountains of Italy.

#### *Airborne assistance in forest fires fighting*

Fire-fighting activity by aircraft was particularly intense on both a national level, coordinated by the C.O.A.U, (Unified Airborne Operations Centre) set up at the Civil Protection Department, and by the regions or independent provinces, activated directly by the Operations Rooms or by the Unified Permanent Operation Rooms (UPOR).

Twenty-one vehicles were made available during the winter, out of which 9 Canadairs and 3 Erickson S-64s, and 42 for the summer campaign, out of which 13 Canadairs and 7 Erickson S-64s.

During the summer there were also 5 Air Tractor-Fire Bosses used, the new vehicles rented by the Civil Protection Department from the 24<sup>th</sup> of July to the 30<sup>th</sup> of September, located at the Pontecagnano bases in Campania, and the Tortoli bases in Sardinia.

The AT 802 amphibian model was already used in the past, with good results, in Basilicata and Sardinia.

The positive characteristics of the Air Tractor-Fire Boss are its capability to load water while taxiing and a digital controlled release system for

the pilot to define the drop area and the quantity to dump according to the size of the fire and its speed. In the first airdrop the vehicle can dump 2,500 litres of water and retardant, in successive airdrops it can drop as much as 3,150 liters of water. The Fire Bosses have turned out to be very useful vehicles because of their versatility and economic aspect, due to low maintenance costs and the presence of only one pilot. They were successfully used in medium sized fires and in more extensive ones, helping the Canadair CL415s and the Erickson S64s.

In 2007 there were a total of 4,744 national air missions carried out, out of which more than half with the Canadairs, for a total of 10,510 hours of flying time, of which 6,326 hours working on fires. With respect to the previous year the missions have been more than doubled, whereas the hours of flying time have nearly tripled.

The greatest number of requests for national airborne support was forwarded from Calabria (582) and Campania (428). In this latter Region, there were 915 missions and there were 2,170 hours of flying time, for a total of 8,585 airdrops.

The regions and the autonomous provinces contribute to fire prevention work both during the sighting phase and in the extinguishing phase, by private airborne vehicles, fixed wing and helicopters, whose use is defined by stipulating specific conventions.

The regional airborne assistance responds to the need to integrate the national Civil Protection activity to better respond to local needs, with vehicles based in the areas of greatest risk and therefore can knock down the intervention times and guarantee fire fighting in the initial phases.

Overall there was an agreement from the regions, both ordinary and special statute, and from the autonomous provinces, for 77 extinguishing vehicles and 22 sighting vehicles.

The yearly trends in terms of numbers of fires and burnt areas during the last 28 years in Italy are shown in 8.

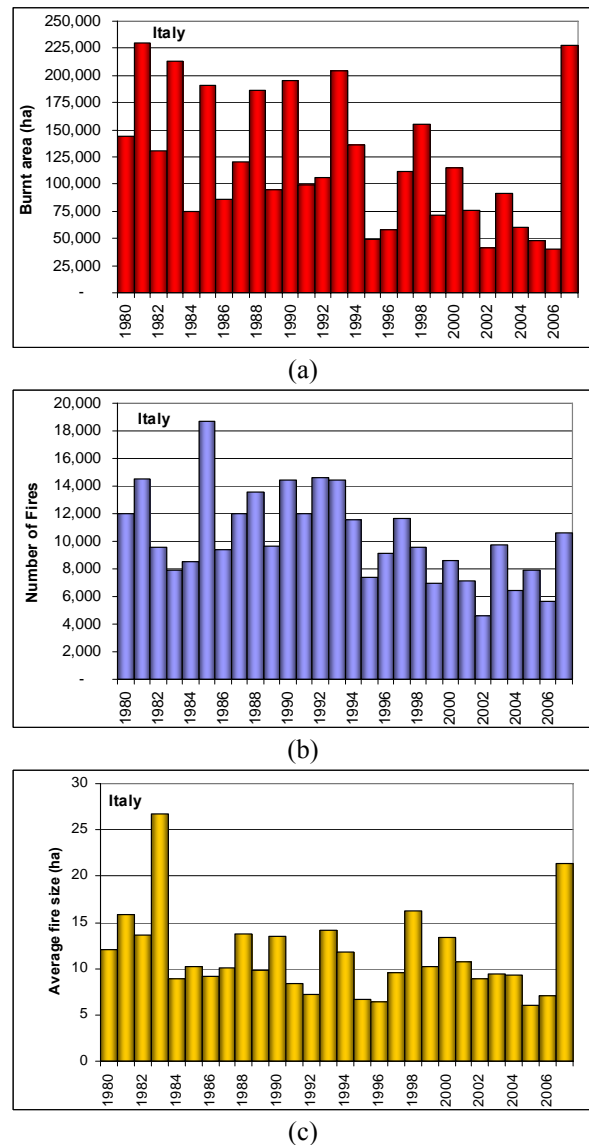


Figure 9. Burnt areas (a), number of fires (b) and average fire size (c) in Italy for the last 28 years.

(Source: Ministero delle Politiche Agricole Alimentari e Forestali, Corpo Forestale dello Stato, Italy).

### 2.1.5. Greece

#### *Fire danger in the 2007 season*

The 2007 has been the worst year for forest fires ever recorded in Greece

The paragraphs below describe some unusual characteristics of the 2007 fire season that contributed to make it so extreme.

Weather conditions:

- Three unusually long periods of extremely high temperatures causing conditions of prolonged heat waves
- Prolonged drought of the past months
- Simultaneous strong winds blowing in the regions where the fires started

The characteristics of the three consecutive heat waves were:

- Very high maximum temperatures (in some areas above 46° C)
- Very high minimum temperatures during the evening
- Very low levels of humidity

The heat waves were followed by very dry and strong Northern winds.

The major fires broke out after the three consecutive heat waves, while their increasing size was a result of the extreme drought and hot conditions coupled with very strong winds, especially in the last week of August in Peloponnesus.

At the end of August, five major fires in Peloponnesus burnt a total of 170 000 ha, two other major fires at the same time in Evia burned 25 000 ha of land,

More than 70% of the final total burnt areas in the season resulted from the above 7 forest fires.

#### *Fire occurrence and affected surfaces*

The total burnt areas was estimated in 225 733.9 ha. The provisional results of the fire campaign of 2007 in Greece, according to data taken by the Fire Brigades and verified by the Forest Service for the forest fires data are shown in Table 5.

Table 6 shows the details of wildfires that were not classified as forest fires (column Greece 2), while detailed information on forest fires (column Greece 1) by regional forest administration in Greece is presented in Table 7 and Table 8.

Table 5. Forest fires in Greece in 2007 (Provisional data)

| <i>Forest fires in Greece (1/1/2007 – 31/12/2007)</i> |                     | <i>GREECE<br/>(1)</i> | <i>GREECE<br/>(2)</i> | <i>GREECE<br/>(1+2)</i> |
|---|---------------------|-----------------------|-----------------------|-------------------------|
| <i>NUMBER OF FIRES</i>                                | <i>&lt;1 ha</i>     | 1 343                 | 5 975                 | 7 318                   |
|   | <i>1 - 5 ha</i>     | 338                   | 584                   | 922                     |
|   | <i>5 - 100 ha</i>   | 218                   | 374                   | 592                     |
|   | <i>100 - 500 ha</i> | 49                    | 16                    | 65                      |
|   | <i>&gt;500 ha</i>   | 35                    | 1                     | 36                      |
|   | <b><i>TOTAL</i></b> | <b>1 983</b>          | <b>6 950</b>          | <b>8 933</b>            |
| <i>BURNT AREAS (ha)</i>                               | <i>FORESTS</i>      | 196 262.9             | 0                     | 196 262.9               |
|   | <i>NON FORESTS</i>  | 29 470.7              | 88 092.5              | 117 563.2               |
|   | <b><i>TOTAL</i></b> | <b>225 733.9</b>      | <b>88 092.5</b>       | <b>313 825.9</b>        |

(1) Forest fires data from Forest Service; (2) Additional fire data as reported by the Fire Brigade  
(1+2) sum of (1) and (2)

Table 6. Wildfires not classified as forest fires (fires that do not burn in areas classified as forestland)

| <i>Forest administration</i> | <i>Total number of fires</i> | <i># fires &lt;1 ha</i> | <i># fires 1-5 ha</i> | <i># fires 5-100 ha</i> | <i># fires 100-500 ha</i> | <i># fires &gt;500 ha</i> | <i>Burned area (ha)</i> |
|------------------------------|------------------------------|-------------------------|-----------------------|-------------------------|---------------------------|---------------------------|-------------------------|
| <i>REG. EAST MAC. THR.</i>   | 864                          | 689                     | 133                   | 39                      | 3                         | 0                         | 2151.9                  |
| <i>REG. CENT. MACEDONIA</i>  | 1529                         | 1429                    | 76                    | 24                      | 0                         | 0                         | 567.7                   |
| <i>REG. W. MACEDONIA</i>     | 301                          | 154                     | 33                    | 112                     | 2                         | 0                         | 685.5                   |
| <i>REG. IPEIROU</i>          | 309                          | 292                     | 17                    | 0                       | 0                         | 0                         | 214.8                   |
| <i>REG. THESSALIAS</i>       | 228                          | 169                     | 25                    | 33                      | 1                         | 0                         | 754.3                   |
| <i>REG. IONIAN ISLANDS</i>   | 286                          | 275                     | 9                     | 2                       | 0                         | 0                         | 156.6                   |
| <i>REG. W. GREECE</i>        | 740                          | 693                     | 35                    | 11                      | 1                         | 0                         | 43086.3                 |
| <i>REG. ST. GREECE</i>       | 324                          | 284                     | 28                    | 10                      | 2                         | 0                         | 1011.6                  |
| <i>REG. ATTIKIS</i>          | 128                          | 123                     | 5                     | 0                       | 0                         | 0                         | 32.7                    |
| <i>REG. PELOPONISOU</i>      | 1129                         | 1056                    | 51                    | 17                      | 4                         | 1                         | 35633.9                 |
| <i>REG. N. AIGAIUO</i>       | 136                          | 121                     | 10                    | 5                       | 0                         | 0                         | 108.7                   |
| <i>REG. S. AIGAIUO</i>       | 135                          | 121                     | 10                    | 3                       | 1                         | 0                         | 2312                    |
| <i>REG. KRITIS</i>           | 841                          | 569                     | 152                   | 118                     | 2                         | 0                         | 1376.5                  |
| <b>TOTAL</b>                 | <b>6950</b>                  | <b>5975</b>             | <b>584</b>            | <b>374</b>              | <b>16</b>                 | <b>1</b>                  | <b>88092.5</b>          |

Table 7. Burnt areas in Greece by regional forest administration in 2007

| <i>Forest administration</i> | <i>Total burned area (ha)</i> | <i>Wooded Burned area (ha)</i> | <i>Non wooded burned area (ha)</i> |
|------------------------------|-------------------------------|--------------------------------|------------------------------------|
| <i>REG. EAST MAC. THR.</i>   | 1468.8                        | 811.7                          | 657.1                              |
| <i>REG. CENT. MACEDONIA</i>  | 6249.5                        | 4173.2                         | 2076.3                             |
| <i>REG. W. MACEDONIA</i>     | 9108.5                        | 5969.7                         | 3138.8                             |
| <i>REG. IPEIROU</i>          | 4525.6                        | 3121.5                         | 1404.1                             |
| <i>REG. THESSALIAS</i>       | 13287.7                       | 10448.4                        | 2839.1                             |
| <i>REG. IONIAN ISLANDS</i>   | 2881.4                        | 2880.6                         | 0.8                                |
| <i>REG. W. GREECE</i>        | 79385.7                       | 75385.2                        | 4000.5                             |
| <i>REG. ST. GREECE</i>       | 30256.7                       | 16671.8                        | 13584.9                            |
| <i>REG. ATTIKIS</i>          | 8348.0                        | 7951.5                         | 396.4                              |
| <i>REG. PELOPONISOU</i>      | 66332.5                       | 66332.5                        | 0                                  |
| <i>REG. N. AIGAIUO</i>       | 3081.2                        | 2070.0                         | 1011.2                             |
| <i>REG. S. AIGAIUO</i>       | 374.2                         | 158.1                          | 216.1                              |
| <i>REG. KRITIS</i>           | 434.1                         | 288.7                          | 145.4                              |
| <b>TOTAL</b>                 | <b>225 733.9</b>              | <b>196 262.9</b>               | <b>29 470.7</b>                    |

Table 8. Number of fires in Greece by regional forest administration in 2007

| <i>Forest administration</i> | <i>Total number of fires</i> | <i># fires &lt;1 ha</i> | <i># fires 1-5 ha</i> | <i># fires 5-100 ha</i> | <i># fires 100-500 ha</i> | <i># fires &gt;500 ha</i> |
|------------------------------|------------------------------|-------------------------|-----------------------|-------------------------|---------------------------|---------------------------|
| <i>REG. EAST MAC. THR.</i>   | 122                          | 69                      | 34                    | 14                      | 4                         | 1                         |
| <i>REG. CENT. MACEDONIA</i>  | 109                          | 76                      | 19                    | 9                       | 3                         | 2                         |
| <i>REG. W. MACEDONIA</i>     | 161                          | 87                      | 33                    | 29                      | 7                         | 5                         |
| <i>REG. IPEIROU</i>          | 225                          | 143                     | 37                    | 38                      | 6                         | 1                         |
| <i>REG. THESSALIAS</i>       | 181                          | 102                     | 54                    | 20                      | 3                         | 2                         |
| <i>REG. IONIAN ISLANDS</i>   | 177                          | 140                     | 22                    | 13                      | 1                         | 1                         |
| <i>REG. W. GREECE</i>        | 166                          | 140                     | 14                    | 8                       | 0                         | 4                         |
| <i>REG. ST. GREECE</i>       | 188                          | 112                     | 37                    | 22                      | 9                         | 8                         |
| <i>REG. ATTIKIS</i>          | 131                          | 80                      | 29                    | 15                      | 3                         | 4                         |
| <i>REG. PELOPONISOU</i>      | 348                          | 258                     | 40                    | 35                      | 10                        | 5                         |
| <i>REG. N. AIGAIUO</i>       | 44                           | 34                      | 4                     | 4                       | 0                         | 2                         |
| <i>REG. S. AIGAIUO</i>       | 31                           | 23                      | 4                     | 3                       | 1                         | 0                         |
| <i>REG. KRITIS</i>           | 100                          | 79                      | 11                    | 8                       | 2                         | 0                         |
| <b>TOTAL</b>                 | <b>1983</b>                  | <b>1343</b>             | <b>338</b>            | <b>218</b>              | <b>49</b>                 | <b>35</b>                 |



As a result of the catastrophic events:

- 1 710 buildings burned down or were rendered uninhabitable
- Many villages were evacuated
- Several protected (Natura2.000) sites were destroyed
- Sites of major international interest, such as Ancient Olympia, were threatened
- A large scale economic and social damage to the rural economies occurred.

#### *Fire fighting means and information campaigns*

The following ground and aerial means of the Greek government participated in the forest fire fighting operations.

**Ground Forces** The total personnel of the Fire Brigade was about 14 500 from which 9 500 is permanent personnel which deals also with the structural fires and 5 500 is the seasonally hired personnel just for the forest fires. Fire Brigade of Greece owns at about 1 525 engines, which are involved in both structural, and forest fire suppression efforts and few more small engines owned by Municipalities of high risk areas were involved occasionally in some incidents. The suppression efforts were supported also by:

- 3 000 Soldiers
- 200 Volunteers of Fire Services
- Hundreds of Volunteers
- Hundreds of active Citizens

**Aerial Means** The following aerial means were operating for the fire fighting operations:

- 21 CANADAIR fire fighting aircrafts
- 18 PZL fire fighting aircrafts
- 3 GRUMMAN fire fighting aircrafts
- 2 SUPER PUMA helicopters
- 3 BK-117 helicopters
- 19 special fire-fighting helicopters
- 1 Be-200 fire fighting aircraft

The detailed information on the national aerial means that participated in the fire campaign is show in Table 9.

Table 9. Aerial means participating in the 2007 campaign.

| <i>STATE OWNED MEANS</i> |                 |               |    |
|--------------------------|-----------------|---------------|----|
| <i>AIRCRAFTS</i>         | <i>LARGE</i>    | CL-215        | 13 |
|                          |                 | CL-415        | 8  |
|                          |                 | C-130 + MAFFS | -  |
|                          | <i>SMALL</i>    | PEZETEL       | 18 |
|                          |                 | GRUMMAN       | 3  |
| <i>HELICOPTERS</i>       |                 | H/P PK 117    | 3  |
|                          |                 | SUPER PUMA    | 2  |
|                          |                 | TOTAL         | 47 |
| <i>HIRED MEANS</i>       |                 |               |    |
| <i>HELICOPTERS</i>       | H/P MI-26       |               | 8  |
|                          | H/P SIKORSKY 64 |               | 3  |
|                          | H/P MI-8-MTV    |               | 2  |
|                          | H/P KA-32       |               | 6  |
| <i>AIRCRAFT</i>          |                 | Be-200        | 1  |
|                          |                 | TOTAL         | 20 |

#### *Loss of human lives*

69 civilians lost their lives

9 seasonal forest fire-fighters and 2 pilots were killed during the operations

#### *Operations of mutual assistance*

The following assistance was provided to Greece upon request, according to the dates in which major fire events took place:

June 27 – July 2.

| <b>Request</b>  | <b>Assistance accepted</b>                                       | <b>Affected Areas</b>                                     |
|---|--|---|
| 4 Canadairs (water-bombing aircraft) and 3 heavy-duty helicopters | 7 fire-fighting aircrafts from Italy, France, Portugal and Spain | Attica (Mount Parnitha) Region of Thessaly (Mount Pelion) |

July 5 – July 6

| <b>Request</b>  | <b>Assistance accepted</b>           | <b>Affected Areas</b>  |
|---|--------------------------------------|--|
| 6 Canadairs (water-bombing aircraft) and 3 heavy-duty helicopters | 2 fire-fighting aircrafts from Italy | Fires in Attica (Mount Parnitha) and Region of Thessaly (Mount Pelion) |

July 18 – August 1

| Request                              | Assistance accepted  | Affected Areas   |
|--------------------------------------|--|--|
| 4 Canadairs (water-bombing aircraft) | A total of 11 Canadairs made available by France, Italy, Portugal and Spain. | Korinthos, Patras and Mani (in the Peloponnese) Kithira Island and Kefallinia Island |

August 24 – September 5

| Request   | Assistance accepted  | Affected Areas  |
|---|--|---|
| Initially 8 fire-fighting aircrafts, however as a result of worsening conditions this request increased | 10 Canadairs, 3 Pilatus planes and 12 helicopters were deployed to Greece through the Mechanism. Additionally more than 400 specialists where on site, including aircraft crew, fire-fighters, logisticians, and others. | Large areas of Greece, ranging from the island of Evia north of Athens to the Peloponnese in the south. |

Table 10. Assistance in aerial means provided by European Countries for the last period (24 August – 5 September)

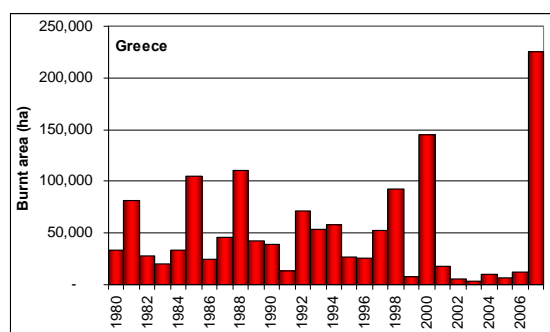
| Country      | Aircrafts          | Helicopters         | Arrival   |
|--------------|--------------------|---------------------|-----------|
| FRANCE       | n. 4 CL-415        |                     | 25/8/2007 |
| NETHERLANDS  |                    | n. 3 SUPER PUMA-120 | 27/8/2007 |
| ITALY        | n. 1 CL-415        |                     | 25/8/2007 |
| SERBIA       | n. 7 6 PZL, 1 AN-2 |                     | 28/8/2007 |
| GERMANY      | n. 1 C 160         | n. 3 3 S-53         | 28/8/2007 |
| ROMANIA      |                    | n. 1 Mi-8           | 27/8/2007 |
| NORWAY       |                    | n. 1 B-412          | 28/8/2007 |
| SLOVENIA     |                    | n. 1 BELL-412       | 26/8/2007 |
| SPAIN        | n. 4 CL-415        |                     | 26/8/2007 |
| SWITZERLAND  |                    | n. 4 SUPER PUMA-120 | 27/8/2007 |
| PORTUGAL     | n. 1 CL-215        |                     | 28/8/2007 |
| AUSTRIA      | n. 3 PC-6          | n. 2 BELL-212       | 27/8/2000 |
| TURKEY       | n. 1 CL-215        |                     | 27/8/2007 |
| SWEDEN       |                    | n. 1 AB-205         | 30/8/2007 |
| CROATIA      | n. 1 CL-215        |                     | 29/8/2007 |
| RUSSIAN      | n. 1 B 200         |                     | 30/8/2007 |
| <b>TOTAL</b> | <b>24</b>          | <b>16</b>           |           |

Table 11. Assistance provided to Greece in Ground forces at the same period

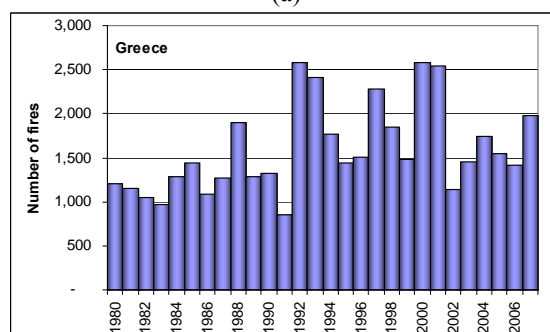
| Country                       | Arrival   | Personnel  | Engines   |
|-------------------------------|-----------|------------|-----------|
| Cyprus                        | 26/8/2007 | 59         | 6         |
| Cyprus                        | 27/8/2007 | 72         | 8         |
| France                        | 26/8/2007 | 64         |           |
| France                        | 29/8/2007 | 8          |           |
| Israel                        | 27/8/2007 | 60         |           |
| Hungary                       | 27/8/2007 | 19         | 5         |
| Albania                       | 28/8/2007 | 4          | 1         |
| Serbia                        | 30/8/2007 | 55         | 7         |
| Bulgaria                      | 31/8/2007 | 45         | 5         |
| International volunteers team | 27/8/2007 | 7          |           |
| <b>TOTAL</b>                  |           | <b>402</b> | <b>32</b> |

Figure 10 shows trends in the number of fires and burnt areas in Greece over the last 28 years.

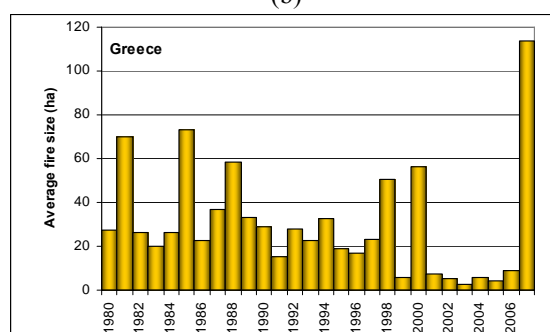
(Source: Ministry of Rural Development and Foods, Directorate General for Development and Protection of Forests and Natural Environment, Greece).



(a)



(b)



(c)

Figure 10. Burnt areas (a), number of fires (b) and average fire size (c) in Greece for the last 28 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

#### *Fire danger in the 2007 fire season*

The spring and summer seasons were very wet in Austria and consequently the wildland and forest fires were less than in 2006.

#### *Fire occurrence and affected surfaces*

In 2005, there were 1 598 wildland fires with a total burnt area of 72 ha and 750 forest fires which resulted in 48 ha of burnt land. Most of the fires were smaller than 1 ha, the largest fire event resulted in 4 ha of burnt area.

Table 12. Number of fires and burned area in Austria in 2007.

| <i>Fire type</i>      | <i>No. of Fires</i> | <i>Burned area(ha)</i> |
|-----------------------|---------------------|------------------------|
| <i>Wildland fires</i> | 1598                | 72                     |
| <i>Forest fires</i>   | 750                 | 48                     |
| <b><i>Total</i></b>   | 2348                | 120                    |

#### *Fire fighting means and information campaigns*

The area of Austria is 83 858 sq km. Austria is divided in 9 provinces, 15 towns with separate status, 84 administration districts, and 2 350 municipalities. There are 4 567 voluntary fire brigades and 6 professional fire brigades (Vienna, Graz, Linz, Salzburg, Innsbruck, Klagenfurt). In average there are 2 fire brigades per municipality. In total there are approximately 290 000 fire-fighters. Fire-fighters can follow special courses for forest fire fighting, in particular for actions in the mountain areas, and some of them are specialized for working with helicopters and airplanes. The response time by fire is between 10 and 15 minutes (except for mountain areas) leading to a very small burned area per fire (e.g.: ~1 000 m<sup>2</sup>). The largest ever recorded burned area was about 50 ha.

#### *Operations of mutual assistance*

In 2007 the Austrian Federal Fire Brigades were in action in Greece in cooperation with the Austrian army.

One expert team has been sent in Albania and Croatia.

Some special equipment for forest fires were sent to Albania after a call of the Austrian Ministry of the Interior.

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

### 2.2.2. Bulgaria

#### *Fire danger in the 2007 fire season*

The forest land in Bulgaria is 4 089 762 hectares (ha) and occupies 37 % of the territory of the country. Of the territory classified as forest land, 3 691 868 ha (89 %) are wooded areas.

During the last 7 years more than 100 000 ha of forests were affected by fires. The 2007 was the second worst year (after 2000) in the history of the Bulgarian forests, with 1 479 forest fires and 43 000 ha burned (1 710 forest fires and 57 406 ha burned in 2000).

The peak of forest fire danger was in the period 19<sup>th</sup> to 30<sup>th</sup> of July. In that time the weekly averages of FWI for Bulgaria were the highest in Europe (EFFIS Newsletter 1 of 2007). Disaster situation was declared in 11 municipalities of 5 regions: Stara Zagora, Lovech, Haskovo, Smolian and Pazardjik.

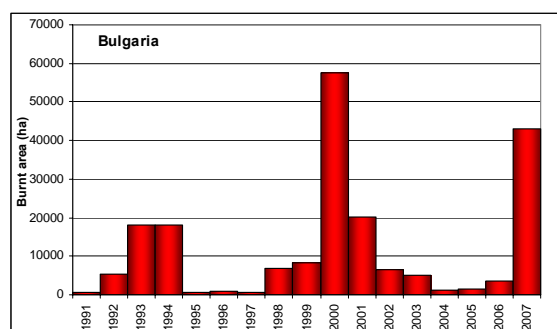
#### *Fire occurrence and affected surfaces*

The main causes of forest fires during 2007 were the following:

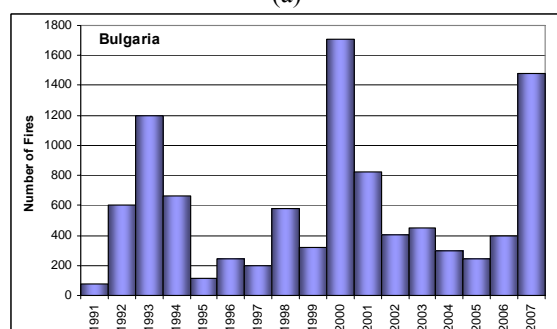
- Carelessness – 78%
- Deliberate or Arson- 5%
- Natural – 1%
- Unknown-16%

The immediate loss for Bulgarian forests in 2007 are calculated on the amount of 5 000 000 EUR, without considering the budget for the restoration of the burned areas.

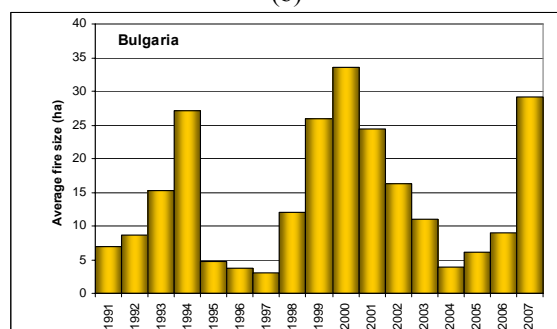
Figure 11 shows trends in the number of fires and burnt areas in Bulgaria from 1991 to 2007.



(a)



(b)



(c)

Figure 11. Burnt areas (a), number of fires (b) and average fire size (c) in Bulgaria from 1991 to 2007.

### *Injuries and loss of human lives*

During the extreme fire danger conditions of 2007, 51 houses were burned, 21 families were evacuated. 3 persons died, 14 were injured (6 of them were fire fighters).

### *Operations of mutual assistance*

At the end of July Bulgaria made requests for assistance to:

- EU/MIC (as Member State),
- NATO/EADRCC (as Member State),
- Russia (based on a bilateral agreement)

Three offers of assistance were received from:

- EU with an offer from a private company,
- NATO with help from the Republic of Turkey,
- Russia sending an aircraft with crew.

In the first days of August the aircraft Il-76 was sent from Russia to Bulgaria and started working in the regions of Stara Zagora and Haskovo.

During the summer 2007, following the request of assistance from Greece to EU/MIC, Bulgaria had the opportunity to send 5 fire fighter tracks with 49 fire fighters in September 2007.

*(Source: State Forest Agency, Sector Forest Fire Management, Bulgaria)*

Table 13. Forest fire statistics for Bulgaria for the period 1998-2007

| Year | Total number of fires | Burnt area [ha] |              | Fires causes (number of fires) |           |         |
|------|-----------------------|-----------------|--------------|--------------------------------|-----------|---------|
|      |                       | Total           | Forest lands | by human activities            | naturally | unknown |
| 1998 | 578                   | 6967            | 6060         | 147                            | 6         | 425     |
| 1999 | 320                   | 8291            | 4198         | 84                             | 9         | 227     |
| 2000 | 1710                  | 57406           | 37431        | 385                            | 18        | 1307    |
| 2001 | 825                   | 20152           | 18463        | 187                            | 19        | 619     |
| 2002 | 402                   | 6513            | 5910         | 150                            | 7         | 245     |
| 2003 | 452                   | 5000            | 4284         | 281                            | 9         | 162     |
| 2004 | 294                   | 1137            | 881          | 172                            | 5         | 117     |
| 2005 | 241                   | 1456            | 1456         | 125                            | 7         | 109     |
| 2006 | 393                   | 3540            | 3540         | 190                            | 9         | 194     |
| 2007 | 1479                  | 42999           | 42999        | 1163                           | 18        | 298     |
| Mean | 669                   | 15346           | 12522        | 288                            | 11        | 370     |

### 2.2.3. Cyprus

#### *Fire danger in the 2007 fire season*

The 2007 fire season was one of the worst on record for forest fires in Cyprus. The winter period was dry with very limited precipitation and summer period was characterized by very high temperatures and strong winds.

#### *Fire occurrence and affected surfaces*

During 2007, a total number of 111 forest fires broke out in Cyprus affecting an area of 4 483 ha of wooded and non-wooded land. The trends regarding both the number of fires and burnt areas over the last 8 years (2000-2007) are shown in what follows. The total number of forest fires in Cyprus during this period was 1 943 fires and the total burnt area was 26 108 ha.

A total number of 16 forest fires with burnt area equal or greater than 50 ha, were recorded.

Figure 12 shows trends in the number of fires, burnt areas and average fire size in Cyprus from 2000 to 2007. The critical situation faced in 2007 is evident from the average fire size graph.

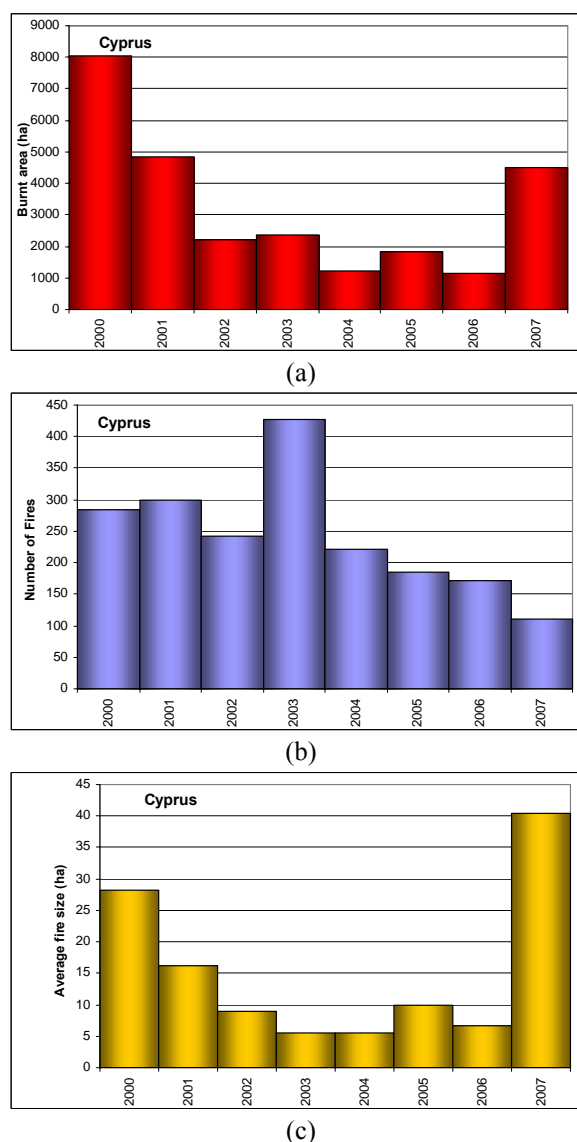


Figure 12. Burnt areas (a), number of fires (b) and average fire size (c) in Cyprus from 2000 to 2007.

Table 14. Number of forest fires and burnt areas in Cyprus

| Year | Number of fires | Total burnt area (ha) | Forest and other wooded land burnt area (ha) | Non wooded land burnt area (ha) |
|------|-----------------|-----------------------|--|---------------------------------|
| 2000 | 285             | 8034                  | 2552   | 5482                            |
| 2001 | 299             | 4830                  | 778  | 4052                            |
| 2002 | 243             | 2196                  | 166  | 2030                            |
| 2003 | 427             | 2349                  | 921  | 1428                            |
| 2004 | 221             | 1218                  | 667  | 551                             |
| 2005 | 185             | 1838                  | 962  | 876                             |
| 2006 | 172             | 1160                  | 888  | 272                             |
| 2007 | 111             | 4483                  | 3704   | 779                             |

#### *Injuries and loss of human lives*

In Cyprus, 8 fire fighters were injured during the 2007 fire season.

#### *Fire fighting means and information campaigns*

A campaign aimed at informing 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 NGOs 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 27 permanent and temporal lookout stations 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 2007. Additionally one fire fighting aeroplane and two medium 5 tonnes helicopters were used. In some cases, Army and Police helicopters were also involved in the fire fighting operations.

The average response time for forest fires over the last eight years (2000 – 2007) was found to be 12 minutes and the burnt area for 92% of the fires, did not exceed the size of 5 hectares.

#### *Operations of mutual assistance*

For the large fire of the 29<sup>th</sup> of June 2007 at Troodos forest, that burned a total area of 1 182 hectares, cross-border assistance was requested through the M.I.C. Two Bell 212 helicopters from Lebanon and one Thrusch 510 aircraft from Israel were sent to Cyprus and participated in fire fighting. Moreover, two Canadair 415 amphibious aircrafts were sent to Cyprus from Italy.

During the massive forest fires in Greece of August 2007 at Peloponnese and Euboea areas, Cyprus actively participated in fire fighting operations with ground forces (fire fighting vehicles and a large number of fire fighters).

Also, upon request from Lebanon for assistance, Cyprus dispatched one helicopter for the suppression of a fire at Bekaa valley.

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

#### **2.2.4. Estonia**

In 2007 a total number of 2 055 forest fires and wildfires were recorded, 64 of these were classified as forest fires. Forest fires and wildfires caused the death of 1 person and

destroyed 40 buildings. In 2006 they were recorded 6 783 forest fires and wildfires, 250 of these were classified as forest fires. Forest fires and wildfires caused the death of 4 people and destroyed 80 buildings.

Forest fires in 2007 were recorded in 13 counties. The highest number of fires (18) was in Harju county. The first fire in 2007 was recorded in April, the last one in September. The largest fire of 2007 occurred in June in Harju county Nissi. In the course of 17 days 205 ha of bog forest were burnt.

In 2007, 98% of forest fires were of human direct or indirect origin, while 2% were started by lightning; 47% fires were caused by careless smoking and making fire.

Figure 13 shows trends in the number of fires and burnt areas in Estonia from 2002 to 2007.

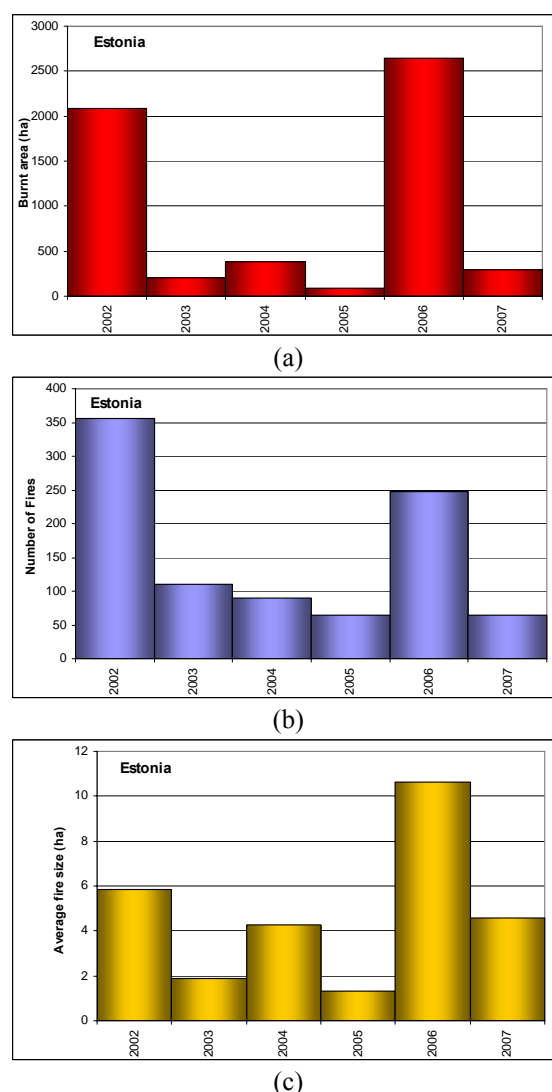


Figure 13. Burnt areas (a), number of fires (b) and average fire size (c) in Estonia from 2002 to 2007.

The Rescue Board is responsible for fighting forest fires, including wildfires, and for managing rescue works. Since forest fires and wildfires are extremely specific, the Rescue Board cooperates in its operations with the State Forest Management Centre, the Environmental Inspectorate, local governments, volunteer organisations and other institutions. Regional cooperation training sessions in fighting forest fires and wildfires are held for institutions engaged in the process.

Table 15 . Forest fires in Estonia in 1998 – 2007

| Year | Number | Area [ha] | Average area [ha] |
|------|--------|-----------|-------------------|
| 1998 | 61     | 53.8      | 0.9               |
| 1999 | 130    | 1103.4    | 8.5               |
| 2000 | 158    | 683.9     | 4.3               |
| 2001 | 91     | 61.8      | 0.7               |
| 2002 | 356    | 2081.7    | 5.9               |
| 2003 | 111    | 206.6     | 1.9               |
| 2004 | 89     | 378.9     | 4.3               |
| 2005 | 65     | 86.5      | 1.3               |
| 2006 | 250    | 3095.6    | 12.4              |
| 2007 | 64     | 292.4     | 4.6               |

(Source: Centre of Forest Protection and Silviculture, Estonia).

## 2.2.5. Finland

### *Fire danger in the 2007 fire season*

In Finland the fire season 2007 was an average one in term of fire danger and numbers of fires.

### *Fire occurrence and affected surfaces*

A total of 2 918 wildfires were reported, of which 1 204 were classified as forest fires. The total burned land was 841.12 ha of which 576.05 ha of forest land. The average burnt forest area per fire was 0.48 ha.

The burnt areas, number of fires and average fire size for the years 1996-2007 are shown in Figure 14.

### *Injuries and loss of human lives*

Two casualties (in two different fires) and 14 injuries were reported in 2007. In two fires the crews of the rescue service also suffered some minor injuries.

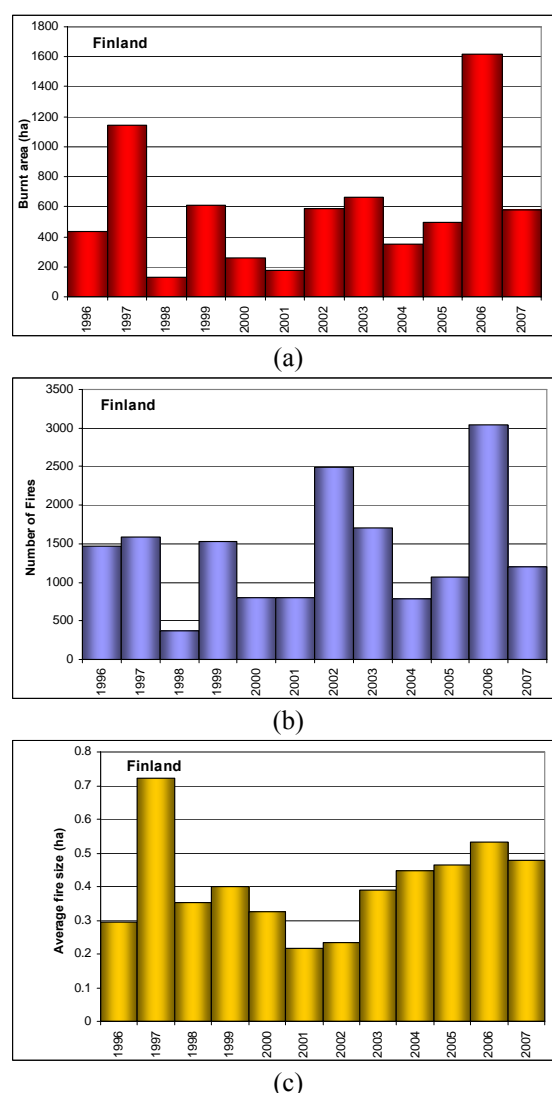


Figure 14. Burnt areas (a), number of fires (b) and average fire size (c) in Finland from 1991 to 2007.

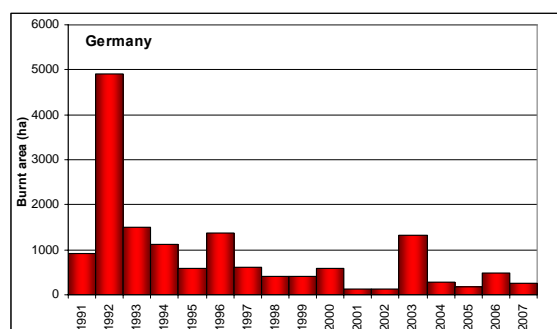
(Source: Ministry of Interior, Department for Rescue Services, Finland)

## 2.2.6. Germany

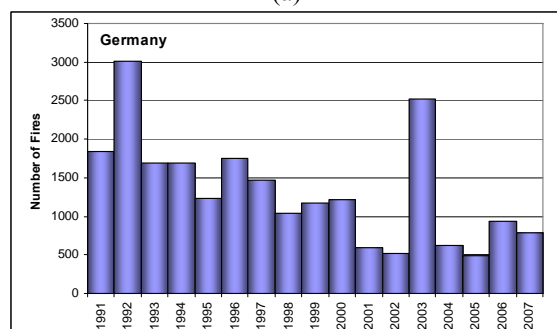
A total of 779 forest fires were reported in Germany in 2007. The total burned area was 255.6 ha.

The trend of the burnt areas, number of fires and average fire size in Germany for the years 1991-2007 are shown in Figure 15.

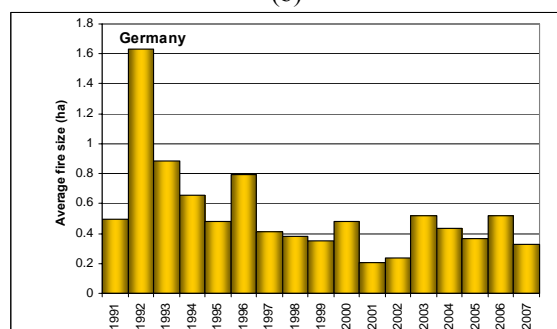




(a)



(b)



(c)

Figure 15. Burnt areas (a), number of fires (b) and average fire size (c) in Germany from 1991 to 2007.

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

## 2.2.7. Hungary

### Fire danger in the 2007 fire season

In Hungary during the month of April and the first week of May 2007 the fire danger increased unusually, reaching a moderate level. A similar condition was reported towards the end of June and even more during the month of July when fire weather conditions were quite severe for forest fires and some large events broke out in Hungary.

The winter 2007 has been the warmest winter of the past century in Hungary. The spring and the summer were also unusually warm, reaching a record temperature in August of

2007. Between September 2006 and August 2007 the average temperature of all months was higher than a long series of past years. A similar situation was never recorded in more than 100 years of meteorological data.

The distribution of precipitation was equivalent to the average of past years, though being dryer in July and beginning of August and wetter in April, which has been anomalous in this respect, being the driest month of the records of past century. In the summer months intense precipitation events were recorded locally (75 mm in Budapest on 19<sup>th</sup> August. But in the flatland of mid Hungary it was dry and there the largest fires occurred.

### Fire occurrence and affected surfaces

The system of fire data collection has been modernized in 2007. The forest Authority's fire database is now integrated with the Disaster Management's database thanks to regular uploading of updated data files. Data exchange is done normally biweekly, and almost daily during the fire season. After the update, the application automatically emails the data on fire events to forest inspectorates.

In Hungary forest fires are strictly connected to other vegetation fires. In many cases the fires spread from burned stubble into the forest, or it starts in forests intensively managed.

Table 16 – Wildland fires and forest fires in Hungary in 2007

|                  | Number of fires | Burned area (ha) |
|------------------|-----------------|------------------|
| Forest fires     | 603             | 4636             |
| Other land fires | 6088            | -                |
| Total wildfires  | 6691            | -                |

About 9-10% of the total vegetation fires are forest fires only. Nevertheless the natural value which is lost in these fires is much higher than in all the vegetation fires, where fires are also much less intense.

The number of forest fires did not increase significantly compared to the past years (and the improvement of the data collection mechanism plays a role in the increase of the number of fires), but the high severity and the large fires occurred in 2007 is quite evident.

The burnt area has increased compared to the past years, also because fire brigades were supplied with GPS devices and more precise measurements were undertaken, followed by filed checking done by forest inspectors.

The seasonal trend of fire activity along the year was the typical one for Hungary, with two well separated fire danger periods.

The burnt area, number of fires and average fire size for the years 1999-2007 are shown in Figure 16.

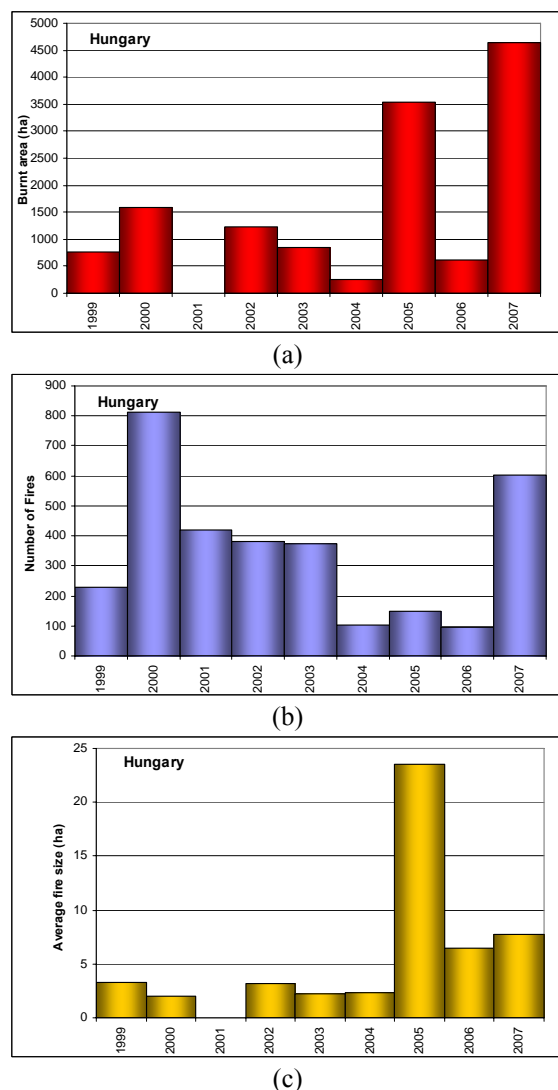


Figure 16. Burnt areas (a), number of fires (b) and average fire size (c) in Hungary from 1999 to 2007.

Table 17 – Monthly forest fires in Hungary in 2007

| Month     | Forest fires in Hungary |                  |
|-----------|-------------------------|------------------|
|           | Number of fires         | Burned area (ha) |
| January   | 20                      | 92               |
| February  | 14                      | 410              |
| March     | 98                      | 1 047            |
| April     | 132                     | 574              |
| Mai       | 28                      | 171              |
| June      | 38                      | 55               |
| July      | 202                     | 2 127            |
| August    | 56                      | 128              |
| September | 1                       | 4                |
| October   | 12                      | 28               |
| November  | 2                       | 0                |
| December  | 0                       | 0                |
| Total     | 603                     | 4 636            |

The meadow and stubble burning in the winter-early spring period is part of the traditional usage. As a result, the fire ignited carelessly may spread onto the forests easily. On the other hand under dry and hot weather of summer the conditions are favourable to fires.

In 2007 39% of forest fires burned in March-April (33% of the total burnt area) and 43% burnt in July-August (52% of the total burnt area). In the two short periods there were 488 forest fires altogether (82% of all forest fires of the year, affecting 85% of the total burnt area).

Of 44% of winter-early spring fires burned in the northern region of Hungary. This concentration is due to the specific socio-economic problems of the region

On the other hand a considerable part of the summer fires burnt in the Plain region and western Hungary. There were 105 fire events in the Plain region in July and August, burning 1 368 ha. It means that 17% of fires in 2007 burnt during a drought period of about 6 weeks in the plain pinewoods..

There were 103 fire events in the Counties of Baranya, Somogy, Tolna, Veszprém in July and August, burning altogether 699 ha.

In one single fire occurred on 25-30 July in the parish border of Kunfehértó, 949.4 hectares of forest were burned.

Table 18 – Forest fires in the Counties of Hungary in 2007

| <i>Counties of Hungary</i>           | <i>Forest fires</i>    |                               | <i>Non forest fires</i> |
|--------------------------------------|------------------------|-------------------------------|-------------------------|
|                                      | <i>Number of fires</i> | <i>Total burned area (ha)</i> | <i>Number of fires</i>  |
| <i>Baranya county</i>                | 28                     | 319                           | 83                      |
| <i>Bács-Kiskun county</i>            | 49                     | 1 251                         | 756                     |
| <i>Békés county</i>                  | 13                     | 15                            | 228                     |
| <i>Borsod-Abaúj-Zemplén county</i>   | 56                     | 512                           | 547                     |
| <i>Csongrád county</i>               | 13                     | 68                            | 383                     |
| <i>Fejér county</i>                  | 67                     | 247                           | 504                     |
| <i>Győr-Moson-Sopron county</i>      | 11                     | 16                            | 57                      |
| <i>Hajdú-Bihar county</i>            | 13                     | 372                           | 241                     |
| <i>Heves county</i>                  | 33                     | 223                           | 583                     |
| <i>Jász-Nagykun-Szolnok county</i>   | 16                     | 185                           | 1023                    |
| <i>Komárom-Esztergom county</i>      | 26                     | 113                           | 196                     |
| <i>Nógrád county</i>                 | 65                     | 244                           | 316                     |
| <i>Pest county</i>                   | 40                     | 216                           | 177                     |
| <i>Somogy county</i>                 | 61                     | 154                           | 453                     |
| <i>Szabolcs-Szatmár-Bereg county</i> | 7                      | 57                            | 133                     |
| <i>Tolna county</i>                  | 31                     | 448                           | 111                     |
| <i>Vas county</i>                    | 22                     | 58                            | 32                      |
| <i>Veszprém county</i>               | 36                     | 97                            | 83                      |
| <i>Zala county</i>                   | 4                      | 11                            | 62                      |
| <i>Budapest capital city</i>         | 12                     | 29                            | 120                     |
| <b>TOTAL</b>                         | <b>603</b>             | <b>4 636</b>                  | <b>6 088</b>            |

The recorded average burnt area increased significantly compared to the previous years due to the improvement of the data collection mechanism and the number of large fires occurred in summer 2007.

**Burned areas** The wildland fires in Hungary can be divided in two main groups with different fire sizes and characteristics. A first group with small fires of less than 1 ha, a second group of more than 1 ha. The size of forest fires is normally below 50 ha, but some exceptions occurred in 2007.

In 2007 34% of fires were smaller than 1 ha (see Table 19), thanks to the fast detection and first intervention. These are normally low intensity surface fires, burning cured grass and thin branches of the understory. The average burnt area of these fires is 0.2 ha.

Most of the problems are with fires of 1 to 50 ha (64% of the fires in 2007). The average burnt area of this group is 5.9 ha. These are also surface

fires, but having higher intensity of the previous ones. They are mostly caused by negligence.

Table 19 – Size of forest fires in Hungary 2007

| <i>Size of forest fires</i> | <i>Forest fires</i>    |                         |
|-----------------------------|------------------------|-------------------------|
|                             | <i>Number of fires</i> | <i>Burned area (ha)</i> |
| <i>&lt; 1 ha</i>            | 206                    | 35                      |
| <i>1 – 50 ha</i>            | 386                    | 2 297                   |
| <i>50 – 100 ha</i>          | 6                      | 364                     |
| <i>100 – 500 ha</i>         | 5                      | 992                     |
| <i>&gt; 500 ha</i>          | 1                      | 949                     |
| <b>TOTAL</b>                | <b>603</b>             | <b>4 636</b>            |

Forest fires above 100 ha are very rare in Hungary. In 2007 there have been 6 fires like this, burning altogether 1 941 ha (1 119 ha of forest land and 822 ha of other land). Two of them were large crown fires and 4 were surface fires. In these fires pinewood, acacia and domestic poplar species were destroyed.

**Fire types** Ground fires are not frequent in Hungary (see Table 20). In 2007, 95% of forest fires were surface fires which burned 73% of the total burned area.

The crown fires were 23, burning 1 206 ha (average fire size 52.4 ha). Of these crown fires, 13 occurred in the county of Bács-Kiskun, 11 happening in the summer period (July-August). 73% of crown fires burnt mostly in pinewoods, in many cases spreading in broadleaf stands also.

Table 20. Type of forest fires in Hungary in 2007

| Type of forest fires | Forest fires    |                 |
|----------------------|-----------------|-----------------|
|                      | Number of fires | Burnt area (ha) |
| Ground fire          | 7               | 61              |
| Surface fire         | 573             | 3 370           |
| Crown fire           | 23              | 1 206           |
| <b>TOTAL</b>         | <b>603</b>      | <b>4 636</b>    |

The duration of most fires (95%) was 1 to 3 hours, with a maximum of 6 days. The small fires are generally extinguished within 1 hour.

**Fire causes** The fires were in 95% of cases human caused. Most fires started because of negligence, whereas only a small part of fires are caused by arsonists (Table 21). Typical causes are the incorrect extinguished fires of hikers, and the illicit agricultural fires (45% of fires). Natural causes are not relevant in Hungary. 39% of total burnt area is due to incorrectly extinguished fires.

There are a lot of fires with unknown causes, since in many cases the cause of a fire is not verifiable directly. The Hungarian fire brigades record the cause as unknown if the circumstances of the fire are indeterminate.

Table 21. Forest fire causes in 2007 in Hungary

| Cause of fire | Forest fires    |                 |
|---------------|-----------------|-----------------|
|               | Number of fires | Burnt area (ha) |
| Unknown       | 326             | 2 841           |
| Natural       | 6               | 9               |
| Negligence    | 240             | 1 669           |
| Arson         | 31              | 117             |
| <b>TOTAL</b>  | <b>603</b>      | <b>4 636</b>    |

**Fuel type** The fire brigades and the forest authority use the same data sheet for recording fire information. The comparability of the data and the uniformity in the data gathering system are ensured. The burnt area is classified in fuel types to model the biomass affected (Table 22).

Table 22. Type of fuels affected in Hungary in 2007

| Fuel model types  | Type of vegetation       | Total burnt area (ha) |
|-------------------|--------------------------|-----------------------|
| Other land        | Short grass              | 1054                  |
|                   | Tall grass               | 672                   |
| Forested land     | Broadleaf reforestation  | 205                   |
|                   | Coniferous reforestation | 104                   |
|                   | Broadleaf stands         | 770                   |
|                   | Coniferous stands        | 979                   |
| Other wooded land | Shrubland                | 836                   |
|                   | Juniperus                | 18                    |
| <b>TOTAL</b>      |                          | <b>4636</b>           |

The forest land burnt area in 2007 has been of 2 058 ha (44% of total burnt area). This means that during a fire event, the flames easily spread from the forest to affect other land types. In addition to the damaged forest stands (which were affected by all forest fires) 1 725 ha of grass land and 854 ha of other wooded land were burned.

Afforested and forest regeneration lands were affected for 417 ha; it was necessary to repeat the plantations in 150 hectares.

#### *Fire fighting means and information campaigns*

Fire prevention and fire fighting activities were presented very well by spokesmen of disaster management and forest authority and by media in the frame of awareness-rising campaigns during last fire season. Some media events such as press conferences, short reports and announcements in newspapers and on the radio and TV were organized.

A brand new forest fire prevention campaign symbol was worked out. Size and text of information boards have been standardized so that it can be installed onto excursion places, in forest areas and beside motorways.

Expert presentation and a demonstration about forest fire prevention and suppression were organised by SFS for fire and forest managers.

#### *Operations of mutual assistance*

The Fire Service of Budapest provided help to Greece in 2007. No significant accidents happened during the mission.

(Source: State Forest Service, Central Agricultural Office, Forestry Directorate, Hungary)

## 2.2.8. Latvia

### *Fire danger in the 2007 fire season*

The 2007 fire season was not a critical one from the point of view of fire danger. The majority of fires were in spring and early summer. Regular rains in late summer (July, August) reduced the chance of fire occurrence and thus the fire frequency.

### *Fire occurrence and affected surfaces*

Compared to the record number of forest fires in 2006 (1 929 fires), the 2007 fire season was quite smooth. The total number of forest fires was 425, with an average number of fires for the past 17 years of 867.

The total burned area was 272 ha against 3 387 ha in 2006. In 90 % of cases the fire was detected and extinguished before the burned area had reached 1 ha.

As usual, the highest number of forest fires was in the vicinity of the two Latvia's biggest cities – Riga and Daugavpils, respectively having 129 fires with 148 ha affected, and 128 fires with 26 ha.

The two larger fires of 2007 were also in the vicinity of Riga (40 ha and 31 ha).

In 2007 the State Forest Service introduced the forest fire database, which integrates GIS maps and allows displaying location and coordinates of places where fires occurred. It enables mapping the forest fires, thus making analyses easier.

The burnt area, number of fires and average fire size for the years 1993-2007 are shown in Figure 17.

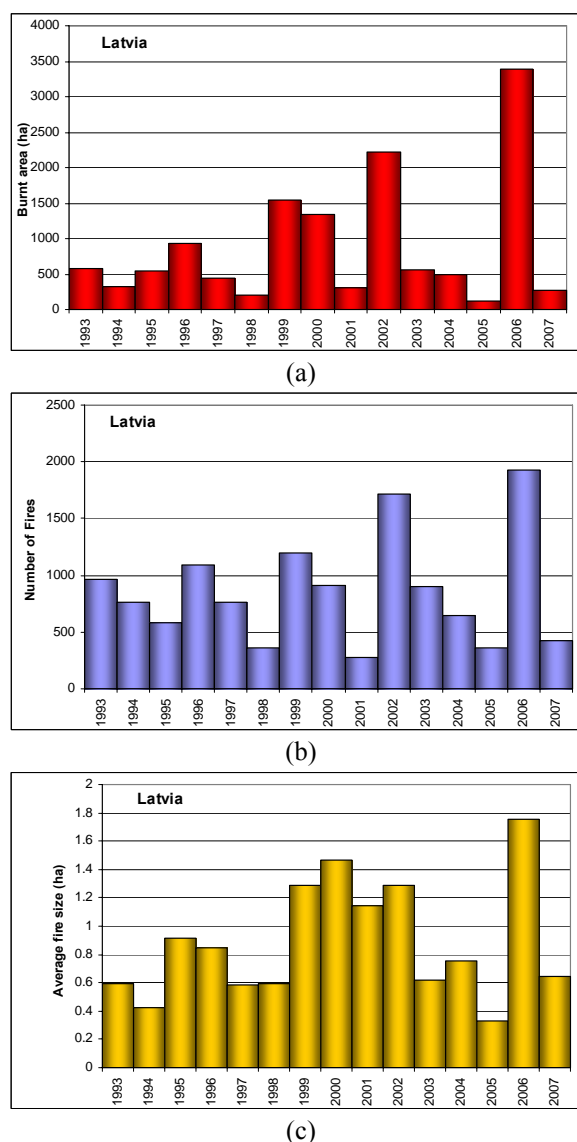
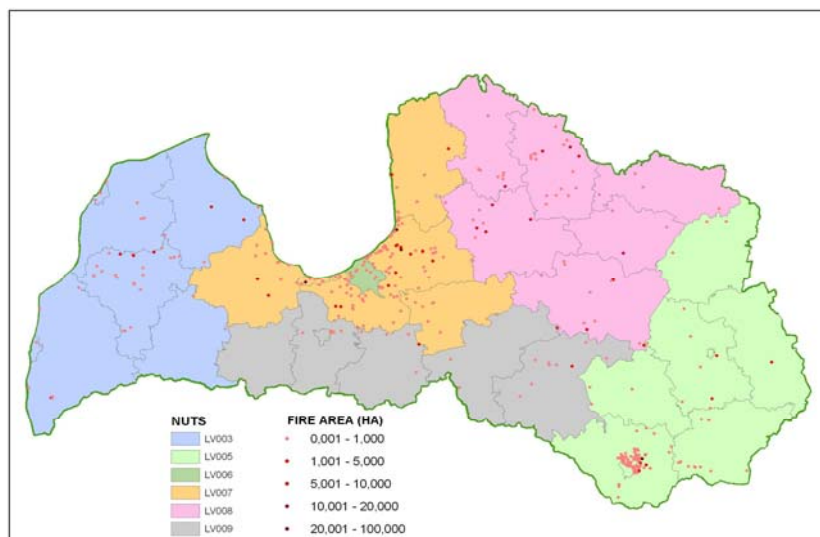


Figure 17. Burnt areas (a), number of fires (b) and average fire size (c) in Latvia from 1993 to 2007.

(Source: State Forest Service, Forest Fire Control Unit, Latvia)

Figure 18 – Map of forest fire locations in Latvia in 2007



### 2.2.9. Lithuania

In 2007, according to the data of the Directorate General of State Forests, 251 forest fires occurred and damaged 38 ha of forest. Compared with the previous 16 years, in 2007 both the number of fires and the burned forest area are at the minimum level recorded. The total damage was estimated to be 77 500 EUR. The average fire size was approximately 0.15 ha. The overall trends of number of fires, burnt area and average fire size from 1992 to 2007 in Lithuania are shown in Figure 19.

*(Source: Ministry of Environment, Forests Department, Lithuania)*

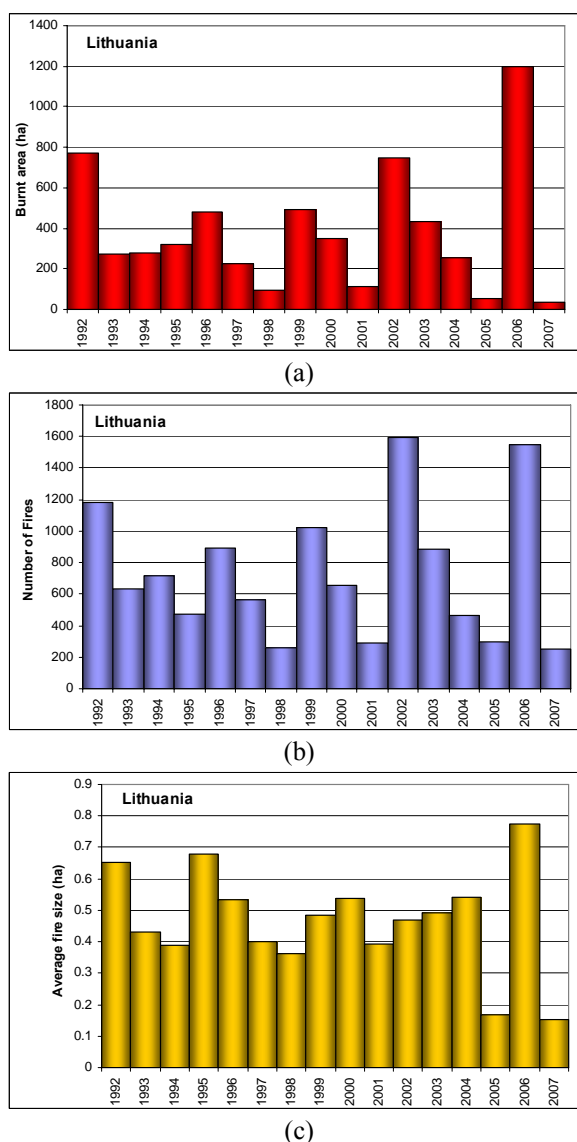


Figure 19. Burnt areas (a), number of fires (b) and average fire size (c) in Lithuania from 1992 to 2007.

## 2.2.10. Poland

### *Fire danger in the 2007 fire season*

Forest fire danger in 2007 has been generally lower than in previous years, mostly as a result of meteorological conditions that were not conducive to fires. April and May were exceptions. The diagrams in Figure 20 to Figure 23 depict values of air temperature, precipitation, pine litter humidity (*Pinus sylvestris* L.) and the national degree of forest fire danger risk (NDFFDR) in the 2007 fire season. The number of fires that occurred is marked as well.

The highest forest fire danger (that was also significantly higher than the multi-year period 2001-2005) occurred in April 2007 (NDFFDR = 2.3) and in May-June it was close to the multi-year period. The mean degree of forest fire danger risk for Poland (NDFFDR = 1.6) was close to the value referred to as “high risk” (corresponding to 2 in the forecast scale). In the remaining months, it was lower of about 0.2-0.3 in comparison with the previous year.

The share of occurrence of the third (highest) degree of forest fire danger risk for the fire season amounted to, on average, 24% and was slightly lower (2%) than the multi-year value. In April it reached 54%, i.e. it was twice as high as in the period 2001-2005; in May (35%) it was close to the multi-year average, but in September, it amounted to 1-2% only and in August it was 12-19% lower than in the multi-year period.

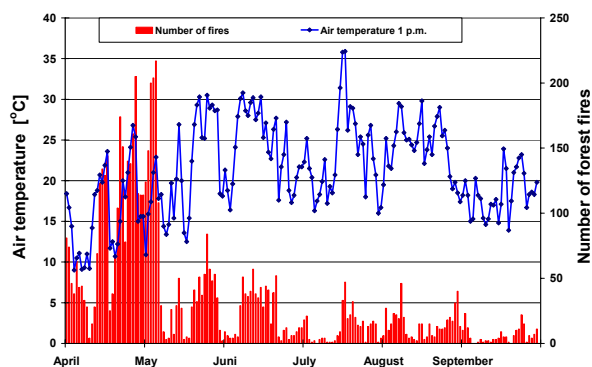


Figure 20. The air temperatures and numbers of forest fires in fire season 2007

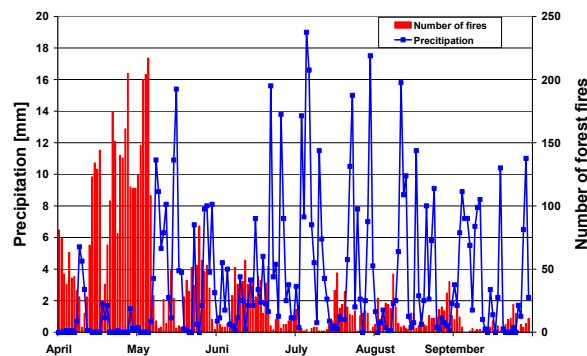


Figure 21. Precipitations and numbers of forest fires in fire season 2007

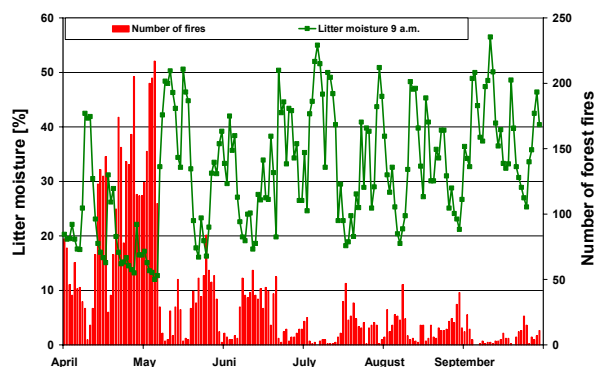


Figure 22. Litter moisture and numbers of forest fires in fire season 2007

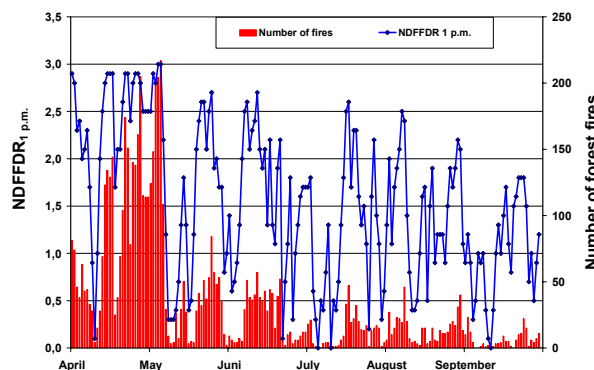


Figure 23. The National Degree of Forest Fire Danger Risk and numbers of forest fires in fire season 2007

### *Fire occurrence and affected surfaces*

In total, in 2007, there were 7 049 fires in Poland and an area burned of 2 455 ha (see Table 23 and Figure 24). The average area for one forest fire reached the lowest value ever (0.35 ha).



Table 23. Forest fire database for Poland in the period 1994-2007

| Year                                | Number of forest fires | Burned area [ha] | Forest fires average area [ha] |
|-------------------------------------|------------------------|------------------|--------------------------------|
| 1994                                | 10 710                 | 9 171            | 0,86                           |
| 1995                                | 7 681                  | 5 306            | 0,69                           |
| 1996                                | 7 924                  | 14 120           | 1,78                           |
| 1997                                | 6 818                  | 6 598            | 0,97                           |
| 1998                                | 6 166                  | 4 019            | 0,65                           |
| 1999                                | 9 820                  | 8 307            | 0,85                           |
| 2000                                | 12 428                 | 7 013            | 0,56                           |
| 2001                                | 4 480                  | 3 429            | 0,77                           |
| 2002                                | 10 101                 | 5 593            | 0,55                           |
| 2003                                | 17 088                 | 28 554           | 1,67                           |
| 2004                                | 7 219                  | 4 338            | 0,60                           |
| 2005                                | 12 803                 | 7 387            | 0,58                           |
| 2006                                | 11 828                 | 5 912            | 0,50                           |
| 2007                                | 7 049                  | 2 455            | 0,35                           |
| <b>Yearly Average in the Period</b> |                        |                  |                                |
| 1996-2000                           | 8 631                  | 8 011            | 0,93                           |
| 2001-2005                           | 10 338                 | 9 860            | 0,95                           |

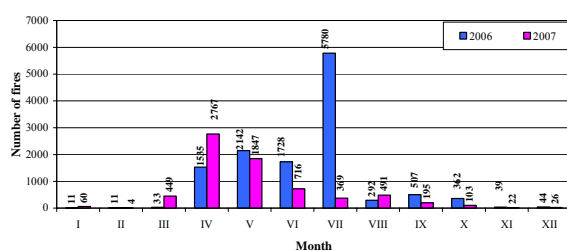


Figure 24. Distribution of number of forest fires by months in 2006 and 2007 in Poland

The month with the highest number of fires was April (39% of fires, i.e. 2 767); in that month, the number of fires was 31% higher than in the period 2001-2005. In terms of number of fires, next months were May (26%) and June (10%). The lowest number of fires in the fire season occurred in September (3%, i.e. 195), that is, almost 6 times less than the average in the multi-year period (see Figure 24).

The share of the total number of fires in early Spring (April-May) was 65%, clearly higher than in the previous year (26%) and in the multi-year average (38%) for the period 2001-2005. Of all the fires occurred, 90% were in the fire season, i.e. more than in the previous year (85%) and in the multi-year period (81%).

In 2007, the highest number of fires (19%), i.e. 5% less than in 2006, occurred in the Mazowieckie Voivodeship (1 327) and in the Silesian Voivodeship (821). More than 400 fires occurred in the Lubuskie (622), Dolnośląskie (577), Świętokrzyskie (542) and Podkarpackie

(448) Voivodeship. The lowest number of forest fires occurred in the Opolskie (133) and Warmińsko-Mazurskie Voivodeship (142). The largest areas of burnt forests were reported in the Mazowieckie (370 ha) Podkarpackie (369 ha) and Silesian (367 ha) Voivodeship, i.e. 15% of the total area each, as well as in the Świętokrzyskie (262 ha) and Dolnośląskie (242 ha) Voivodeship. The smallest areas were located in the Warmińsko-Mazurskie (24 ha), Kujawsko-Pomorskie (45 ha) and Opolskie (47 ha) Voivodeship. These data are depicted in the map of Figure 25

Small forest fires, i.e. fires smaller than 1 ha, accounted for 90% of all forest fires in 2007 (see Figure 26).

The main cause of forest fires was man-made activities, arsons accounted for almost half of the cases, carelessness for 41%, unknown for almost 10% (Figure 27).

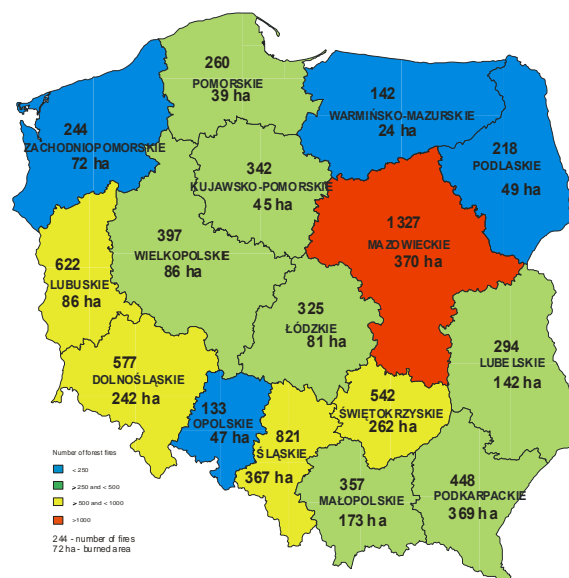


Figure 25. Number of forest fires and burned areas by provinces of Poland in 2007

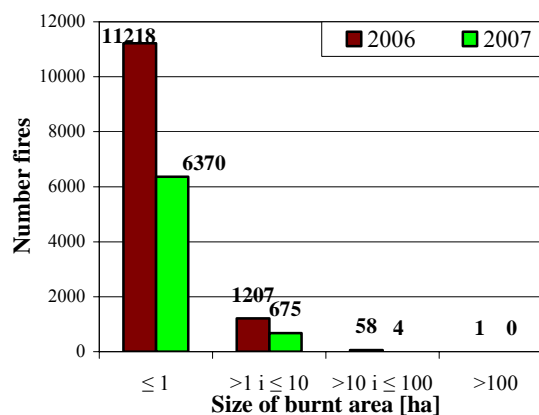


Figure 26. Distribution of number of forest fires by size of burnt area in year 2006 and 2007 in Poland



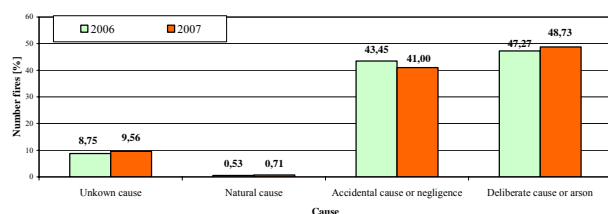


Figure 27. Distribution of number of forest fires by causes in 2006 and 2007 in Poland

The burnt area, number of fires and average fire size for the years 1993-2007 are shown in Figure 28.

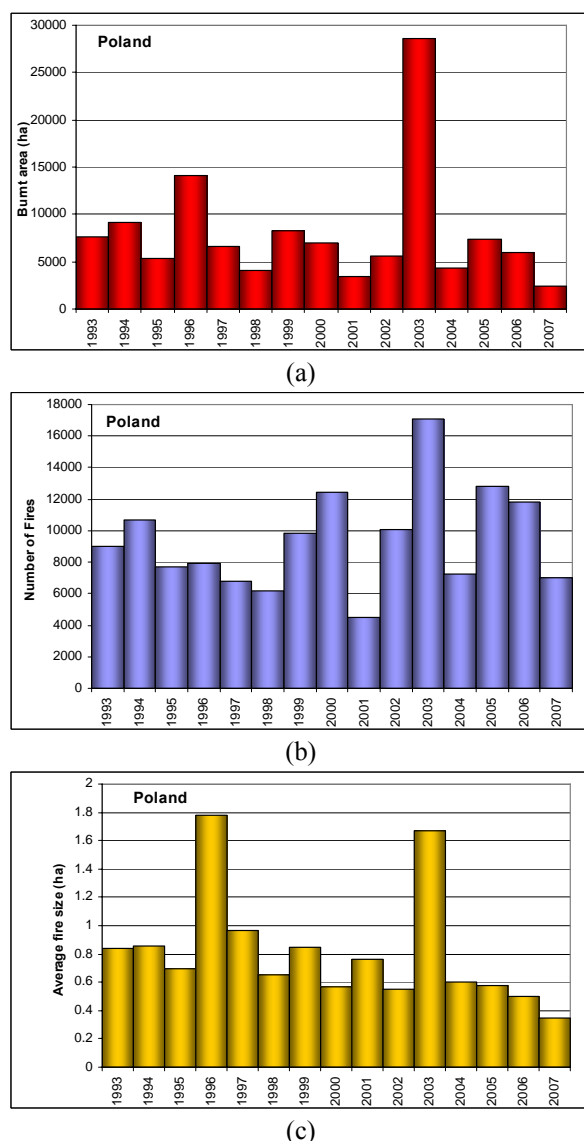


Figure 28. Burnt areas (a), number of fires (b) and average fire size (c) in Poland from 1993 to 2007.

The amount of losses caused by forest fires in individual years during the period 1994–2007 is reported in Table 24. According to this information, total losses in the analyzed period

amounted to ca. € 155 million<sup>1</sup>. These losses are quite differentiated from year to year ranging from ca. € 4 million in 2001 to € 31 million in 2003. In 2007 losses amounted to ca. € 6 million and were lower by half than the multi-year averages and of losses in 2006. The calculated average value of 1 ha of forest in Poland is € 9 804. The value of forests (high forest) only in the area affected by fires in the years 2006 and 2007 amounted to € 53 million and € 22 million respectively; the estimated value of direct losses corresponded to 23% and 27% of such values.

Table 24. Losses caused by forest fires in the period 1994-2007

| Year                                | Losses Caused by Forest Fires [thousand € <sup>1</sup> ] |
|-------------------------------------|--|
| 1994                                | 10 827   |
| 1995                                | 8 206  |
| 1996                                | 16 701   |
| 1997                                | 10 121   |
| 1998                                | 6 589  |
| 1999                                | 13 938   |
| 2000                                | 9 894  |
| 2001                                | 4 206  |
| 2002                                | 6 016  |
| 2003                                | 30 969   |
| 2004                                | 3 840  |
| 2005                                | 15 167   |
| 2006                                | 12 595   |
| 2007                                | 5 993  |
| 1994-2007                           | 155 062  |
| 1996-2000                           | 57 242   |
| 2001-2005                           | 60 198   |
| <i>Yearly Average in the Period</i> |  |
| 1996-2000                           | 11 449   |
| 2001-2005                           | 12 040   |

On the basis of the amount of plant biomass per area unit that was burnt in the forests and in undeveloped lands, the amount of carbon dioxide (CO<sub>2</sub>) that was emitted during the fires was calculated. In the calculations, the type of fire and amount of plant biomass burnt were taken into account, assuming the value of 82 t/ha (soil cover fire and ground fire) for forests, 94 t/ha (total fires) and 55 t/ha for undeveloped lands. Detailed information can be found in Table 25, differentiated by year. In total, in the period 1994-2007, as a result of fires, 12.5 million tons of CO<sub>2</sub>

<sup>1</sup> € 1 = PLN 3.4518 according to the exchange rate of 2<sup>nd</sup> May, 2008.

were emitted (ranging on a yearly basis from ca. 0.6 million tons in 1995 to ca. 3.2 million tons in 2003. In 2007, ca. 0.3 million tons of CO<sub>2</sub> were emitted, which was the lowest value, corresponding to 1/3 of the multi-year averages (ca. 0.9 million tons). Apart from that, ca. 26 000 tons of carbon monoxide, 10 000 tons of solid and liquid particles (fumes) and 2 000 tons of hydrocarbons were estimated to have been emitted into the atmosphere.

Table 25. The quantities of CO<sub>2</sub> [thousand ton] emitted as result of forest fires in the period 1994-2007

| <i>Period</i>          | <i>CO<sub>2</sub> [thousand tons] emitted from forest fires</i> |
|------------------------|---|
| 1994                   | 1 016   |
| 1995                   | 574   |
| 1996                   | 1 547   |
| 1997                   | 724   |
| 1998                   | 440   |
| 1999                   | 939   |
| 2000                   | 784   |
| 2001                   | 383   |
| 2002                   | 625   |
| 2003                   | 3 216   |
| 2004                   | 481   |
| 2005                   | 819   |
| 2006                   | 655   |
| 2007                   | 272   |
| <i>Total 1994-2007</i> | 12 475  |
| <i>Yearly Average</i>  | 891   |
| <i>Total 1996-2000</i> | 4 434   |
| <i>Yearly Average</i>  | 887   |
| <i>Total 2001-2005</i> | 5 524   |
| <i>Yearly Average</i>  | 1 105   |

#### *Fire fighting means and information campaigns*

In 2007, like in the previous years, various types of actions were undertaken, which focused on disseminating the principles of proper behaviour in the forest, as well as on safety rules in performing manual jobs near the forests. These activities were conducted in many communities, especially among young people and farmers, and with the use of various media. For instance, more than 10.5 thousands lectures were given in schools, at summer camps and meetings, there were about 600 interviews on the radio and TV, more than 500 articles were published in the press, almost 9 700 information tables took place, and more than 164 000 of various propaganda materials (posters, folders, calendars, leaflets, etc.) were distributed.

In forest areas, within the framework of preventive actions, work was carried out in order to limit forest fires propagation. Within the context of these activities, 80 km of new fuel-breaks were made, 9 584 km of fuel-breaks were renewed and flammable materials were removed from 35 485 ha of forest areas.

In 2007, the forest observation system consisted of:

- 640 ground observation posts, including 175 TV observation posts,
- 10 patrol planes, 28 fire fighting planes and 9 helicopters.

The effectiveness of fire detection was as follows:

- observation posts detected 43% of the overall number of forest fires that occurred last year;
- fire patrols and employees of the State Forests: 11%;
- planes and helicopters: 3% of the total number of fires;
- Civilians: 43%.

The emergency communications network has undergone a significant improvement, thanks to which it is now possible to quickly inform the State Fire Service units of detected forest fires. In total 8 131 radiotelephones were available, including 1 290 base ones, 3 276 portable ones and 3 565 walkie talkies.

In 2007, in order to improve the capacity of quick fire suppression, 111 new water pick up points for fire fighting purposes were made. There were 17 387 water pick up points in forest areas.

There were available, among others:

- 340 light fire trucks (including 334 patrol vehicles with a fire suppression unit),
- 25 medium and heavy trucks,
- 275 fire engines, including 183 amphibious vehicles.

In 2007, the State Forests units suppressed unaided 9% of the total number of fires. The remaining fires were suppressed with support provided by voluntary fire brigades and units of the State Fire Service. Planes and helicopters participated in 702 fire fighting actions, making 2 788 drops of fire fighting agents. In 2007, the total cost of fire protection amounted to € 19 280 thousand (in 2006: € 18 110 thousand).

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

### 2.2.11. Slovenia

In 2007, there were 140 forest fires resulting in 127.82 ha of burned area. Most of the fires (112) were below 1 ha. 68.42 ha of the burned areas were wooded.

The burnt area, number of fires and average fire size for the years 2002-2007 are shown in Figure 29.

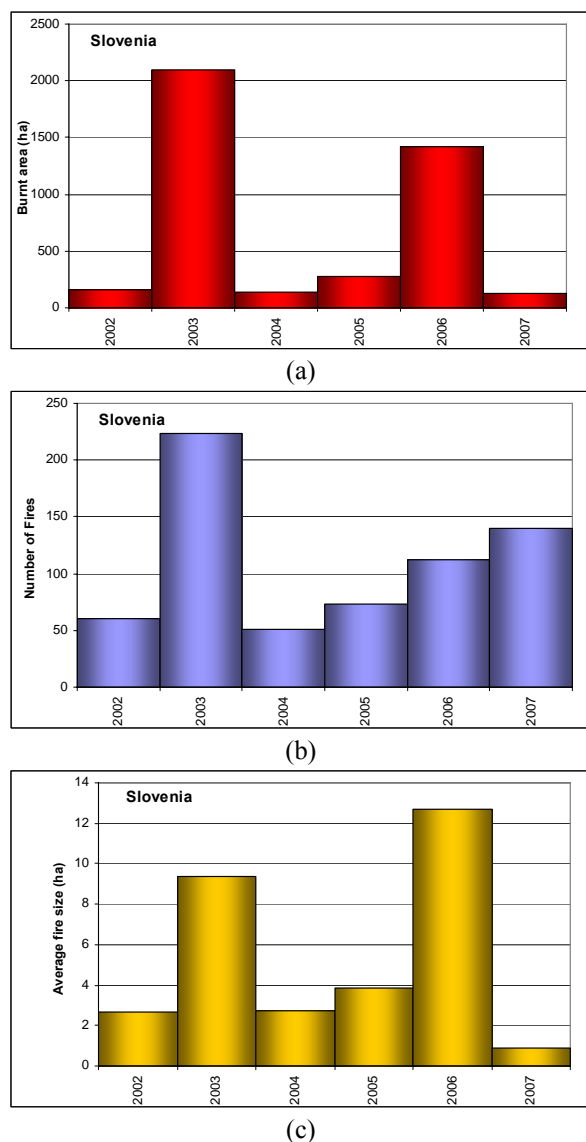


Figure 29. Burnt areas (a), number of fires (b) and average fire size (c) in Slovenia from 2002 to 2007.

(Source: Slovenia Forest Service).

### 2.2.12. Sweden

#### Fire danger in the 2007 fire season

The fire danger was in general rather low. Only at the beginning of the summer in some parts of the country it was relatively dry.

#### Fire occurrence and affected surfaces

During 2007 the number of fires recorded were 3 737, burning 312 ha of forest land, 255 ha of other wooded land and 523 ha of other land.

The biggest fire was recorded on 4<sup>th</sup> of May 2007 in the Ljungby municipality. In this event 100 ha were burned, of which 40 ha of forest.

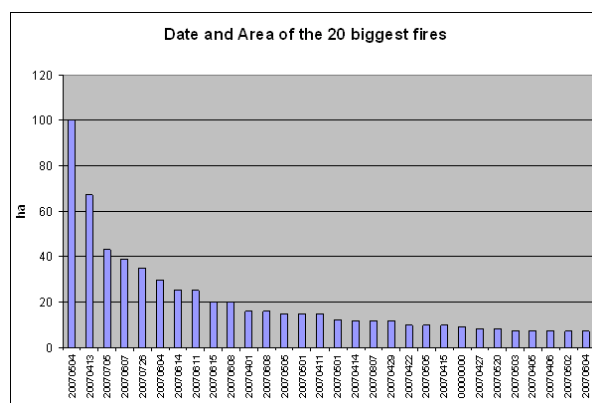


Figure 30. Larger fires in 2007 in Sweden

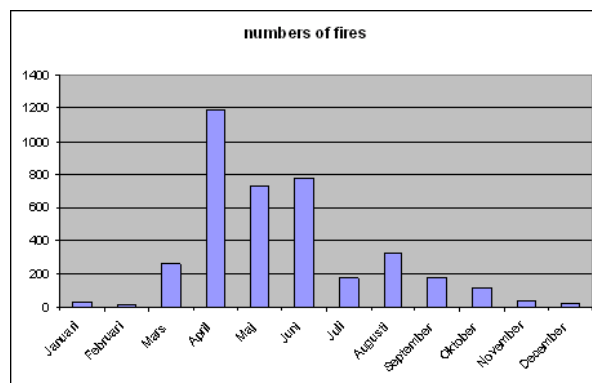


Figure 31. Fire frequency by month in 2007

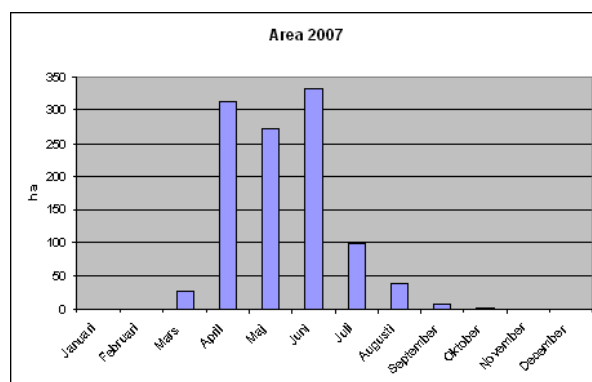


Figure 32. Burnt area by month in 2007

Figure 33 shows trends in the number of fires and burnt areas in Sweden from 1996 to 2007.

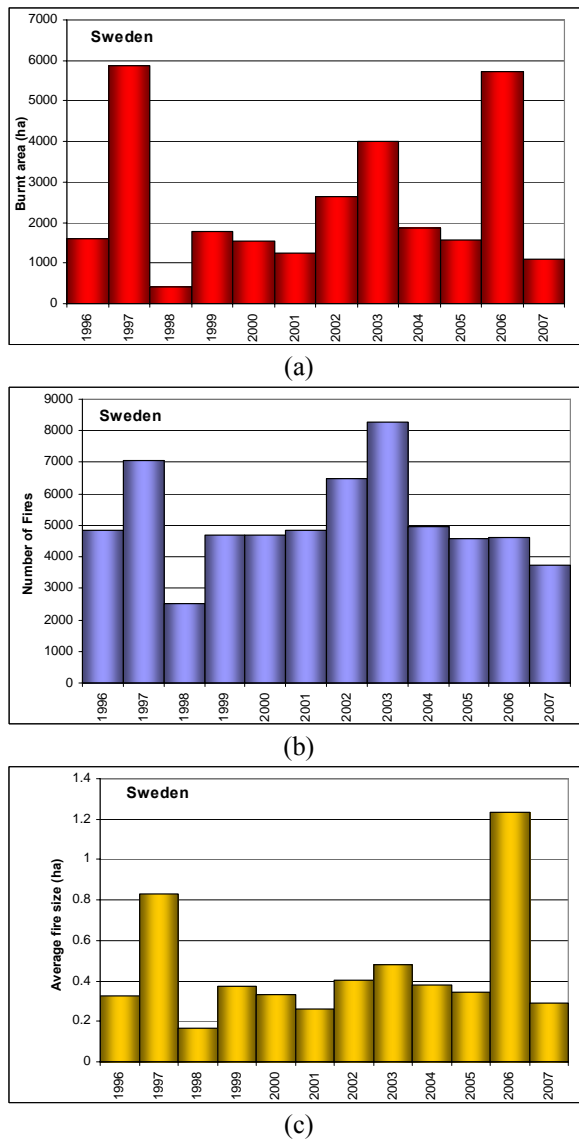


Figure 33. Burnt areas (a), number of fires (b) and average fire size (c) in Sweden from 1996 to 2007.

### *Operations of mutual assistance*

Sweden supported Albanian and Macedonian with equipment. Moreover 1 helicopter and 2 people were sent to Greece during the extreme conditions of the 2007 fire season.

*(Source: Swedish Rescue Services SRSA, Sweden).*

## 2.3. EU Candidate Countries

### 2.3.1. Croatia

In the last 15 years all preparedness, prevention and operation activities have been based upon the Governmental Program of activities and special measures for the protection against forest fires of the Republic of Croatia. Responsible agency for coordinating all activities based on the mentioned program is the National Protection and Rescue Directorate.

#### *Fire danger in the 2007 fire season*

According to the weather situation the fire season started on June 20<sup>th</sup> and finished on September 10<sup>th</sup>. In this period the average value of FWI has been higher than 20. Between July 20<sup>th</sup> and August 8<sup>th</sup> the value of FWI was higher than 40

(average value for litoral and karsts region). In this three weeks period there were approximately 60-90 fires/day.

#### *Fire occurrence and affected surfaces*

During the entire 2007 there were 5 176 wildfires affecting 63 719 ha of which 19 687 of forest and other wooded land.

In the four months of summer (June-September) there were 1 493 wildland fires that burned 22 953 ha.

It is important to note that 14 fires started in the neighbouring countries Bosnia and Herzegovina (affecting 8 400 ha in Croatia) and one in Montenegro (affecting 555 ha in Croatia).

In Figure 34 the daily number of fires versus FWI values is shown for the months August – September.

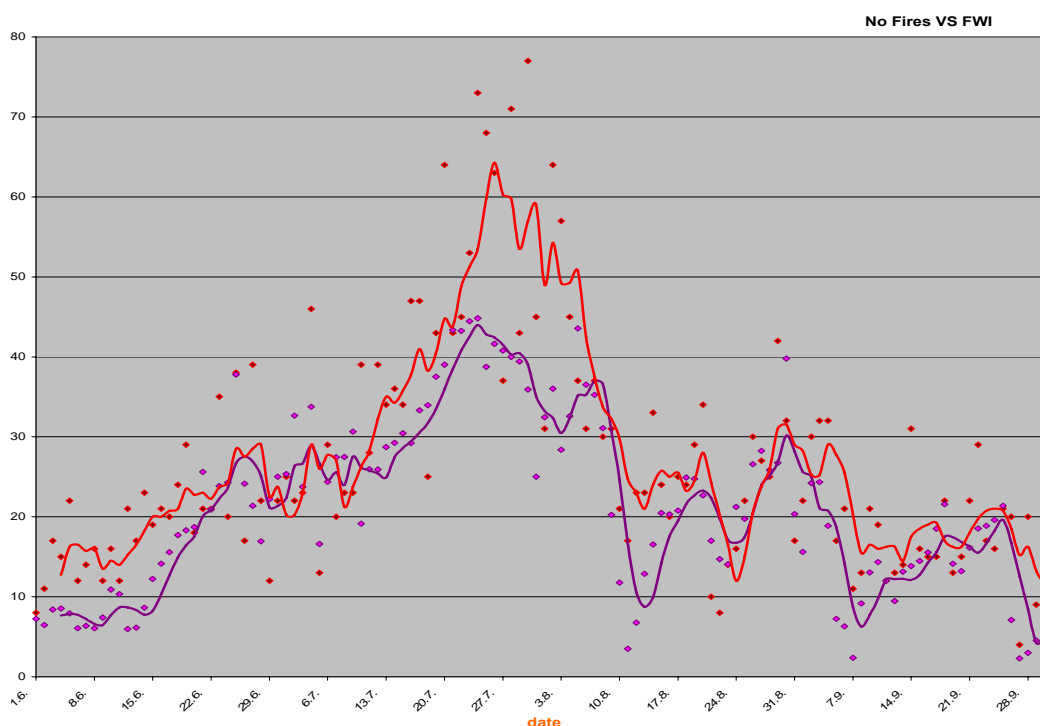


Figure 34 – Number of fires and FWI values during the summer 2007 in Croatia (in red are the daily number of fires– dots and trend line – in violet are the FWI values – daily values and trend line).

#### *Fire fighting means and information campaigns*

For the fire season 2007 in operational function there were:

- 4 CL 415
- 4 helicopters (MI-8) for transport and suppression
- 1 Bell 206 for surveillance

- 1 AT 802F for patrolling and initial attack

In the Croatian coast during the season there are between 3500 and 5200 fire fighters operating for fire suppression (local units 60%, unit from Inland 35%, other 5%).

### *Injuries and loss of human lives*

None of local habitants or tourists lost they lives during the season.

On August 30<sup>th</sup> in the Island of Kornat, 12 fire fighters died and 1 fireman was heavily injured. The investigation is not finished yet. In total during 2007, 3 fire fighters were heavily injured, 13 lost their lives.

### *Operations of mutual assistance*

During the 2007 fire campaign Croatia assisted:

- Greece (one time with one Canadair),
- Macedonia (one time with one Canadair)
- Bosnia and Herzegovina (two times with two Canadair; three times with fireman units) – following the request of Bosnian Government.

To protect the Croatian territory, according to the bilateral agreement with Bosnia and Herzegovina, Croatian forces intervned for fire suppression of cross boarding fires few times during the campaign in the 2007 season, without the demand of neighbouring Governments.

The burnt area, number of fires and average fire size for the years 2000-2007 in Croatia are shown in Figure 35.

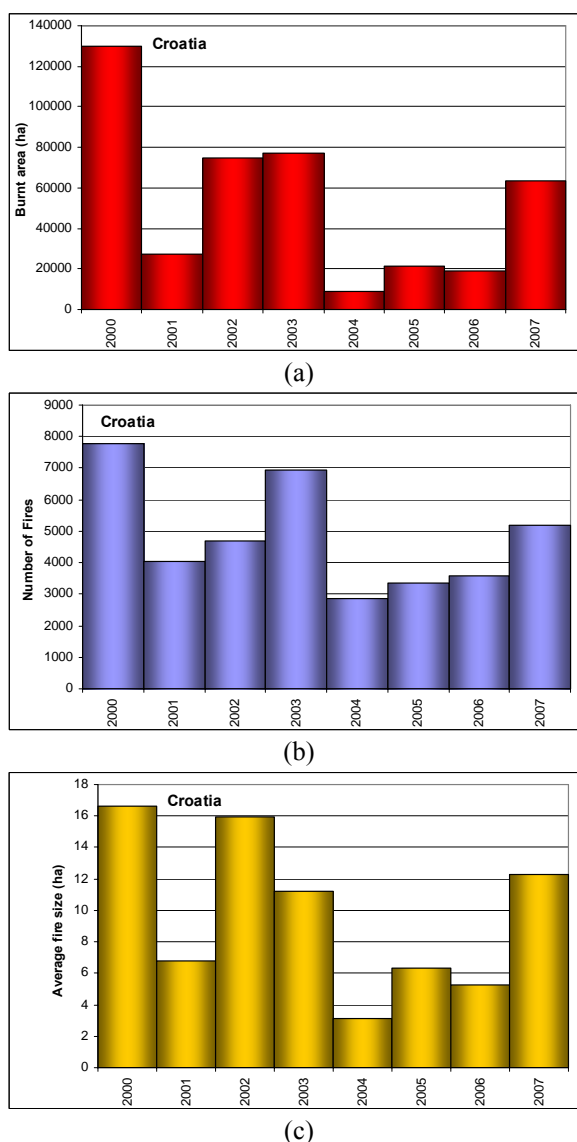


Figure 35. Burnt areas (a), number of fires (b) and average fire size (c) in Croatia from 2000 to 2007.

*(Source: National Protection and Rescue Directorate, Fire Service, Croatia)*

### 2.3.2. Turkey

#### *Fire danger in the 2007 fire season*

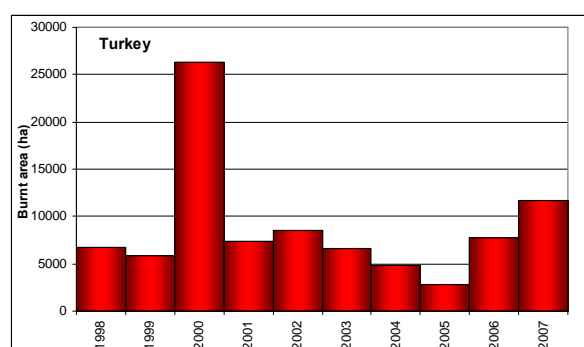
The forest fires danger has been at high level during the period June to October.

#### *Fire occurrence and affected surfaces*

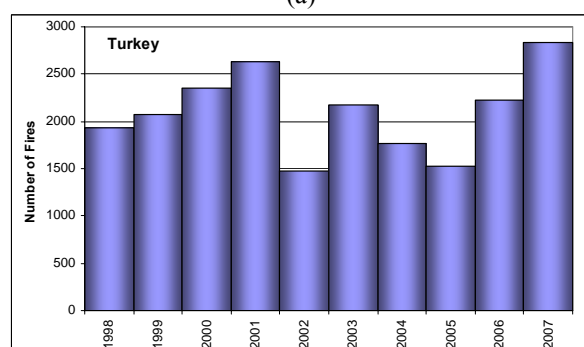
In Turkey 2 829 forest fires occurred in 2007 burning a total area of 11 664 ha, of which 7 827 ha of forest land.

In terms of large fires, 2 events were larger than 500 ha and 24 events between 100 and 500 ha.

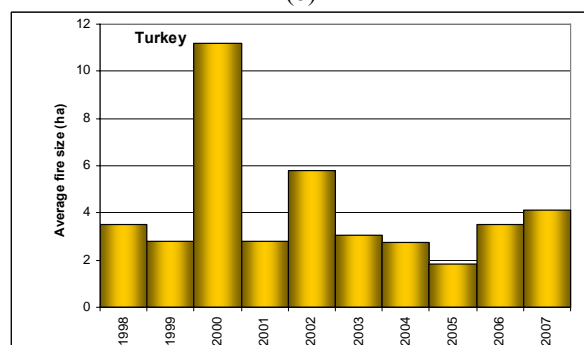
The burnt area, number of fires and average fire size for the years 1998-2007 are shown in Figure 36.



(a)



(b)



(c)

Figure 36. Burnt areas (a), number of fires (b) and average fire size (c) in Turkey from 1998 to 2007.

#### *Fire fighting means and information campaigns*

The following equipments were used for fire fighting: 818 fire trucks, 152 bulldozers, 143 water tanks, 128 graders, 111 trailers, 32 water tankers, 53 caravans, 366 vehicles, 717 motorcycles, 23 leased helicopters, 6 administration helicopters, 15 airplanes Dromader, 5 CL-215 Canadair.

Education and awareness raising campaigns have been carried out to increase the consideration for forest fires and particularly with the aim of:

- Making people aware about the problem of forest fires.
- Training the forest fire fighting teams.
- Training the technical personnel.

#### *Injuries and loss of human lives*

During the 2007 fire season 4 people lost their lives.

#### *Operations of mutual assistance*

The following support was given in 2007:

- 4 helicopters, 33 fire trucks, 8 bulldozers, 100 fire fighters and 13 technical personnel sent to Syria.
- 1 helicopter and 1 CL-215 Canadair sent to Macedonia.
- 1 CL-215 Canadair sent to Greece.

(Source: Ministry of Environment and Forestry, Forest Fire Prevention Department, Turkey)

## 2.4. Other European Countries

### 2.4.1. Switzerland

Systematic forest fire data in Switzerland are currently available for 4 cantons only (Grisons, Uri, Valais and Ticino) covering the most fire prone areas of the Country (the Alps and the southern slopes of the Alps).

In 2007 a total of 39 forest fires were recorded in this area, burning 281.6 hectares. The number of fires was the lowest since 1980. The extent of the total burnt area is mainly due to 2 fires of 61 ha and 175 ha respectively, the rest of the fires being in most cases below 1 ha (median of 0.5 ha).

Most of the fires (74%) happened during the winter season (November to April), when also most of the surface (99.5%) was burnt.

An extension of the fire database of Switzerland is currently under development and starting from 2008 it is expected to provide fire data for the whole country.

The burnt area, number of fires and average fire size for the years 1980-2007 in Switzerland are shown in Figure 37.

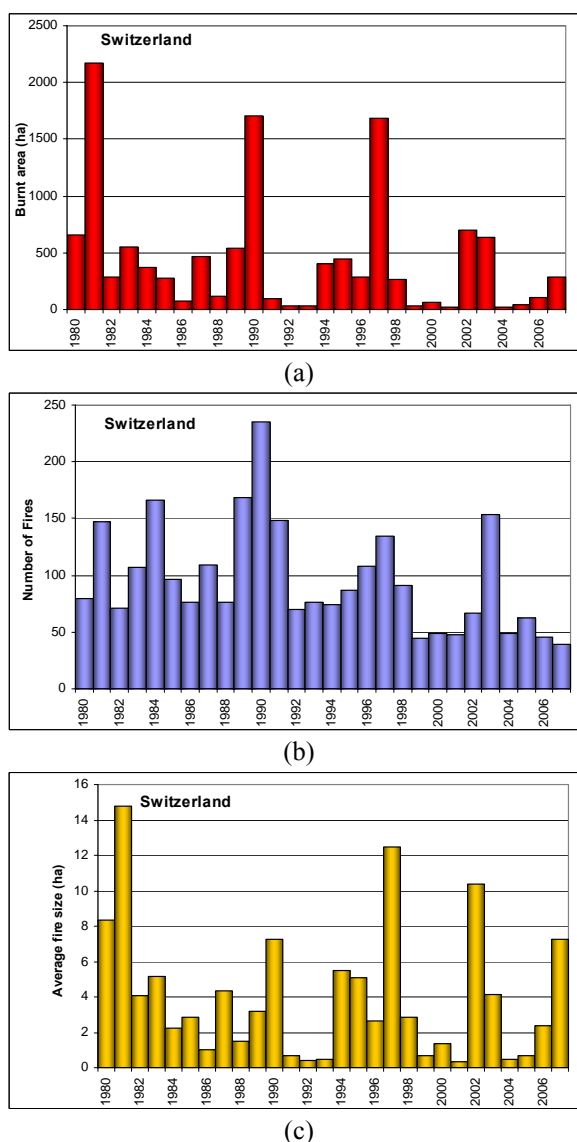


Figure 37. Burnt areas (a), number of fires (b) and average fire size (c) in Switzerland from 1980 to 2007.

*(Source: Swiss Federal Institute for Forest, Snow and Landscape Research - WSL, Switzerland)*



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

In 1997 the European Commission set up a research group to work specifically on the development and implementation of advanced methods for the evaluation of forest fire risk and for the estimation of burnt areas in the European Union. This group is currently working as part of the Institute for Environment and Sustainability of the European Commission 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. The module forecasts forest fire danger in Europe on the basis of the Canadian Fire Weather Index (FWI), allowing a harmonized evaluation of the forest fire danger situation during the year. Since 2002 the danger assessment is performed for an extended period of six months and since 2005 for a period of 9 months. Therefore, also in 2007, EFFIS Danger Forecast started to evaluate forest fire danger on 1 February 2007, and ended on 31 October 2007. Forest fire danger maps were computed and broadcast to the relevant services in the Member States and the European Commission.

The JRC evaluates the annual damage caused by forest fires in Europe using the EFFIS Rapid Damage Assessment module. The evaluation focuses mainly on Southern Europe and is based on the analysis of satellite imagery and

geographic information. Since 2000 cartography of all the burned areas larger than 50 ha is produced every year through the processing of satellite imagery. The areas affected by fires of at least 50 ha correspond, on average, to 75% of the area burnt in Europe each year. Further to the mapping of burnt areas, the analysis of which types of land cover classes were affected by fires is performed. All the information is stored in a module referred to as the EFFIS Rapid Damage Assessment that replaced the old EFFIS Damage Assessment from 2004 onwards. This module uses MODIS satellite imagery with a ground spatial resolution of about 250 meters. Although initially it was meant to map fires of at least 100 ha it was realized that even fires of 50 ha could be mapped with this system. For this reason EFFIS Damage Assessment was replaced by EFFIS Rapid Damage Assessment since 2005. With this system the evaluation of damages is performed weekly, newsletters are published at least twice during the fire campaign and the final results are included in the yearly report.

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

#### 3.1. EFFIS DANGER FORECAST: 2007 RESULTS

The EFFIS Danger Forecast was developed to support the Commission's Directorate-General for the Environment and the forest fire-fighting services in the EU Member States. Since 2002, at the request of the Member States, operation of the EFFIS Danger Forecast has been extended to six months starting on 1 May and ending on 31 October and in 2006 to nine months, from 1 February to 31 October.

In this chapter the fire danger trends assessed by EFFIS in the different countries during the fire season 2007 are presented, comparing them with previous years.

**In the Mediterranean region** of Europe at the end of April and in the first two weeks of May some high picks were recorded in Cyprus and Greece. In the second half of May the fire danger level was in most of the countries quite low.

The build up of the fire season started slowly in June, with constant increase of the fire danger level in the Southeastern sectors. During July, and especially during the second half of the month, in Cyprus, Greece, Central and Southern Italy, Bulgaria, Croatia, Turkey quite severe fire weather conditions were met with consequent very high fire danger level and picks of fire activity.

The Eastern sectors of the Mediterranean region, and particularly Southern Italy and Greece were again heavily affected during the second half of August, reaching towards the end of the month extreme fire weather conditions that resulted in highly catastrophic events for the areas.

In September the conditions returned gradually to normality, though Cyprus was still faced with very high danger conditions in the first half of the month, while in Southern France the danger conditions remained high during most of the month.

**In Central and Northern EU regions** during the month of April and the first week of May in Northern Europe the fire danger increased unusually, reaching a moderate level in Hungary. A similar condition was again reported in Hungary towards the end of June and even more during the month of July when fire weather conditions were quite high. During the month of July the rest of the countries in Central and Northern Europe were in low fire danger condition, which continued during the months of August and September.

Through the Danger Forecast module of EFFIS the situation has been continuously monitored and the risk level analyzed and mapped.

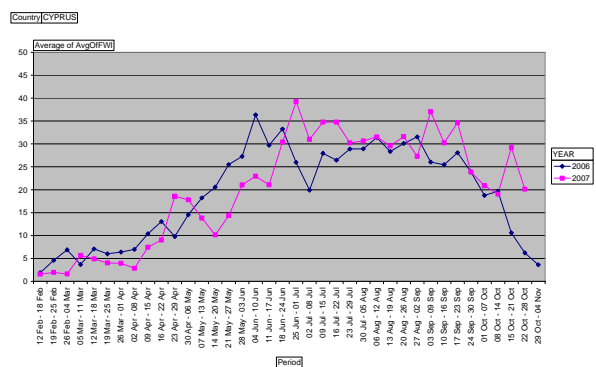
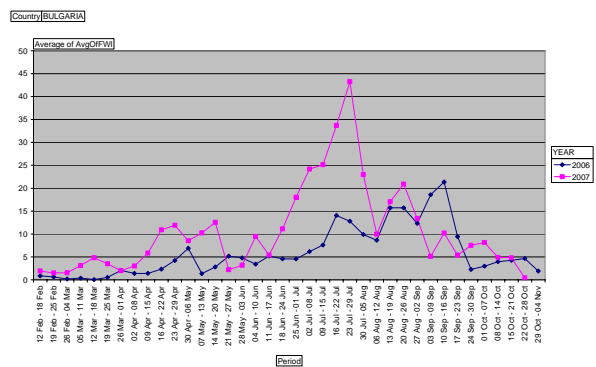
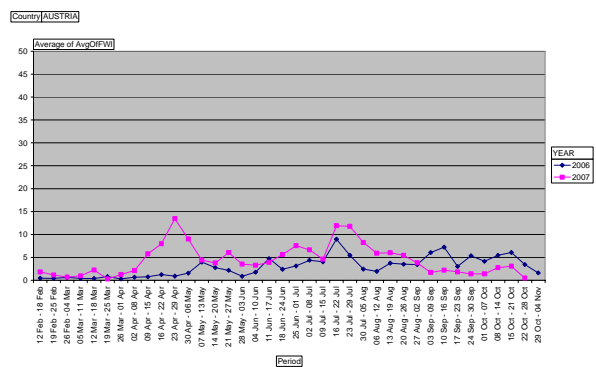
The following figures show fire danger through 2007 as determined by the average FWI values assessed during the fire season in the individual countries.

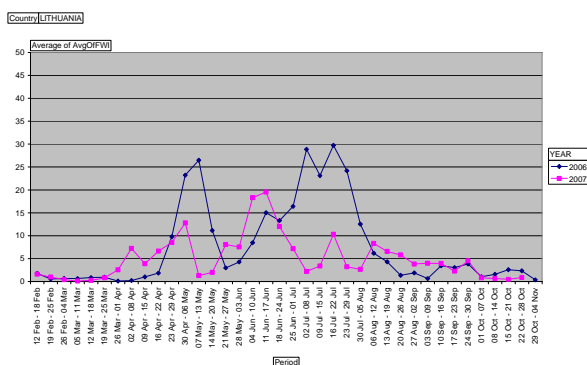
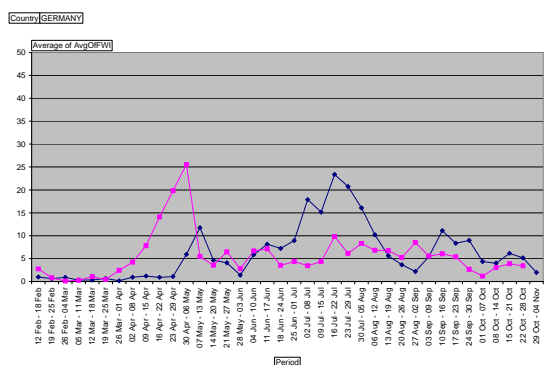
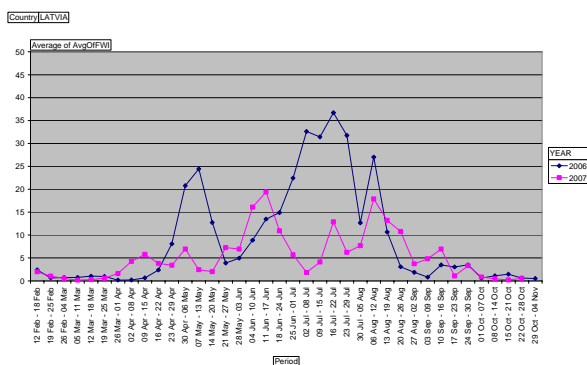
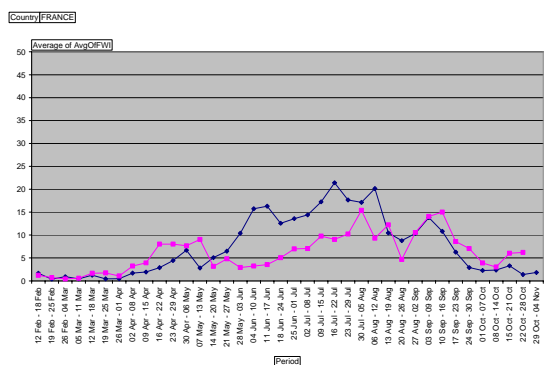
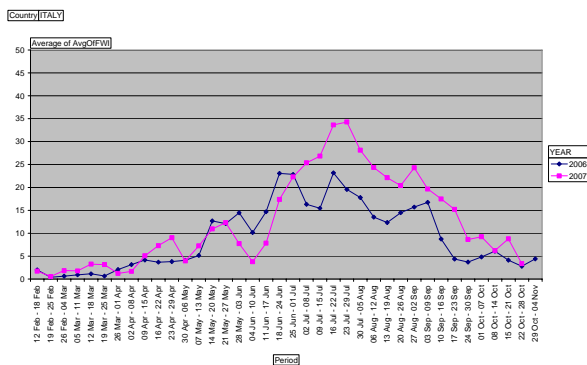
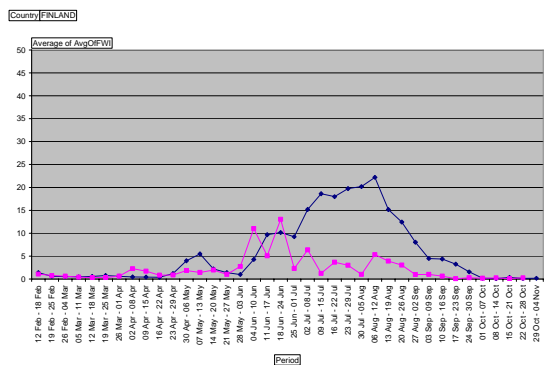
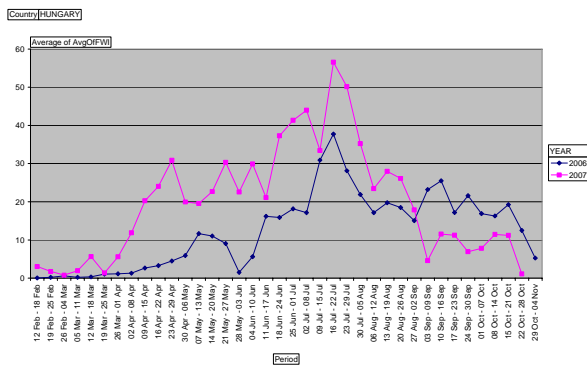
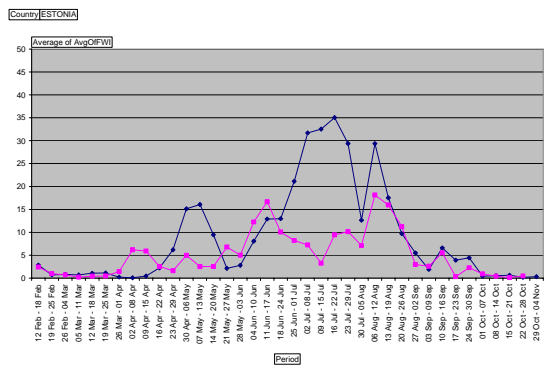
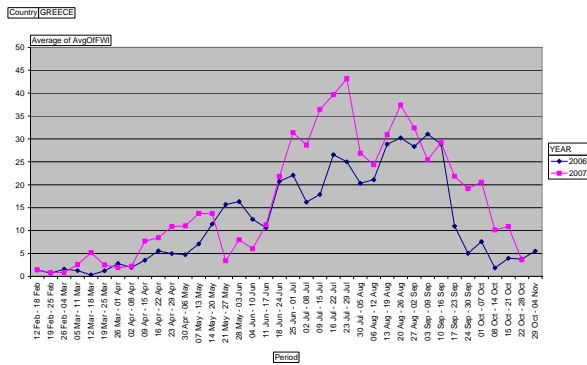
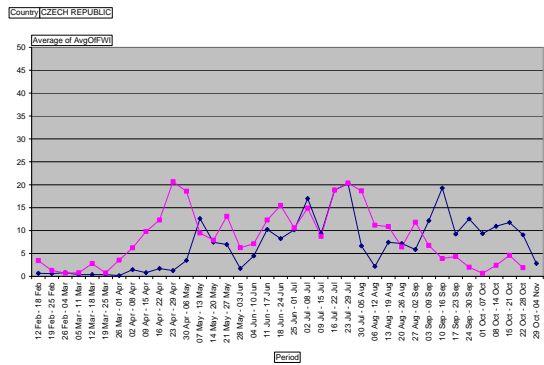
The graphs show the weekly averages of FWI over entire countries, therefore local peaks might have been flattened, especially in those countries such as France or Italy, where there are strong differences in fire danger level with changing latitudes; nevertheless the general trend is depicted providing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

*It is important to note that the algorithms and the input data to compute the daily FWI values have been modified, to better reflect the variety of conditions found in Europe as compared to Canada where the index was originally*

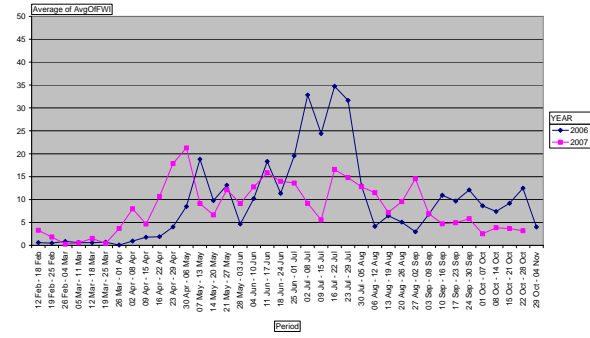
*developed. Therefore the historical series of FWI values has been also recalculated and the fire danger levels revised. For this reasons the curves presented in this report cannot be directly compared with the ones issued in previous years. To allow a better comparison with past seasons, the curves of 2006 is presented in conjunction with 2007 for all countries*

The countries analyzed are those participating to the EFFIS network and are shown in alphabetic order in the graphs that follow.

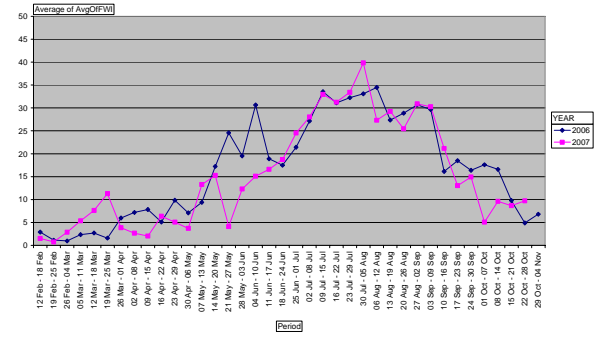




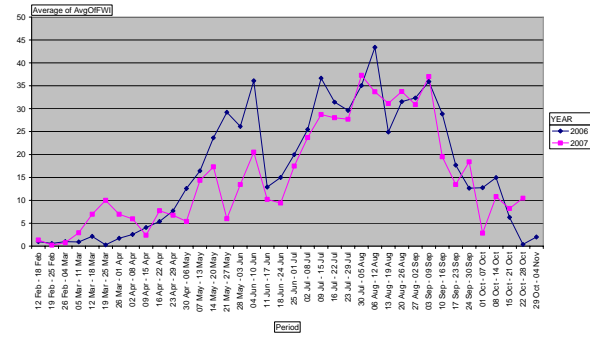
Country: POLAND



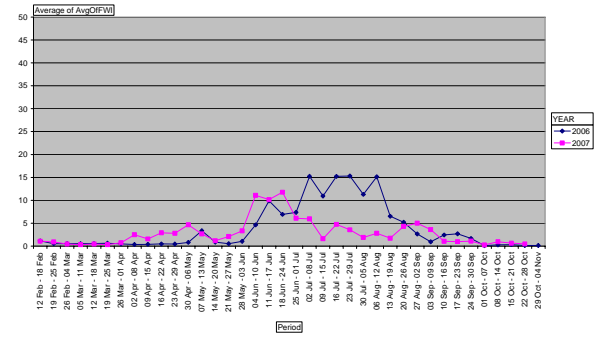
Country: SPAIN



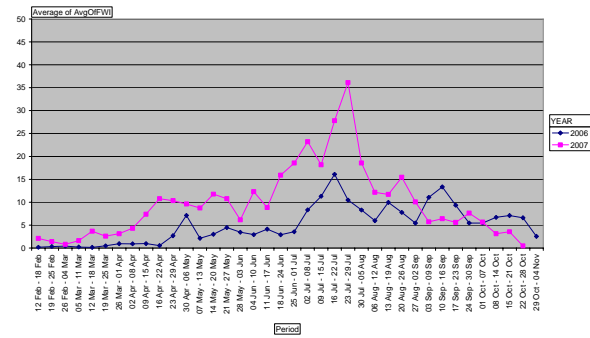
Country: PORTUGAL



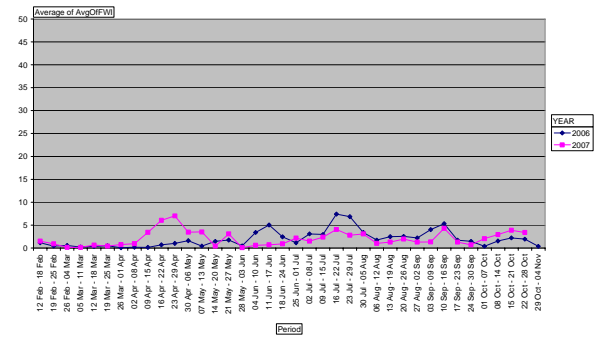
Country: SWEDEN



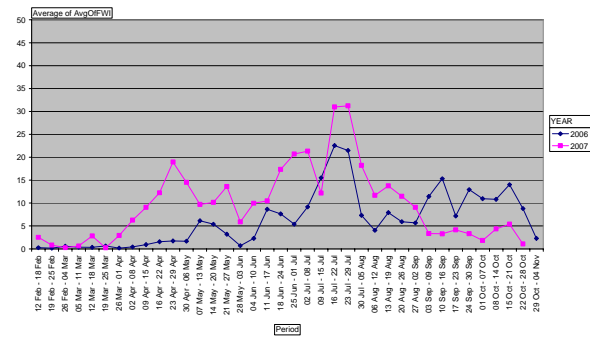
Country: ROMANIA



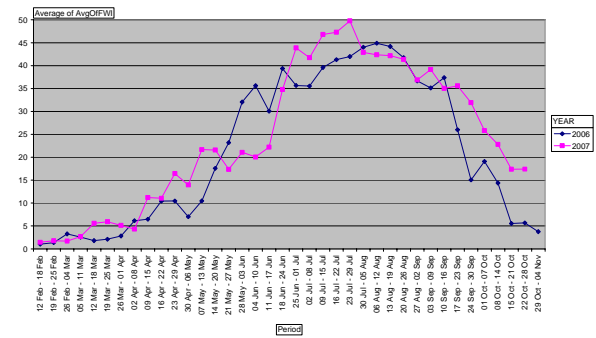
Country: SWITZERLAND



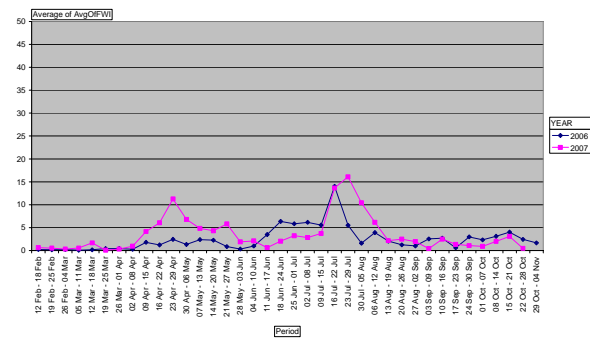
Country: SLOVAKIA



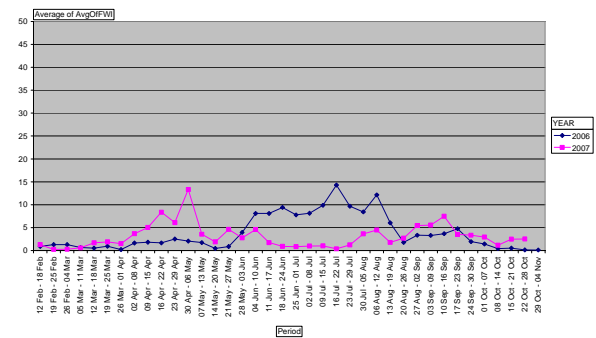
Country: TURKEY



Country: SLOVENIA



Country: UNITED KINGDOM



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

Therefore, to show more clearly the seasonal changes in FWI in the larger EU Mediterranean countries, i.e. Portugal, Spain, France, Italy and Greece, their territory has been further divided for fire danger reporting, according to the map showed in Figure 38. The division criteria are mainly administrative and should be taken as provisional, since other fire risk reporting sub-regions, with a specific focus on environmental criteria, might be proposed in the future.

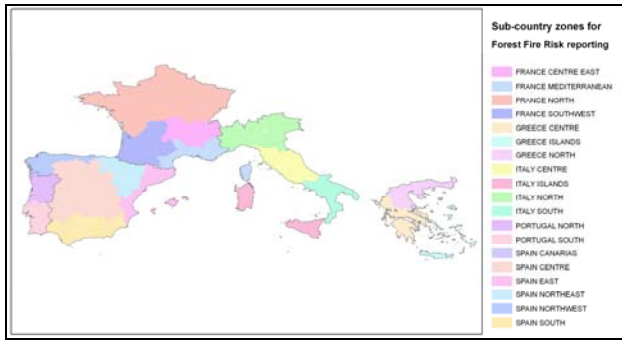


Figure 38. Sub-country regions identified for fire danger trend reporting in five Mediterranean most affected Member States.

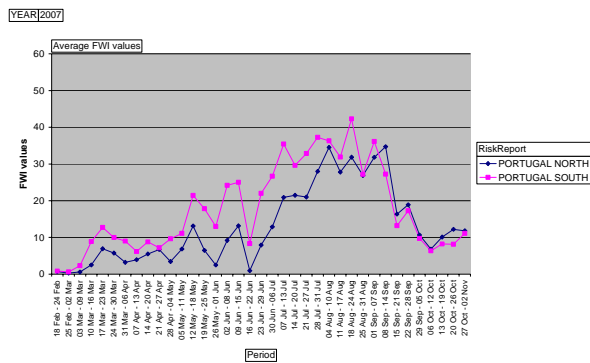


Figure 39. Fire danger trends in 2007 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal

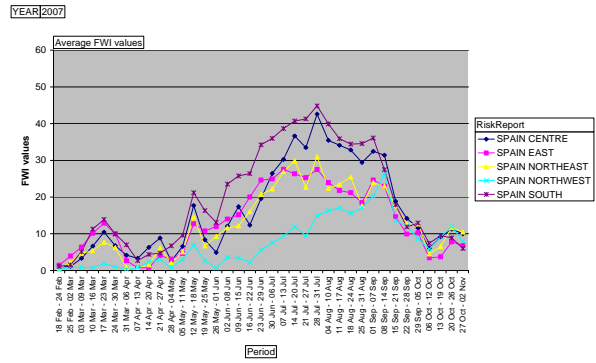


Figure 40. Fire danger trends in 2007 as determined by the Fire Weather Index (FWI) in the regions identified for Spain

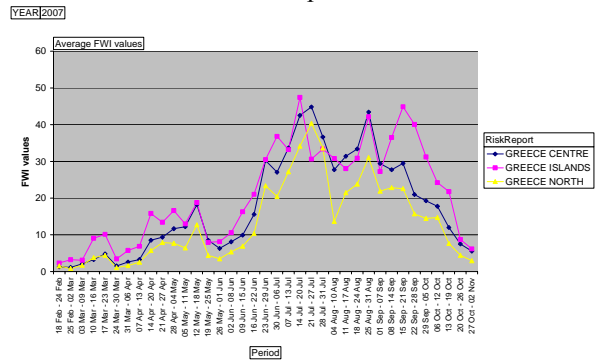


Figure 41. Fire danger trends in 2007 as determined by the Fire Weather Index (FWI) in the regions identified for Greece

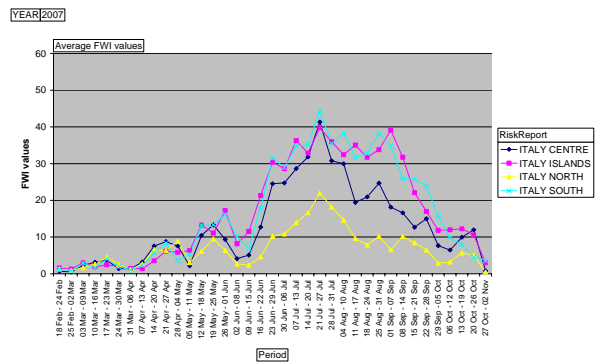


Figure 42. Fire danger trends in 2007 as determined by the Fire Weather Index (FWI) in the regions identified for Italy

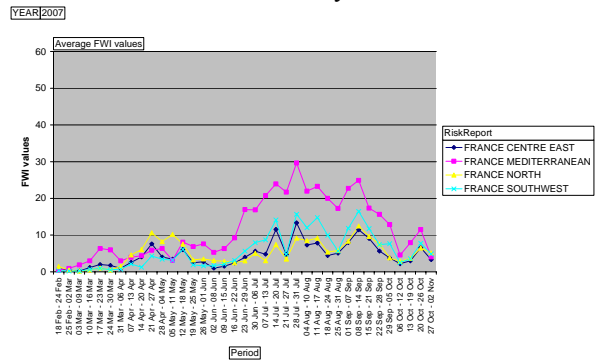


Figure 43. Fire danger trends in 2007 as determined by the Fire Weather Index (FWI) in the regions identified for France.

To facilitate the comparison among the different countries in EU, in the next graphs (Figure 44 to Figure 49), the fire danger trends as determined by FWI are shown for Member States grouped by main bioclimatic type (e.g. Mediterranean, temperate or boreal) and for Candidate countries. Data are given for 2006 and 2007.

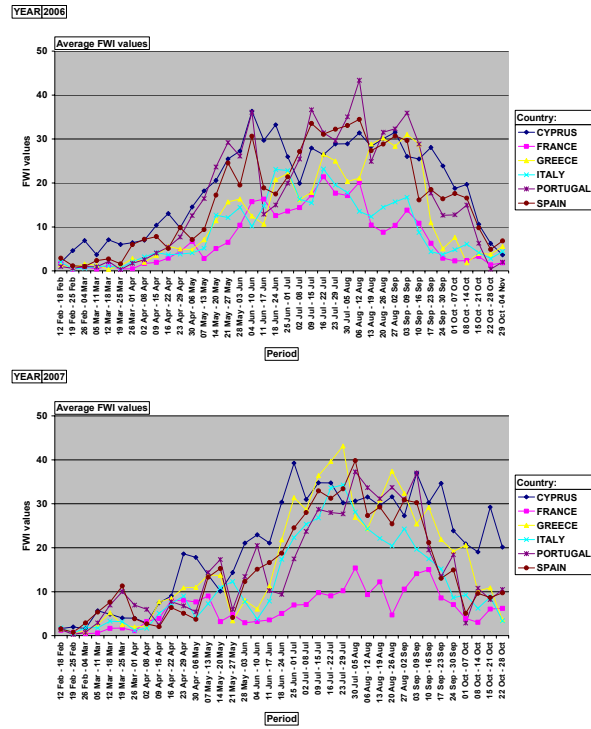


Figure 44. Fire danger trends 2006 and 2007 in EU Mediterranean countries (CY, FR, GR, IT, PT, ES).

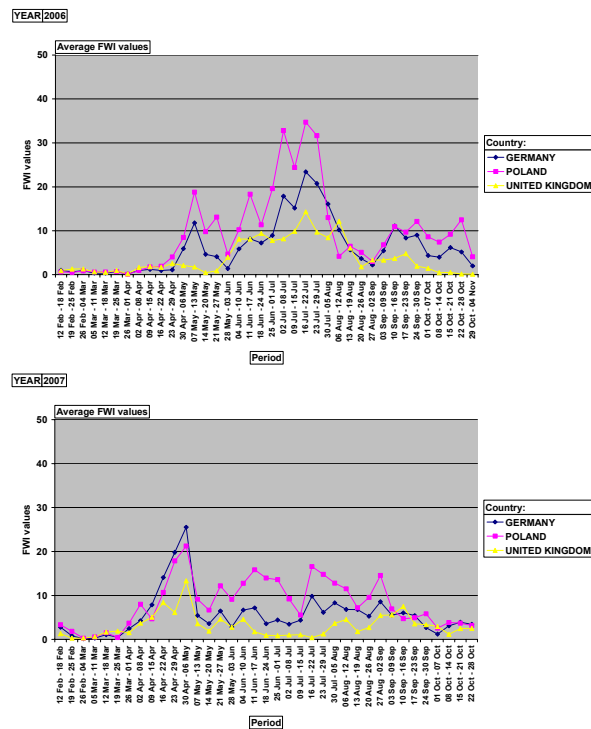


Figure 45. Fire danger trends 2006 and 2007 in some EU temperate countries (DE, PL, UK).

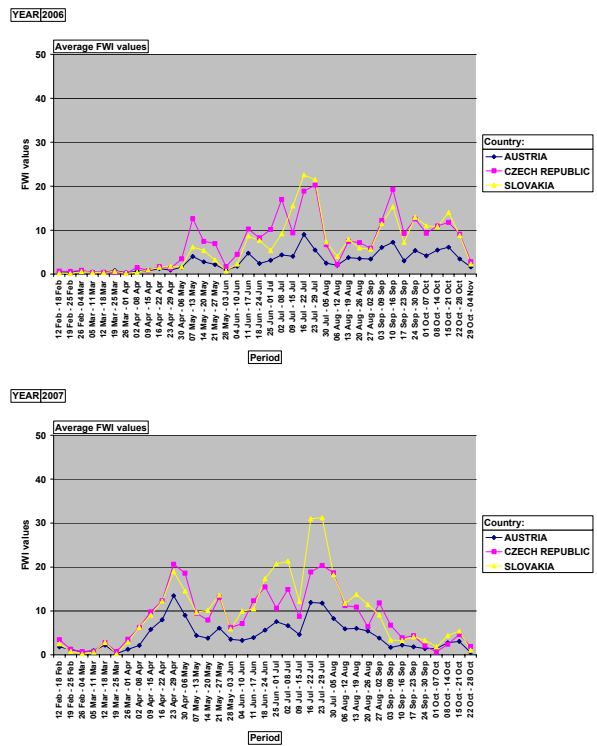


Figure 46. Fire danger trends 2006 and 2007 in some EU temperate countries (AT, CZ, SK).

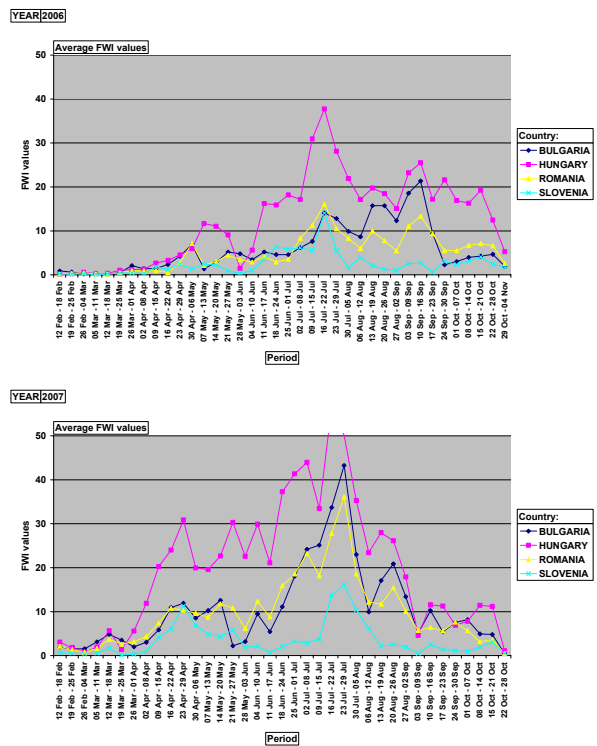


Figure 47. Fire danger trends 2006 and 2007 in some EU temperate countries (BG, HU, RO, SI).



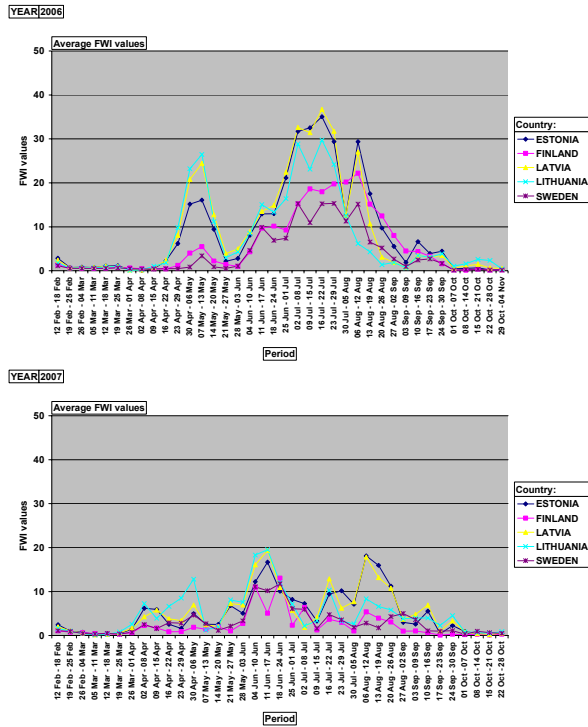


Figure 48. Fire danger trends in the last 2 years (2006 and 2007) in some EU boreal countries (EE, FI, LV, LT, SE).

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.

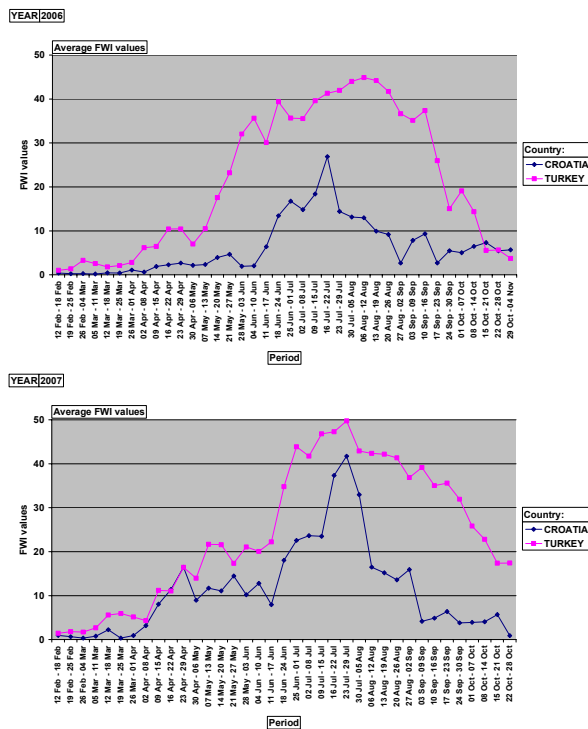


Figure 49. Fire danger trends in the last 2 years (2006 and 2007) in EU candidate countries.

### 3.2. EFFIS RAPID DAMAGE ASSESSMENT: 2007 RESULTS

The Rapid Damage Assessment module of EFFIS was set up to provide reliable and harmonized estimates of the areas affected by forest fires during the fire season. The methodology and the spatial resolution of the satellite sensor data used for this purpose allows the mapping of all fires of about 50 ha or larger. In order to obtain the statistics of the burnt area by land cover type the data from the European CORINE Land Cover 2000 (CLC) database were used. Therefore the mapped burned areas were overlaid to the CLC data, allowing the derivation of damage assessment results comparable for all the EU Countries. Some discrepancies regarding the area of each type of land cover burned may exist when these data are compared with other sources that use different land cover maps.

EFFIS Rapid Damage Assessment is based on the analysis of MODIS satellite images. MODIS instrument is carried both on the TERRA (morning pass) and AQUA (afternoon pass) satellites. MODIS data has 2 bands with spatial resolutions of 250 meters (red and near-infrared bands) and 5 bands with spatial resolution of 500 meters (blue, green, and three short-wave infrared bands). Although mainly the 250 meters bands are used to map the burned areas, the MODIS bands at 500 meters resolution are also used, as they provide complementary information that is used for confirmation of the estimates. This type of satellite imagery allows detailed mapping of fires of about 50 ha or larger. Although only a fraction of the total number of fires is mapped (fires smaller than 50 ha are not mapped), the analysis of historical fire data has determined that the area burned by wildfires of this size represents in most cases the large majority of the total area burned. On average, the area burned by fires of at least 50 ha accounts for about 75% of the total area burnt every year in the Southern EU.

The results for each of the EU southern European countries mostly affected by forest

fires (Portugal, Spain, France, Italy, Greece, and Cyprus) are given in the following paragraphs. In addition, an analysis for other countries in the region that had large forest fires is also presented. Most of the large forest damages occurred in the south-eastern part of the Mediterranean region, which was under the influence of extreme weather conditions that facilitated fire ignition and spread. Overall, 2007 has been one of the worst years in terms of the damages caused by forest fires in Europe. The country that was most heavily damaged was Greece, followed by Italy. Detailed analysis of the fire campaign in those countries has already been presented in previous chapters of this report. The total area burned in 2007 by fires larger than 50 ha, as shown by the analysis of satellite imagery, was 874 424 ha (Figure 26). These figures may include agricultural and urban areas that were also burned during the forest fires.

Table 26. Areas burned by fires of at least 50 ha in 2007 estimated by satellite.

| <i>Country</i>           | <i>Burnt area (ha)</i> |
|--------------------------|------------------------|
| <i>AL - Albania</i>      | 127 943.71             |
| <i>BA - Bosnia</i>       | 56 798.79              |
| <i>BG - Bulgaria</i>     | 67 597.82              |
| <i>CS - Serbia</i>       | 34 829.88              |
| <i>CY - Cyprus</i>       | 2 525.08               |
| <i>ES - Spain</i>        | 56 589.81              |
| <i>FR - France</i>       | 2 629.61               |
| <i>FYROM - Macedonia</i> | 40 282.07              |
| <i>GR - Greece</i>       | 271 516.38             |
| <i>HR - Croatia</i>      | 17 261.32              |
| <i>HU - Hungary</i>      | 798.91                 |
| <i>IT - Italy</i>        | 153 753.10             |
| <i>ME -Montenegro</i>    | 19 272.50              |
| <i>PT- Portugal</i>      | 15 760.49              |
| <i>TR – Turkey</i>       | 6 864.48               |
| <b>TOTAL</b>             | <b>874 423.98</b>      |

Modelling historical fire data from Portugal, Spain, France, Italy and 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. Using these



formulas the total burned area estimated for the five above mentioned countries in 2007 was 656 015 ha (574 361 ha is the total burned area from official, though still provisional, statistics from the countries)

Of particular interest is the analysis of the damages caused by fires to the areas protected within the Natura2000 network, as they included habitats of especial interest which are home for endangered plant and animal species. However, the category of Natura2000 areas only exists in the countries of the European Union. Information on other protected areas outside the EU is not available and is thus not presented in this report. The area burnt within the Natura2000 sites is presented in Table 27.

Table 27. Area burnt in 2007 within Natura 2000 sites in the EU Mediterranean countries.

| <i>Country</i>  | <i>burnt area (ha)</i> | <i>% of total Natura2000 burnt area</i> | <i>% of total Natura2000 area in the country</i> |
|-----------------|------------------------|---|--|
| <i>Portugal</i> | 5464                   | 34.67                                   | 0.30   |
| <i>Spain</i>    | 31143                  | 55.03                                   | 0.23   |
| <i>France</i>   | 692                    | 26.32                                   | 0.01   |
| <i>Italy</i>    | 42263                  | 27.49                                   | 0.74   |
| <i>Greece</i>   | 31356                  | 11.55                                   | 1.26   |
| <i>Cyprus</i>   | 187                    | 7.4                                     | 0.23   |

Figure 50 shows the scars caused by forest fires during the 2007 season. The accumulation of burnt scars on the eastern part of the Mediterranean region is noticeable on this picture, in which burnt scars are overlaid on an image acquired by the MODIS sensor.



Figure 50. Burnt scars produced by forest fires in the Mediterranean region during the fire season 2007.

### 3.2.1. Portugal

Portugal was not severely affected by forest fires in 2007. The total burned area mapped in Portugal was 15760.49 ha. From this area 5464 ha were on Natura2000 sites, corresponding to 35.0% of the total area burned, and 0.30 % of the total Natura2000 areas in Portugal. Table 28 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 15760.49 ha of burnt area mapped, 12480.60 ha of land have been burnt in forest and semi-natural areas, 3167.89 ha were agricultural land, and 10.69 ha in artificial areas (urban, industrial and social areas). Other land types were affected by fires covering an area of 101.31 ha. Some of the forest fires that affected Natura2000 areas in central Portugal are shown in Figure 51.

Table 28. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Portugal.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 3167.89          | 20.10             |
| Artificial surfaces     | 10.69            | 0.07              |
| Forest and Semi-natural | 12480.60         | 79.19             |
| Other land types        | 101.31           | 0.64              |
| Total                   | 15760.49         | 100.00            |

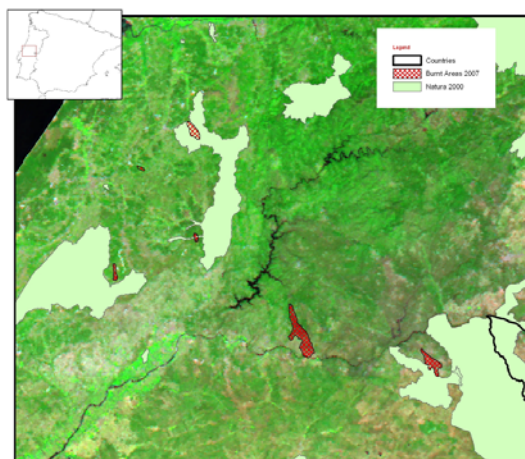


Figure 51. Impact of forest fires in Natura2000 sites – central Portugal.

### 3.2.2. Spain

Spain was the 6<sup>th</sup> country most severely affected by forest fires in 2007. The total burned area mapped in Spain was 56589.81 ha. From this area 31143 ha were on Natura2000 sites, corresponding to 55.3% of the total area burned, and 0.23% of the Natura2000 areas in Spain. Table 29 presents the distribution of the mapped burnt area by land cover type using the CLC 2000

map. In terms of land cover, from a total of 56589.81 ha of burnt area mapped, 48620.82 ha of land have been burnt in forests and semi-natural areas, 7941.50 were agricultural land, and 23.37 ha in artificial areas (urban, industrial and social areas).

The most damaging fire of the season took place in the Canary Islands and affected the Natura2000 sites. A detail of this fire is presented in Figure 52.

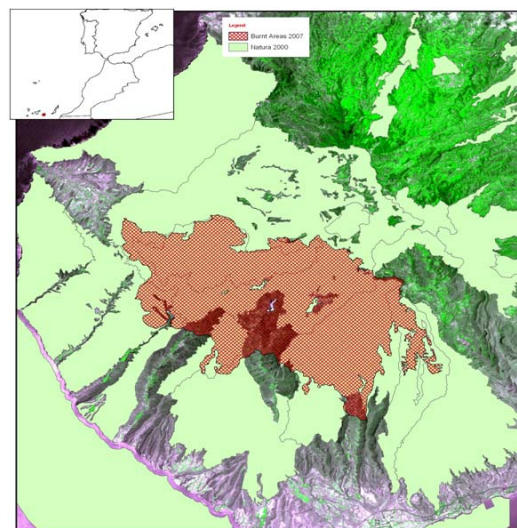


Figure 52. Impact of forest fires in the Natura2000 sites of the Canary Islands.

Table 29. Distribution of burned area (ha) in Spain by land cover type

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 7941.50          | 14.03             |
| Artificial surfaces     | 23.37            | 0.04              |
| Forest and Semi-natural | 48620.82         | 85.92             |
| Other land types        | 4.12             | 0.01              |
| Total                   | 56589.81         | 100.00            |

### 3.2.3. France

Forest fire damages in France were relatively small in 2007. The total burned area mapped in France was 2629.61 ha. From this area 692 ha were on Natura2000 sites, corresponding to 26.32% of the total area burned, and 0.01 of the total Natura2000 areas in the country. Table 30 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 2629.61 ha of burnt area mapped, 2549.79 ha of land have been burnt in forest and semi-natural areas, 47 ha were agricultural land, and 32.82 ha in artificial areas (urban, industrial and social areas).



Table 30. Distribution of burnt areas (fires of at least 50 ha) by land cover class in France in 2007.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 47.00            | 1.79              |
| Artificial surfaces     | 32.82            | 1.25              |
| Forest and Semi-natural | 2549.79          | 96.96             |
| Other land types        | 0.00             | 0.00              |
| Total                   | 2629.61          | 100.00            |

Some of forest fires that affected Natura2000 sites in South-east France are shown in Figure 53.

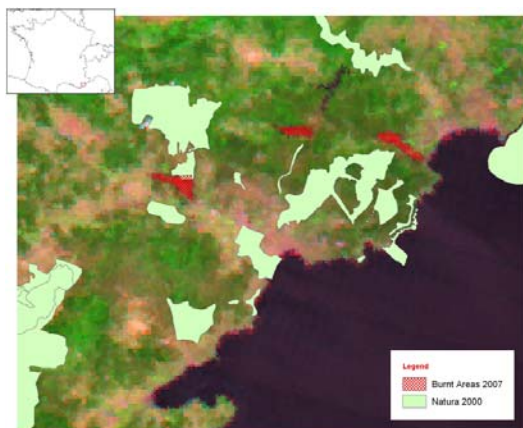


Figure 53. Detail of the Natura2000 sites affected by fires in southern France.

### 3.2.4. Italy

Italy was the 2<sup>nd</sup> country most severely affected by fires in 2007, after Greece. The total burned area mapped in Italy until 30 September 2007 was 153753.10 ha. From this area 42263 ha were on Natura2000 sites, corresponding to 27.49 % of the total area burned, and 0.74% of the total Natura2000 area in the country. Table 31 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 153753.10 ha of burnt area mapped, 97170.67 ha of land have been burnt in forests and semi-natural land, 55173.17 ha were agricultural land, and 1384.26 ha in artificial areas (urban, industrial and social areas). Other 25 ha were burnt in other land types. Figure 54 shows the distribution of forest fires in central and southern Italy. Details of Natura2000 sites affected by forest fires are presented in Figure 55 to Figure 57.



Figure 54. Burnt areas in southern Italy.

Table 31. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Italy.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 55173.17         | 35.88             |
| Artificial surfaces     | 1384.26          | 0.90              |
| Forest and Semi-natural | 97170.67         | 63.20             |
| Other land types        | 25.01            | 0.02              |
| Total                   | 153753.10        | 100.00            |

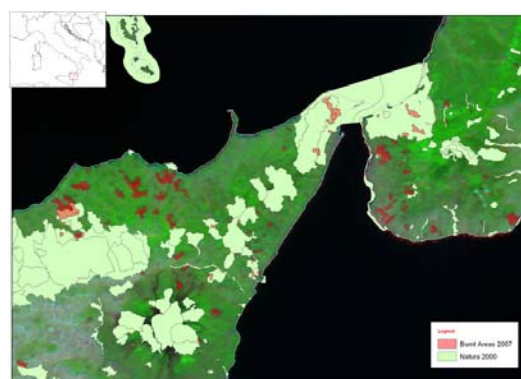


Figure 55. Satellite image showing a detail of the burnt areas in southern Italy (in red) with Natura2000 sites.

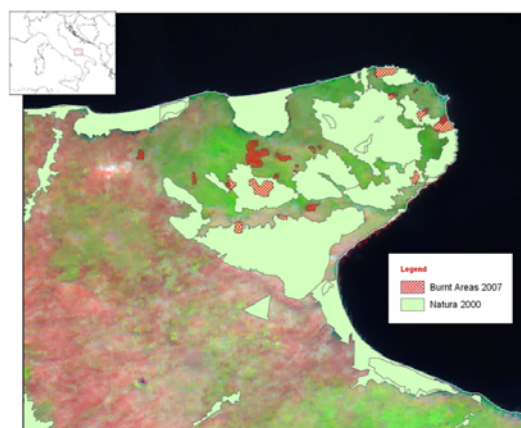


Figure 56. Impact of forest fires on Natura2000 in Gargano (Italy).

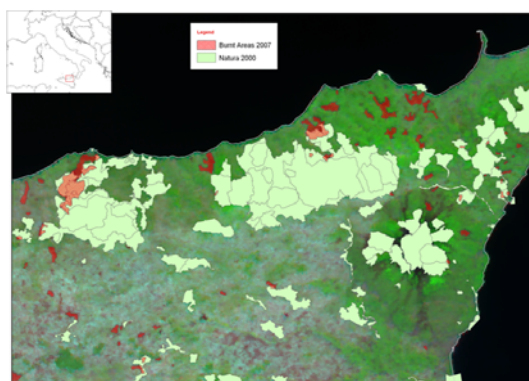


Figure 57. Impact of forest fires on Natura2000 sites in Sicily (Italy).

### 3.2.5. Greece

Greece was the country most severely affected by fires in 2007. The total burned area mapped in Greece until the 30 September 2007 was 271516.38 ha. From this area 31356 ha were on Natura2000 sites, corresponding to 11.55% of the total area burned. Table 32 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 271516.38 ha of burnt area mapped, 155050.66 ha were forest land, 112930.69 ha were agricultural area, and 3075.61 ha were in artificial areas (urban, industrial and social areas). Other land cover types were also affected to total an additional 459.43 ha.

Detail of other damages caused to Greece and its population were presented in previous chapters of this report.

Figure 58 shows the damages caused by forest fires in southern and central Greece and the Natura2000 sites affected by these fires.

Table 32. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Greece.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 112930.69        | 41.59             |
| Artificial surfaces     | 3075.61          | 1.13              |
| Forest and Semi-natural | 155050.66        | 57.11             |
| Other land types        | 459.43           | 0.16              |
| <b>Total</b>            | <b>271516.38</b> | <b>100.00</b>     |

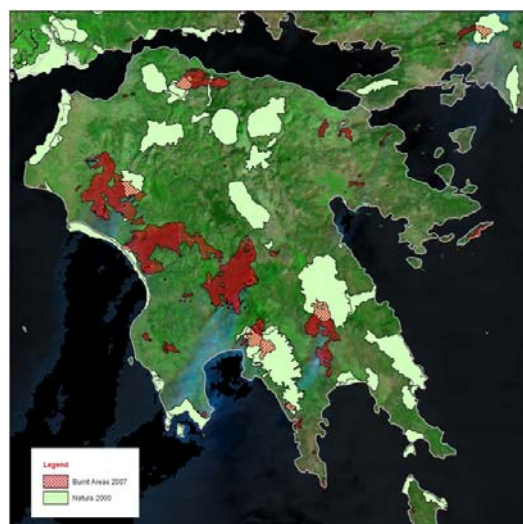


Figure 58. Satellite image showing the burnt areas in Greece (in red).

### 3.2.6. Cyprus

Cyprus was affected by forest fires early in the 2007 fire season. The total area burned mapped in Cyprus was 2525.08 ha. From this area 187 ha were on Natura2000 sites corresponding approximately to 7.4 % of the total area burned. Table 33 presents the distribution of the mapped burnt area by land use type using the CLC 2000 map. From a total of 2525.08 ha of burnt area mapped, 1908.07 ha were forest land, 615.03 ha were agricultural area and nearly 2 ha were artificial areas, i.e. urban, industrial or social areas.

Table 33. Distribution of burnt areas (fires of at least 50 ha) by land cover class in Cyprus in 2007.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 615.03           | 24.36             |
| Artificial surfaces     | 1.99             | 0.08              |
| Forest and Semi-natural | 1908.07          | 75.56             |
| Other land types        | 0.00             | 0.00              |
| <b>Total</b>            | <b>2525.08</b>   | <b>100.00</b>     |





Figure 59. Burnt areas and Natura2000 sites in Cyprus.

### 3.2.7. Bulgaria

Bulgaria was the 4<sup>th</sup> country most severely affected by fires in 2007. The total burnt area mapped from satellite imagery was 67597.82 ha. Table 34 presents the distribution of the mapped burned area by land cover type using the CLC 2000 map. A total of 28969.43 ha were burnt in forests and semi-natural areas. The remaining burned area was distributed in agriculture (38063.85 ha), artificial surfaces, i.e. urban, industrial or social areas (519.50 ha), and other land types (45.03 ha).

An image showing the spatial distribution of the fires in the country is presented in Figure 60.

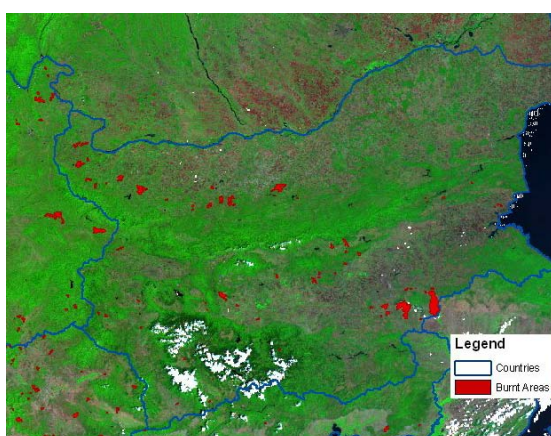


Figure 60. Forest fires in Bulgaria

Table 34. Distribution of burned area (ha) in Bulgaria by land cover types.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 38063.85         | 56.31             |
| Artificial surfaces     | 519.50           | 0.77              |
| Forest and Semi-natural | 28969.43         | 42.86             |
| Other land types        | 45.03            | 0.07              |
| <b>Total</b>            | <b>67597.82</b>  | <b>100.00</b>     |

### 3.2.8. Albania

Albania was the 3<sup>rd</sup> country most severely affected by forest fires in 2007. The total burnt area mapped in Albania measured from satellite imagery was 127943.71 ha. This represented an unusually high damage for the country. Table 35 presents the distribution of the mapped burned area by land cover type using the CLC 2000 map. A total of 122311.03 ha were burnt in forest and semi-natural areas. The remaining burned area was distributed in agriculture (5279.58 ha), and artificial surfaces, i.e. urban, industrial or social areas (292.30 ha), and other land cover types (60.80 ha).

Figure 61 shows the burnt scars resulting from forest fires in the Albanian territory.

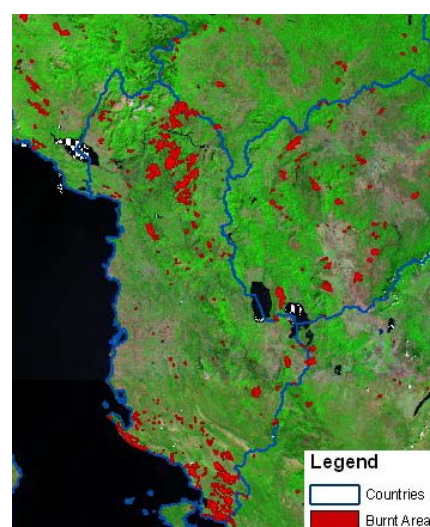


Figure 61. Forest fires in Albania

Table 35. Distribution of burned area (ha) in Albania by land cover types.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 5279.58          | 4.13              |
| Artificial surfaces     | 292.30           | 0.23              |
| Forest and Semi-natural | 122311.03        | 95.60             |
| Other land types        | 60.80            | 0.04              |
| <b>Total</b>            | <b>127943.71</b> | <b>100.00</b>     |

### 3.2.9. Bosnia-Herzegovina

Large damages were caused by forest fires in Bosnia-Herzegovina. The total burned area mapped in the country was 56798.79 ha. Table 36 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 56798.79 ha of burnt area mapped, 50065.44 ha were burnt in forests and semi-natural areas, 6517.27 ha were burnt in agricultural land and

65.65 ha in artificial areas (urban, industrial and social areas). Other land cover types affected by fires added a total 150.43 ha to the total figure of burnt areas in the country.

Figure 62 shows the areas affected by forest fires in Bosnia-Herzegovina.

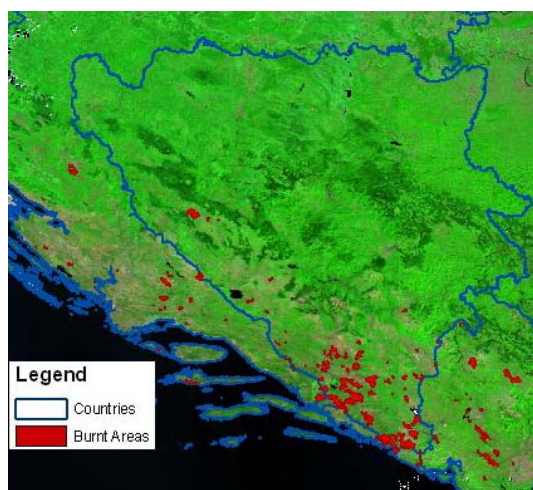


Figure 62. Burnt areas in Bosnia-Herzegovina and Croatia.

Table 36. Distribution of burned area (ha) in Bosnia-Herzegovina by land cover types.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 6517.27          | 11.47             |
| Artificial surfaces     | 65.65            | 0.12              |
| Forest and Semi-natural | 50065.44         | 88.15             |
| Other land types        | 150.43           | 0.26              |
| Total                   | 56798.79         | 100.00            |

### 3.2.10. Croatia

As other countries in the south-eastern Mediterranean region, Croatia was also affected by forest fires in 2007. The total area burned mapped in Croatia measured from satellite imagery was 17261.32 ha.

Table 37 presents the distribution of the mapped burned area by land cover type using the CLC. In terms of land cover, from a total of 17261.32 ha of burnt area mapped, 12083.96 ha were forest and semi-natural areas, 5133.05 ha were agricultural areas, and 44.31 ha were artificial areas, i.e. urban, industrial or social areas.

Visible fire scars caused by forest fires in Croatia can be observed in Figure 62 above.

Table 37. Distribution of burned area (ha) in Croatia by land cover types.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 5133.05          | 29.74             |
| Artificial surfaces     | 44.31            | 0.26              |
| Forest and Semi-natural | 12083.96         | 70.01             |
| Other land types        | 0.00             | 0.00              |
| Total                   | 17261.32         | 100.00            |

### 3.2.11. Former Yugoslav Republic of Macedonia (FYROM)

FYROM was severely affected by forest fires in 2007. The total burned area mapped in FYROM by the end of the fire season was 40282.07 ha. Table 38 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 40282.07 ha of burnt area mapped, 33719.21 ha were burnt in forests and semi-natural areas, 6427.01 ha were agricultural lands, and 84.91 ha in artificial areas (urban, industrial and social areas). Burnt areas in other land types comprised an additional figure of 50.54 ha.

Figure 63 shows the burnt scars caused by forest fires in the country.

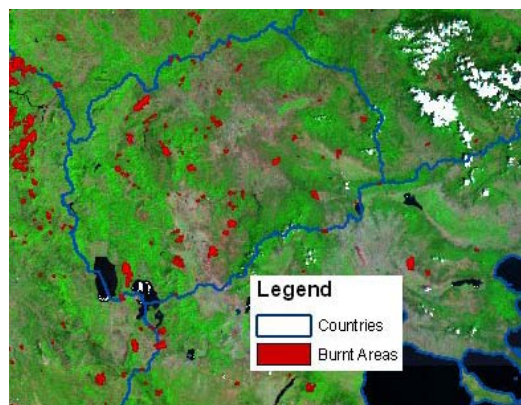


Figure 63. Burnt scars caused by forest fires in FYROM.

Table 38. Distribution of burned area (ha) by land cover types in FYROM.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 6427.01          | 15.96             |
| Artificial surfaces     | 84.91            | 0.21              |
| Forest and Semi-natural | 33719.21         | 83.71             |
| Other land types        | 50.94            | 0.13              |
| Total                   | 40282.07         | 100.00            |

### 3.2.12. Montenegro

Montenegro, as other eastern Mediterranean countries, was also heavily affected by forest fires in 2007. The total burned area mapped in Montenegro was 19 925 ha. Since there is no



CLC2000 maps available for Montenegro no statistics on land cover affected can be presented.

Table 39 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 19272.50 ha of burnt area mapped, 18204.31 ha of land have been burnt in forest and semi-natural areas, 828.51 ha were agricultural land, and 1.69 ha in artificial areas (urban, industrial and social areas).

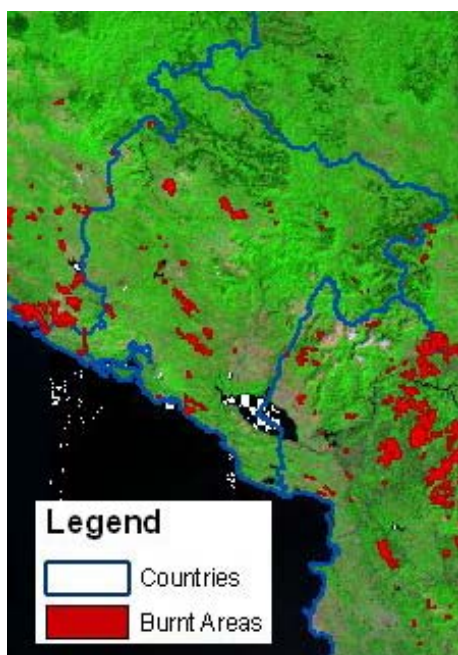


Figure 64. Burnt areas in Montenegro, and border countries Croatia (NW) and Albania (S).

Table 39. Distribution of burned area (ha) in Montenegro by land cover types.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 828.51           | 4.30              |
| Artificial surfaces     | 1.69             | 0.01              |
| Forest and Semi-natural | 18204.31         | 94.46             |
| Other land types        | 0.00             | 1.23              |
| <b>Total</b>            | <b>19272.50</b>  | <b>100.00</b>     |

### 3.2.13. Serbia

Forest fires affected Serbia as well as other neighbour countries. Most of the fires took place in the south and eastern parts of the country. The total burned area mapped in Serbia, mainly in the Kosovo region, was 34 829.88 ha. Since there is no CLC2000 maps available for Serbia no statistics on land cover affected can be presented.

Table 40 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 34 829.88 ha of burnt area mapped, 15648.88 ha of land have been burnt in forest and semi-natural areas, 4424.71 ha were agricultural land, and 14756.29 ha in other land types. The reason for this high percentage of burnt areas in this last cover type is unavailability of CLC information for the Kosovo region, where many of the fires took place.

Burnt scars produced by forest fires in Serbia are shown in Figure 65.

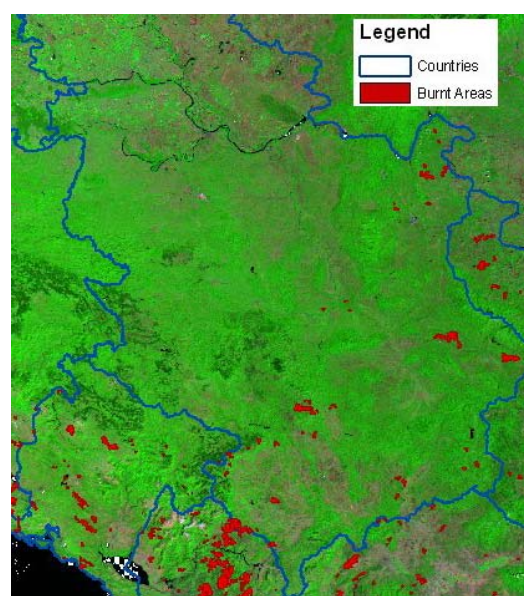


Figure 65. Burnt areas in Serbia.

Table 40. Distribution of burned area (ha) in Serbia by land cover types.

| Land cover              | Area burned (ha) | % of total burned |
|-------------------------|------------------|-------------------|
| Agricultural Areas      | 4424.71          | 12.70             |
| Artificial surfaces     | 0.00             | 0.00              |
| Forest and Semi-natural | 15648.88         | 44.93             |
| Other land types        | 14756.29         | 42.37             |
| <b>Total</b>            | <b>34829.88</b>  | <b>100.00</b>     |

#### **4. BACKGROUND DOCUMENTATION**

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Natura2000 consolidated spatial database. Version May 2008.





## ANNEX I – Summary Tables of Fire Statistics

**Table 41. Number of forest fires in five Southern Member States (1980-2007)**

| <i>Year</i>               | <i>PORTUGAL</i> | <i>SPAIN</i> | <i>FRANCE</i> | <i>ITALY</i> | <i>GREECE</i> | <i>TOTAL</i> |
|---------------------------|-----------------|--------------|---------------|--------------|---------------|--------------|
| 1980                      | 2 349           | 7 190        | 5 040         | 11 963       | 1 207         | 27 749       |
| 1981                      | 6 730           | 10 878       | 5 173         | 14 503       | 1 159         | 38 443       |
| 1982                      | 3 626           | 6 545        | 5 308         | 9 557        | 1 045         | 26 081       |
| 1983                      | 4 539           | 4 791        | 4 659         | 7 956        | 968           | 22 913       |
| 1984                      | 7 356           | 7 203        | 5 672         | 8 482        | 1 284         | 29 997       |
| 1985                      | 8 441           | 12 238       | 6 249         | 18 664       | 1 442         | 47 034       |
| 1986                      | 5 036           | 7 570        | 4 353         | 9 398        | 1 082         | 27 439       |
| 1987                      | 7 705           | 8 679        | 3 043         | 11 972       | 1 266         | 32 665       |
| 1988                      | 6 131           | 9 247        | 2 837         | 13 588       | 1 898         | 33 701       |
| 1989                      | 21 896          | 20 811       | 6 763         | 9 669        | 1 284         | 60 423       |
| 1990                      | 10 745          | 12 913       | 5 881         | 14 477       | 1 322         | 45 338       |
| 1991                      | 14 327          | 13 531       | 3 888         | 11 965       | 858           | 44 569       |
| 1992                      | 14 954          | 15 955       | 4 002         | 14 641       | 2 582         | 52 134       |
| 1993                      | 16 101          | 14 254       | 4 769         | 14 412       | 2 406         | 51 942       |
| 1994                      | 19 983          | 19 263       | 4 618         | 11 588       | 1 763         | 57 215       |
| 1995                      | 34 116          | 25 827       | 6 563         | 7 378        | 1 438         | 75 322       |
| 1996                      | 28 626          | 16 771       | 6 401         | 9 093        | 1 508         | 62 399       |
| 1997                      | 23 497          | 22 320       | 8 005         | 11 612       | 2 273         | 67 707       |
| 1998                      | 34 676          | 22 446       | 6 289         | 9 540        | 1 842         | 74 793       |
| 1999                      | 25 477          | 18 237       | 4 960         | 6 932        | 1 486         | 57 092       |
| 2000                      | 34 109          | 24 118       | 4 603         | 8 595        | 2 581         | 74 006       |
| 2001                      | 26 533          | 19 547       | 4 309         | 7 134        | 2 535         | 60 058       |
| 2002                      | 26 488          | 19 929       | 4 097         | 4 601        | 1 141         | 56 256       |
| 2003                      | 26 195          | 18 616       | 7 023         | 9 697        | 1 452         | 62 983       |
| 2004                      | 21 870          | 21 394       | 3 775         | 6 428        | 1 748         | 55 215       |
| 2005                      | 35 697          | 25 492       | 4 698         | 7 951        | 1 544         | 75 382       |
| 2006                      | 19 929          | 16 355       | 4 608         | 5 634        | 1 417         | 47 943       |
| 2007                      | 18 722          | 10 915       | - *           | 10 639       | 1 983**       | 42 259       |
| <i>% of total in 2007</i> | 44%             | 26%          | - *           | 25%          | 5%            | 100%         |
| <i>Average 1980-1989</i>  | 7 381           | 9 515        | 4 910         | 11 575       | 1 264         | 34 645       |
| <i>Average 1990-1999</i>  | 22 250          | 18 152       | 5 538         | 11 164       | 1 748         | 58 851       |
| <i>Average 2000-2007</i>  | 26 193          | 19 546       | 4 730         | 7 585        | 1 800         | 59 263       |
| <i>Average 1980-2007</i>  | 18 066          | 15 466       | 5 096         | 10 288       | 1 590         | 50 324       |
| <i>TOTAL</i>              | 505 854         | 433 035      | 137 586       | 288 069      | 44 514        | 1 409        |

\* Data not available yet

\*\* Provisional data

**Table 42. Burnt area (hectares) in five Southern Member States (1980 – 2007)**

| <i>Year</i>               | <i>PORTUGAL</i> | <i>SPAIN</i> | <i>FRANCE</i> | <i>ITALY</i> | <i>GREECE</i> | <i>TOTAL</i> |
|---------------------------|-----------------|--------------|---------------|--------------|---------------|--------------|
| 1980                      | 44 251          | 263 017      | 22 176        | 143 919      | 32 965        | 506 328      |
| 1981                      | 89 798          | 298 288      | 27 711        | 229 850      | 81 417        | 727 064      |
| 1982                      | 39 556          | 152 903      | 55 145        | 130 456      | 27 372        | 405 432      |
| 1983                      | 47 811          | 108 100      | 53 729        | 212 678      | 19 613        | 441 931      |
| 1984                      | 52 710          | 165 119      | 27 202        | 75 272       | 33 655        | 353 958      |
| 1985                      | 146 254         | 484 476      | 57 368        | 190 640      | 105 450       | 984 188      |
| 1986                      | 89 522          | 264 887      | 51 860        | 86 420       | 24 514        | 517 203      |
| 1987                      | 76 269          | 146 662      | 14 108        | 120 697      | 46 315        | 404 051      |
| 1988                      | 22 434          | 137 734      | 6 701         | 186 405      | 110 501       | 463 775      |
| 1989                      | 126 237         | 426 693      | 75 566        | 95 161       | 42 363        | 766 020      |
| 1990                      | 137 252         | 203 032      | 72 625        | 195 319      | 38 594        | 646 822      |
| 1991                      | 182 486         | 260 318      | 10 130        | 99 860       | 13 046        | 565 840      |
| 1992                      | 57 011          | 105 277      | 16 593        | 105 692      | 71 410        | 355 983      |
| 1993                      | 49 963          | 89 267       | 16 698        | 203 749      | 54 049        | 413 726      |
| 1994                      | 77 323          | 437 635      | 24 995        | 136 334      | 57 908        | 734 195      |
| 1995                      | 169 612         | 143 484      | 18 137        | 48 884       | 27 202        | 407 319      |
| 1996                      | 88 867          | 59 814       | 11 400        | 57 988       | 25 310        | 243 379      |
| 1997                      | 30 535          | 98 503       | 21 581        | 111 230      | 52 373        | 314 222      |
| 1998                      | 158 369         | 133 643      | 19 282        | 155 553      | 92 901        | 559 748      |
| 1999                      | 70 613          | 82 217       | 15 906        | 71 117       | 8 289         | 248 142      |
| 2000                      | 159 605         | 188 586      | 24 078        | 114 648      | 145 033       | 631 950      |
| 2001                      | 111 850         | 93 297       | 20 642        | 76 427       | 18 221        | 320 437      |
| 2002                      | 124 411         | 107 464      | 30 160        | 40 791       | 6 013         | 308 839      |
| 2003                      | 425 726         | 148 172      | 73 278        | 91 805       | 3 517         | 742 498      |
| 2004                      | 129 539         | 134 193      | 13 711        | 60 176       | 10 267        | 347 886      |
| 2005                      | 338 262         | 188 697      | 22 135        | 47 575       | 6 437         | 603 106      |
| 2006                      | 75 510          | 148 827      | 7 844         | 39 946       | 12 661        | 284 788      |
| 2007                      | 31 450          | 82 048       | 7 400*        | 227 729      | 225 734*      | 574 361      |
| <i>% of total in 2007</i> | 5%              | 14%          | 1%            | 40%          | 39%           | 100%         |
| <i>Average 1980-1989</i>  | 73 484          | 244 788      | 39 157        | 147 150      | 52 417        | 556 995      |
| <i>Average 1990-1999</i>  | 102 203         | 161 319      | 22 735        | 118 573      | 44 108        | 448 938      |
| <i>Average 2000-2007</i>  | 174 544         | 136 411      | 24 906        | 87 387       | 53 485        | 476 733      |
| <i>Average 1980-2007</i>  | 112 615         | 184 013      | 29 220        | 119 869      | 49 755        | 495 471      |
| <i>TOTAL</i>              | 3 153 226       | 5 152        | 818 161       | 3 356        | 1 393         | 13 873       |

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\* Provisional data

**Table 43. Number of forest fires in other EU countries (1990-2007)**

| <i>Country</i>     | <i>1990</i> | <i>1991</i> | <i>1992</i> | <i>1993</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> | <i>1997</i> | <i>1998</i> | <i>1999</i> | <i>2000</i> | <i>2001</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> | <i>2006</i> | <i>2007</i> |
|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <i>Austria</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 954         | 912         | 750         |
| <i>Bulgaria</i>    |             | 73          | 602         | 1 196       | 667         | 114         | 246         | 200         | 578         | 320         | 1 710       | 825         | 402         | 452         | 294         | 241         | 393         | 1 479       |
| <i>Croatia</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 7 797       | 4 024       | 4 692       | 6 923       | 2 853       | 3 368       | 3 571       | 5 176       |
| <i>Cyprus</i>      | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 285         | 299         | 243         | 427         | 221         | 185         | 172         | 111         |
| <i>Czech Rep.</i>  | -           | -           | -           | -           | -           | 1 331       | 1 421       | 1 398       | 2 563       | 1 402       | 1 499       | 483         | 604         | 1 754       | 873         | 619         | 697         | -           |
| <i>Estonia</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 356         | 111         | 89          | 65          | 248         | 64          |
| <i>Finland</i>     | -           | -           | -           | -           | -           | -           | 1 475       | 1 585       | 370         | 1 528       | 806         | 796         | 2 489       | 1 707       | 783         | 1 069       | 3 046       | 1 204       |
| <i>Germany</i>     | -           | 1 846       | 3 012       | 1 694       | 1 696       | 1 237       | 1 748       | 1 467       | 1 032       | 1 178       | 1 210       | 587         | 513         | 2 524       | 626         | 496         | 930         | 779         |
| <i>Hungary</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | 229         | 811         | 419         | 382         | 375         | 104         | 150         | 97          | 603         |
| <i>Latvia</i>      | 604         | 225         | 1 510       | 965         | 763         | 582         | 1 095       | 768         | 357         | 1 196       | 915         | 272         | 1 720       | 900         | 647         | 365         | 1 929       | 425         |
| <i>Lithuania</i>   | -           | -           | 1 180       | 634         | 715         | 472         | 894         | 565         | 258         | 1 022       | 654         | 287         | 1 596       | 885         | 468         | 301         | 1 545       | 251         |
| <i>Poland</i>      | -           | -           | -           | 9 038       | 10 710      | 7 681       | 7 924       | 6 818       | 6 166       | 9 820       | 12 428      | 4 480       | 10 101      | 17 088      | 7 219       | 12 803      | 11 828      | 7 049       |
| <i>Romania</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 516         | 203         | 34          | 64          | -           | -           |
| <i>Slovakia</i>    | -           | -           | -           | -           | 366         | 254         | 662         | 535         | 1 056       | 426         | 824         | 311         | 570         | 872         | 153         | 287         | 237         | -           |
| <i>Slovenia</i>    | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 60          | 224         | 51          | 73          | 112         | 140         |
| <i>Sweden</i>      | -           | -           | -           | -           | -           | -           | 4 854       | 7 057       | 2 503       | 4 707       | 4 708       | 4 831       | 6 490       | 8 282       | 4 955       | 4 573       | 4 618       | 3 737       |
| <i>Switzerland</i> | 235         | 148         | 70          | 76          | 74          | 87          | 108         | 135         | 91          | 45          | 49          | 48          | 67          | 154         | 49          | 63          | 46          | 39          |
| <i>Turkey</i>      | -           | -           | -           | -           | -           | -           | -           | -           | 1 932       | 2 075       | 2 353       | 2 631       | 1 471       | 2 177       | 1 762       | 1 530       | 2 227       | 2 829       |

Table 44. Burnt area (hectares) in other EU countries (1990 – 2007)

| <i>Country</i>     | <i>1990</i> | <i>1991</i> | <i>1992</i> | <i>1993</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> | <i>1997</i> | <i>1998</i> | <i>1999</i> | <i>2000</i> | <i>2001</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> | <i>2006</i> | <i>2007</i> |
|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <i>Austria</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 74          | 75          | 48          |
| <i>Bulgaria</i>    | -           | 511         | 5 243       | 18 164      | 18 100      | 550         | 906         | 595         | 6 967       | 8 291       | 57 406      | 20 152      | 6 513       | 5 000       | 1 137       | 1 456       | 3 540       | 42 999      |
| <i>Croatia</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 129 883     | 27 251      | 74 945      | 77 359      | 8 988       | 21 407      | 18 782      | 63 719      |
| <i>Cyprus</i>      | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 8 034       | 4 830       | 2 196       | 2 349       | 1 218       | 1 838       | 1 160       | 4 483       |
| <i>Czech Rep.</i>  | -           | -           | -           | -           | -           | 403         | 2 043       | 359         | 1 132       | 336         | 375         | 87          | 178         | 1 236       | 335         | 227         | 53          | -           |
| <i>Estonia</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 2 082       | 207         | 379         | 87          | 2 638       | 292         |
| <i>Finland</i>     | -           | -           | -           | -           | -           | -           | 433         | 1 146       | 131         | 609         | 262         | 174         | 584         | 664         | 351         | 495         | 1 617       | 576         |
| <i>Germany</i>     | -           | 920         | 4 908       | 1 493       | 1 114       | 592         | 1 381       | 599         | 397         | 415         | 581         | 122         | 122         | 1 315       | 274         | 183         | 482         | 256         |
| <i>Hungary</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | 756         | 1 595       | -           | 1 227       | 845         | 247         | 3 531       | 625         | 4 636       |
| <i>Latvia</i>      | 258         | 69          | 8 412       | 570         | 326         | 535         | 927         | 448         | 211         | 1 544       | 1 341       | 311         | 2 222       | 559         | 486         | 120         | 3 387       | 272         |
| <i>Lithuania</i>   | -           | -           | 769         | 274         | 279         | 321         | 478         | 226         | 93          | 494         | 352         | 113         | 746         | 436         | 253         | 51          | 1 199       | 38          |
| <i>Poland</i>      | -           | -           | -           | 7 592       | 9 171       | 5 306       | 14 120      | 6 598       | 4 019       | 8 307       | 7 013       | 3 429       | 5 593       | 28 554      | 4 338       | 7 387       | 5 912       | 2 455       |
| <i>Romania</i>     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 3 536       | 762         | 127         | 162         | -           | -           |
| <i>Slovakia</i>    | -           | -           | -           | -           | -           | -           | -           | -           | -           | 557         | 904         | 305         | 595         | 1 567       | 157         | 524         | 280         | -           |
| <i>Slovenia</i>    | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           | 161         | 2 100       | 138         | 280         | 1 420       | 128         |
| <i>Sweden</i>      | -           | -           | -           | -           | -           | -           | 1 588       | 5 873       | 422         | 1 771       | 1 552       | 1 254       | 2 626       | 4 002       | 1 883       | 1 562       | 5 710       | 1 090       |
| <i>Switzerland</i> | 1 705       | 96          | 27          | 34          | 404         | 444         | 286         | 1 685       | 261         | 30          | 68          | 17          | 697         | 640         | 23          | 41          | 108         | 282         |
| <i>Turkey</i>      | -           | -           | -           | -           | -           | -           | -           | -           | 6 764       | 5 804       | 26 353      | 7 394       | 8 513       | 6 644       | 4 876       | 2 821       | 7 762       | 11 664      |



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**Abstract**

This is the eighth “Forest Fires in Europe” report published by the European Commission. The report contains a summary of the 2007 fire season in Europe, with official statistics on number of fires and burned areas compiled by the contributing countries. In addition to country reports with a summary of the past fire season provided by the countries, the report Forest Fires in Europe informs about the latest developments in terms of forest fire prevention and initiatives of the European Commission to support forest fires fire protection activities in the European Union. Furthermore it provides the results of the European Forest Fire Information System (EFFIS) operating during the fire season, with special emphasis on the EFFIS Danger Forecast, providing daily maps of meteorological fire danger forecast of EU, and the EFFIS Rapid Damage Assessment, performing the daily mapping and assessment of main land cover and Natura2000 areas affected by fires of at least 50 ha during the fire season.

The 2007 fire season was characterized by the extreme fire danger conditions occurred in South-eastern Europe towards the end of July and repeated at the end of August, which resulted in catastrophic events affecting Southern Italy, Greece and the Balkans, with record values of burned areas.







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