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ites 2000–2012

Executive Report

Jesús San-Miguel-Ayanz

Tracy Durrant

Roberto Boca

Andrea Camia

2012

European Commission
Joint Research Centre
Institute for Environment and Sustainability

Contact information
Jesús San-Miguel-Ayanz
Address: Joint Research Centre, Via Enrico Fermi 2749, TP 261, 21027 Ispra (VA), Italy
E-mail: Jesus.San-Miguel@jrc.ec.europa.eu
Tel.: +39 0332 78 6138
Fax: +39 0332 78 5500

http://forest.jrc.ec.europa.eu/
http://www.jrc.ec.europa.eu/

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Forest Fire Damage in Natura 2000 sites 2000-2012

Executive report

Jesús San-Miguel-Ayanz, Tracy Durrant, Roberto Boca, Andrea Camia
Joint Research Centre of the European Commission
Institute for Environment and Sustainability
Forest Resources and Climate Unit
T.P. 261, Via E. Fermi 1, 21020 Ispra (VA), Italy.

Abstract

Forest fires are a threat for the forest and natural areas in Europe. Over 65 000 fires take place every year in the European Union, burning, on average, half a million hectares of the European landscape. Economic losses due to forest fires in the European Union territory are estimated in over 2 billion Euro every year. Areas protected under the Natura 2000 scheme are no exception to the damage caused by forest fires. Every year, approximately 80 000 ha are burned within the Natura 2000 sites. In the study period of this report, between the years 2000 and 2012, 1 044 917 ha of Natura 2000 protected areas were burnt, corresponding to 3.28% of the total Natura 2000 area in the affected countries. The environmental and economic damage of these fires is difficult to estimate, since often fires affect protected and endangered species living in these protected habitats. The current report analyses the impact of forest fires in Natura 2000 sites during the period 2000 to 2012. Special emphasis is put on the analysis of damages caused by large fires in the EU Mediterranean region, where most of these fires occur.

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1. Introduction

Forest fires are a recurrent phenomenon in Europe; fires take place in all the European Union territory, although the most affected countries are those of the EU Mediterranean region. On average, about 65000 fires occur every year, burning approximately half a million ha of forests and natural lands.

Most of the fires are caused by humans; recent analysis of data in the European Forest Fire database of European Forest Fires Information System (EFFIS) showed that approximately 98% of the fires have a human related cause, often related to negligence, agricultural practices, but also caused intentionally.

The losses in Europe due to forest fires have been estimated in approximately 2 billion Europe, being this a conservative figure due to the difficulty in valuing the loss of special habitats such as those of the Natura 2000 network. The area protected under this EU scheme is often subject to damages by forest fires.

The present report analyzes the damages caused by forest fires in the Natura 2000 network in the recent past, taking as a reference period the years between 2000 and 2012 for which data are available within EFFIS.

2. Natura 2000 coverage across Europe

In May 1992, the governments of the European Union (EU) adopted legislation designed to protect the most seriously threatened habitats and species across Europe, which is referred as the Natura 2000 network of protected areas. Terrestrial Natura 2000 sites account for around 17% of the territory of Europe.

Natura 2000 coverage in individual EU countries varies from less than 10% (Denmark and UK) to over 30% (Bulgaria and Slovenia). Figure 1 shows the proportion of the Natura 2000 areas in the European countries as compared to the total area in the country. Spain is the country with the largest area protected under the Natura 2000 scheme, being Belgium, Netherlands and Denmark those countries with the smallest proportion of area protected. Malta does not have any Natura 2000 site.

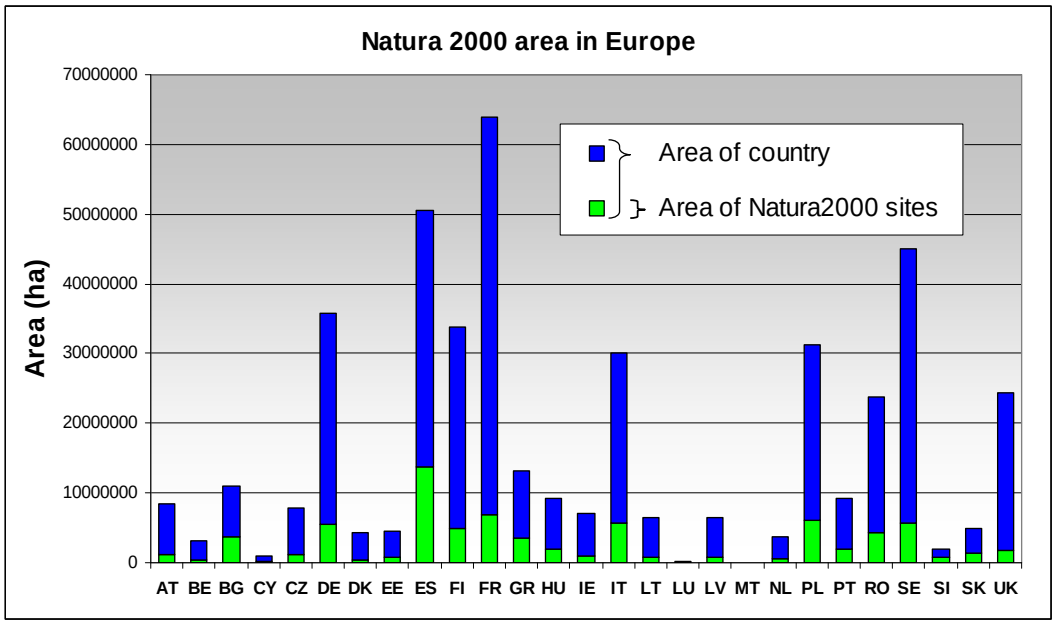

Figure 1. Natura 2000 area in Europe

The landcover within the Natura 2000 scheme represents those habitats that are of special interest and need protection. Within the overall scheme, the majority of the area corresponds to forests, with 39% of the total coverage. Other frequent landcover types are agriculture (29%), followed by "Other natural land" (19%). The proportion of landcover types in Natura 2000 sites of the overall EU territory is presented in Figure 2.

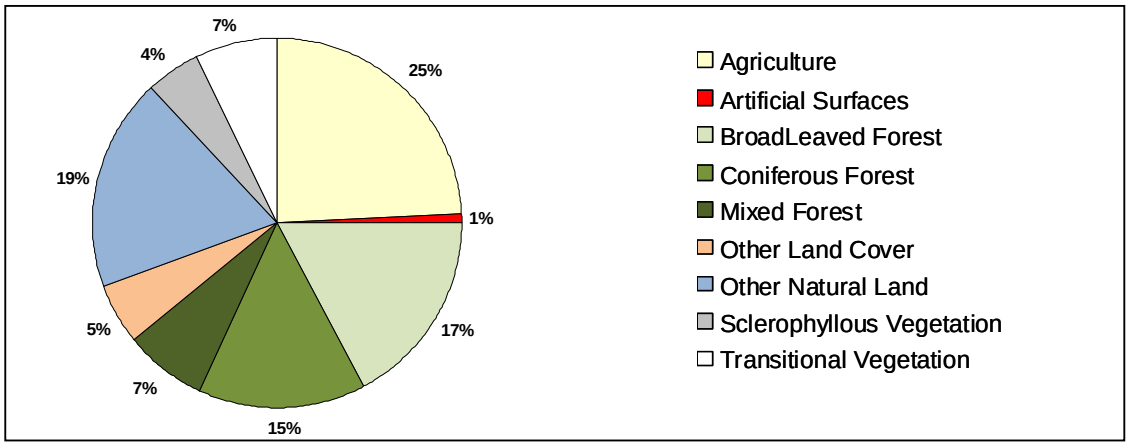

Figure 2. Comparison of the relative area of each of the land types in Natura 2000 sites across Europe.

Since forest is the landcover with the highest coverage, the Natura 2000 areas are also prone to suffer forest fires. The frequency and intensity of the fires within the sites is often high, as forests within protected areas tend to have minimal active management, which in turn leads to fuel accumulation and increased fire risk.

3. Analysis of forest fire damages in Natura 2000 across Europe

Information based on the data at the European Forest Fire Information System (EFFIS) was used for the analysis of forest fire impact in the Natura 2000 network. In EFFIS, imagery from the MODIS NASA satellite is used to map forest fires across the European territory. The spatial resolution of this imagery (250 m) permits the mapping of fires of 40 ha or larger. On average, the area burned by fires of this size corresponds to approximately 75% to 80% of the total area burnt in Europe each year. The estimates of burnt areas are produced daily, which permits the continuous monitoring of forest fires and their impact. EFFIS estimates show that, in Southern Europe during the period 2000–2012, over 80 000 ha of Natura 2000 were damaged by forest fires every year, adding to a total 1 044 917 ha burnt by fires within the Natura 2000 protected network in the period (see Table 1). In relative terms, 3.28% of the Natura 2000 area burnt in the last 13 years.

The CORINE Landcover 2000 database was used to assess the type of land cover burnt. The land cover type most affected in the period 2000-2012 was Other Natural Land. Around one third of the total burnt area mapped was in this class. Figure 3 shows the proportion of the different land cover types affected by forest fires in the reference period.

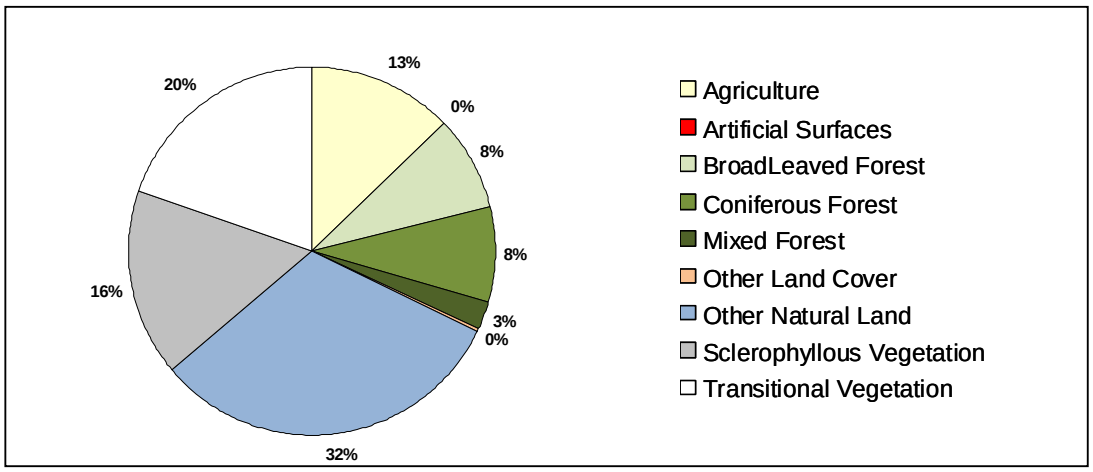

Figure 3. Comparison of burnt area in each of the land cover types in Natura 2000 sites 2000-2012

Figure 4 shows the mapped burnt area by landcover type over the time period 2000-2012. This figure shows that 2012 was the year with the highest damage to the Natura 2000 network. Other significant years were 2007, 2003 and 2000. These years mark also maxima in terms of burnt area in the overall European territory. However, the majority of the large fires in Europe occur in the Mediterranean region. Accordingly, the Mediterranean region is the area where Natura 2000 sites are most affected forest fires. The following sections analyse the damage caused by forest fires within the Natura 2000 network of the most affected EU countries: Portugal, Spain, France, Italy and Greece.

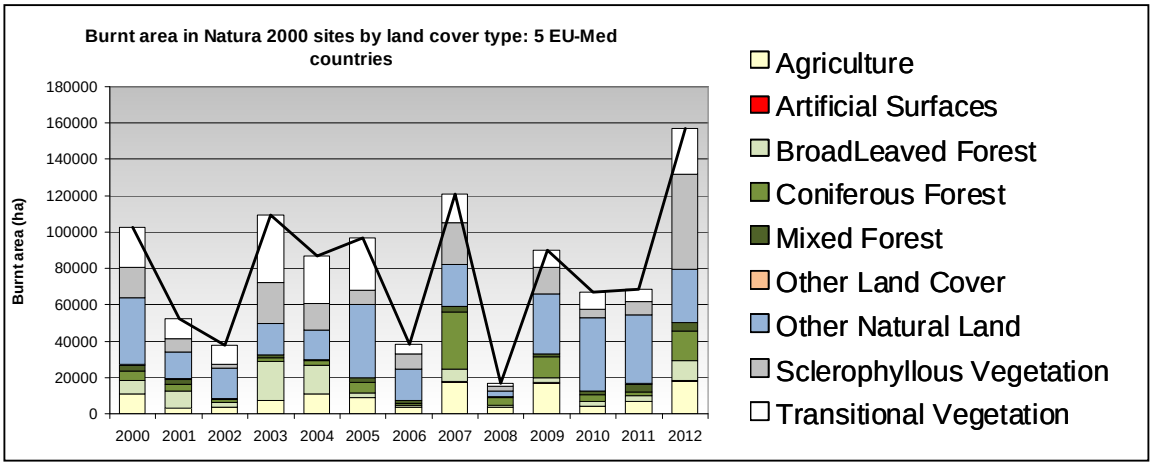

Figure 4. Burned area in Natura 2000 sites by land cover types and year

4. Analysis of damage in Natura2000 areas in the most affected EU countries

Most of the damages caused by forest fires in Natura 2000 occurred in France, Greece, Italy, Portugal and Spain. In these countries, on average, EFFIS estimates that over 80 000 hectares are burnt each year in Natura 2000 sites, with peaks of over 100 000 ha occurring in 2012, 2007, 2003 and 2000. Table 1 (below) shows the annual burnt area in each of the countries during the period 2000 – 2012. The peaks in terms of fire damage for each country are highlighted in bold within the table.

Table 1. Total mapped burnt area in the five southern Mediterranean countries.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
France	5346	2720	1364	**8221**	1673	3629	684	694	1016	1113	3771	691	1474	32396
Greece	12492	1916	302	0	993	1383	3529	**38192**	5179	7390	2427	11849	13821	99473
Italy	16060	7371	1177	8515	2119	4023	3558	**42553**	5338	13895	5259	11987	33311	155166
Portugal	28416	22126	21347	**64765**	44590	53906	17183	5475	846	18915	47862	16905	22510	364845
Spain	40226	18251	13709	27923	37250	33844	13347	34045	4562	48944	7893	27255	**85789**	393037
Total	102539	52384	37898	109424	86625	96786	38302	120960	16941	90255	67212	68687	156905	1044917

Figure 5 shows the distribution of the burnt area within Natura 2000 sites in the five Mediterranean countries in the study period.

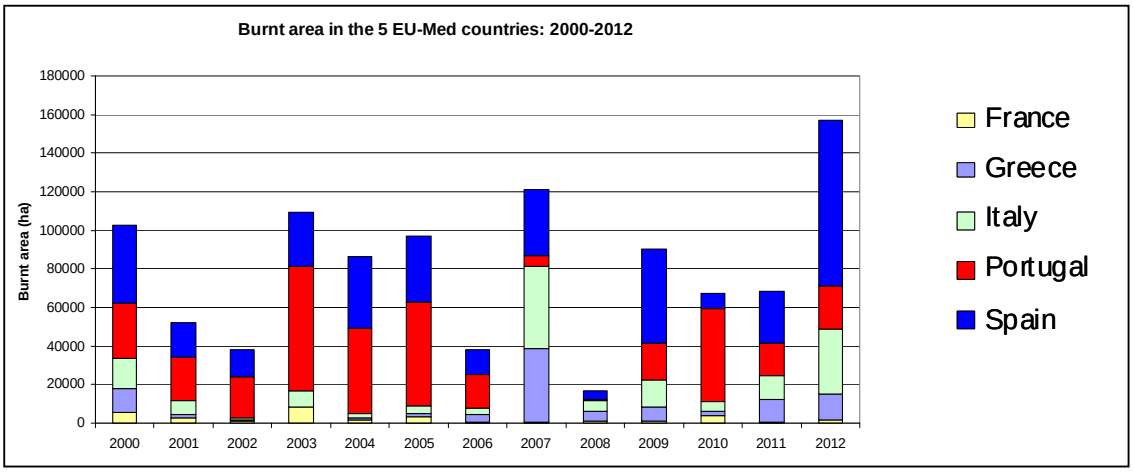

Figure 5. Burnt area in Natura 2000 sites in the 5 southern Mediterranean countries

Portugal suffered high forest fire damages in Natura 2000 areas in the years 2003, 2004, 2005 and 2010. In Spain, the worst two years in terms of damages in the protected area network were 2009 and the current year 2012. Italy, as well as Greece suffered large damages in 2007, when most of the Eastern part of the Mediterranean region was heavily affected by forest fires. The year 2007 marks a historical maximum of forest fire damages in both countries.

The countries in which Natura 2000 areas were most affected by fires in the study period were Portugal and Spain, each of them accounting for over one third of the total burnt area (Figure 6a). The effect on Natura sites is however much higher in Portugal, which is

a smaller country with less Natura 2000 land (Figure 6b). Portugal accounts for only 6% of the Natura 2000 area in the 5 countries, but 35% of the area burnt.

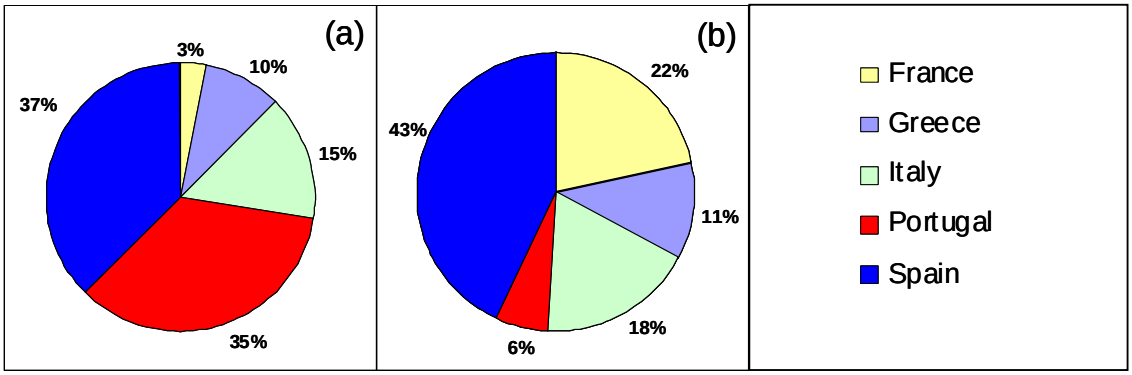

Figure 6 (a) Comparison of burnt area in Natura 2000 sites in the 5 southern Mediterranean countries; (b) Proportion of Natura 2000 sites in the 5 southern Mediterranean countries

Table 2 provides an overview of the area covered by Natura 2000 sites in each of the 5 EU Mediterranean countries most affected by forest fires, the amount of burnt area within the protected network in the study period and the percentage of the total number of protected sites in the country that were affected by forest fires. Spain is the country with the larges area under Natura 2000 protection and the one with the highest burnt area in these sites, corresponding to 2.8% of the total Natura 2000 areas in the country; this percentage is very similar to the percentage of affected Natura 2000 areas in Greece and Italy. Comparatively, the damage suffered by Portugal (364 845 ha) implies a large impact on its Natura 2000 protected sites. Nearly 20% of the total Natura 2000 area in the county was burnt between 2000 and 2011. France is, within the countries most affected by forest fires, the one with the smallest percentage of damage in Natura 2000 areas. However, this is due to the fact that only southern France has a Mediterranean climate and is thus affected by forest fires.

Table 2. Area of Natura 2000 sites in the 5 southern Mediterranean countries

Country	Area of Natura 2000 sites (ha)	Total burnt area (ha) 2000-2011	% of Natura 2000 area affected
France	6 861 964	32 396	0.5%
Greece	3 579 808	99 473	2.8%
Italy	5 769 741	155 166	2.7%
Portugal	1 910 818	364 845	19.1%
Spain	13 718 035	393 037	2.8%

5. Detailed analysis of damage caused by forest fires in Natura 2000 within each country.

This chapter provides a detailed analysis of the damages caused by forest fires in each of the 5 most affected EU Member States, followed by a summary report for the rest of the EU countries.

5.1. EU most affected countries

5.1.1. Portugal

Portugal was the second most affected of the 5 Mediterranean countries in the period 2000-2012. An average of over 28 000 ha are burnt in Natura 2000 land each year. Fires larger than 40 ha affected 74 Natura 2000 sites between 2000 and 2012. The fire damage in Natura 2000 sites by cover type is presented in Figure 7.
The largest of these fires was in 2003 in Monique in the Southwestern part of the country, when 37 618 ha burnt. This is also registered as the largest fire in any Natura 2000 site anywhere over the last 13 years. The most affected land cover type in Portugal was Other Natural Land. The early years of the decade (2003-2005) saw the most damage to Natura 2000 sites. Since 2006, except from the peak in 2010, damage was lower. Figure 8 shows the impact of forest fires in Natura 2000 sites during the study period.

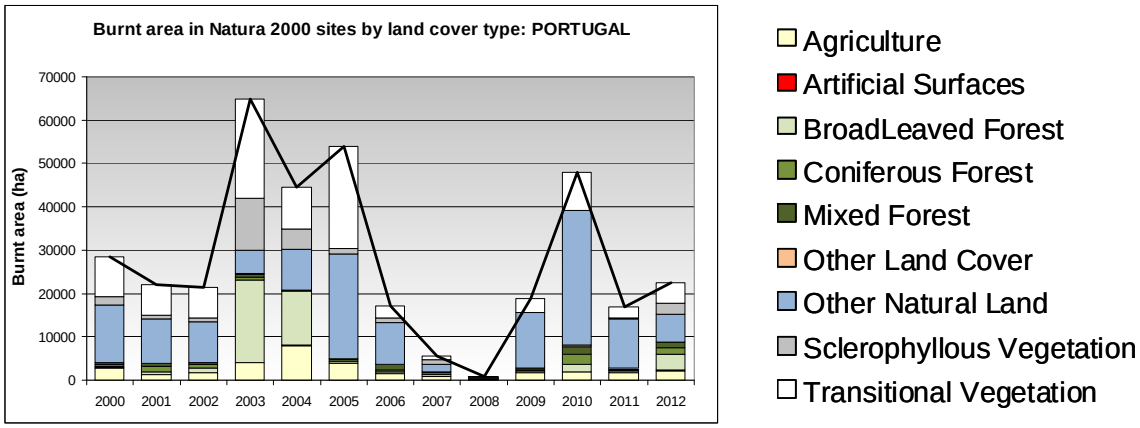

Figure 7. Burnt area in Natura 2000 sites 2000-2012 in Portugal

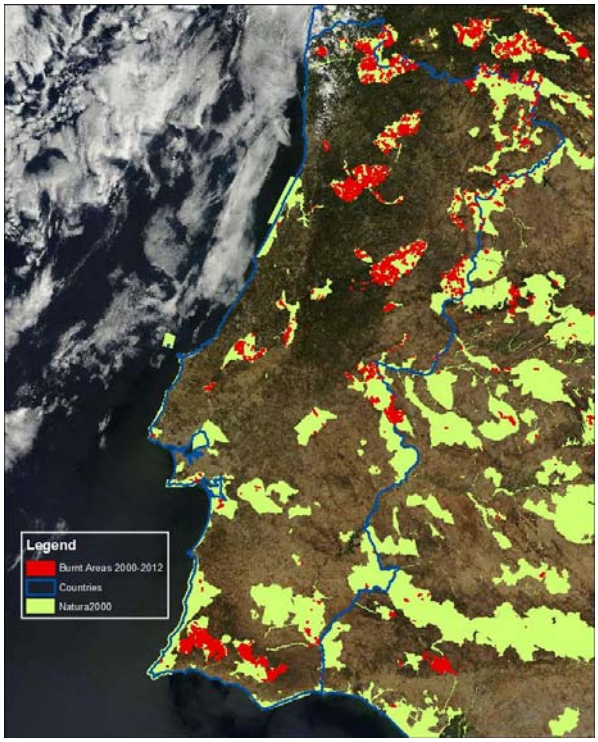

Figure 8. Natura sites affected by fires in Portugal 2000-2012

5.1.2. Spain

The very large area of Natura 2000 land that burnt in 2012 makes Spain the most affected of the 5 EU-Med countries, pushing up the 13 year average to over 30 000 ha burnt annually. The area burnt in 2012 was three times higher than the average of the previous 12 years. Fires of more than 40 ha occurred in 432 different Natura 2000 sites during the period 2000-2012. Peaks of fire damages occurred in the years 2009 and 2012. The trend of fire damage by cover type in the study period is presented in Figure 9. The largest fire was in Sierra De Martés-Muela De Cortes in 2012, when 20 554 ha were burnt.

In Spain the greatest amount of damage is registered in Sclerophyllous Vegetation, mostly because of the huge amount of damage that occurred in 2012. The impact of fires in Natura 2000 sites in Spain is shown in Figure 10.

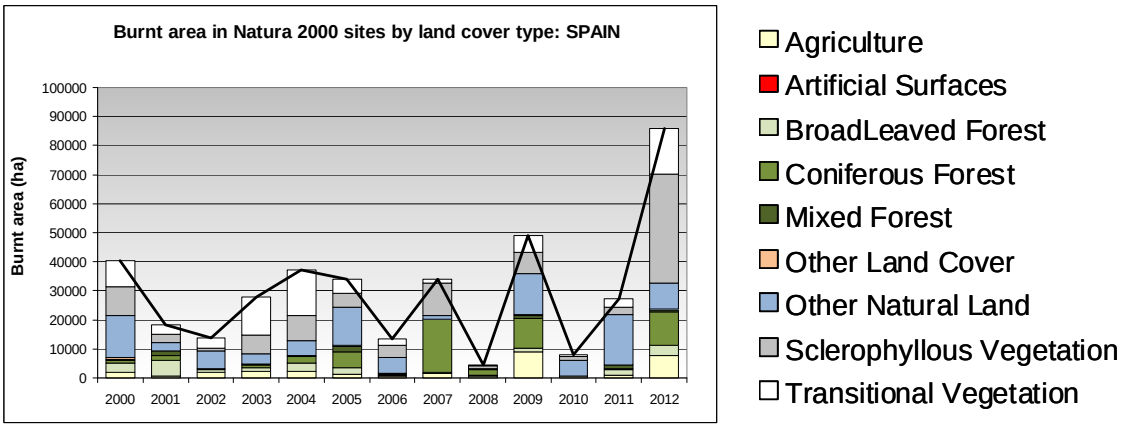

Figure 9. Burnt area in Natura 2000 sites 2000-2012 in Spain

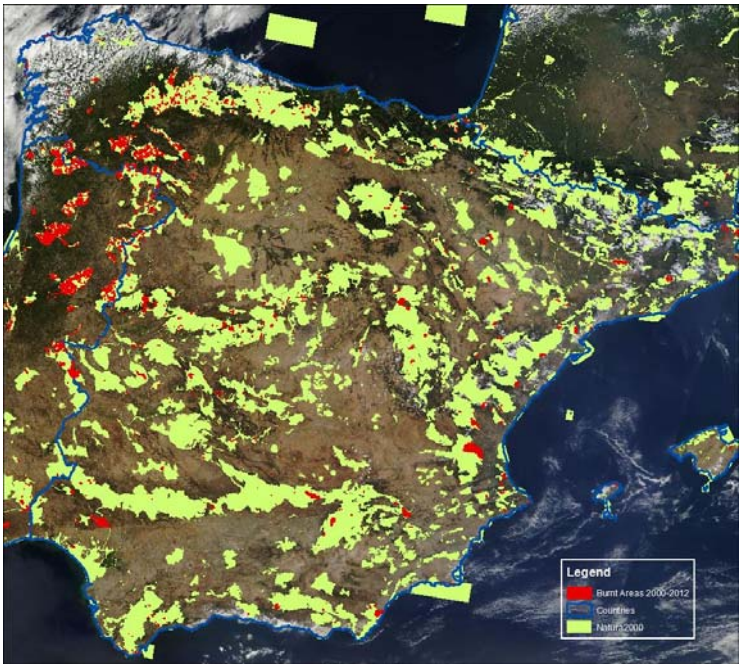

Figure 10. Natura sites affected by fires in Spain 2000-2012

5.1.3. France

In France, 111 Natura 2000 sites were affected by large fires between 2000 and 2011. The average area burnt fires in Natura 2000 sites per year is nearly 2 500 ha, although three times that area burnt in 2003, being this the worst year for damage in France. The intense drought in 2003 lead to an overall record of burnt areas in most European Mediterranean countries. The largest fire was registered in the Massif du Rotondo in Corsica in 2000, when 3590 ha were burnt. The trends of fire damages by cover type in Natura 2000 areas is presented in Figure 11.

In France, the land cover types most affected by fires were Other Natural Land (in particular before 2006) and Sclerophyllous vegetation. Fire distribution and impact on Natura 2000 sites are presented in Figure 12.

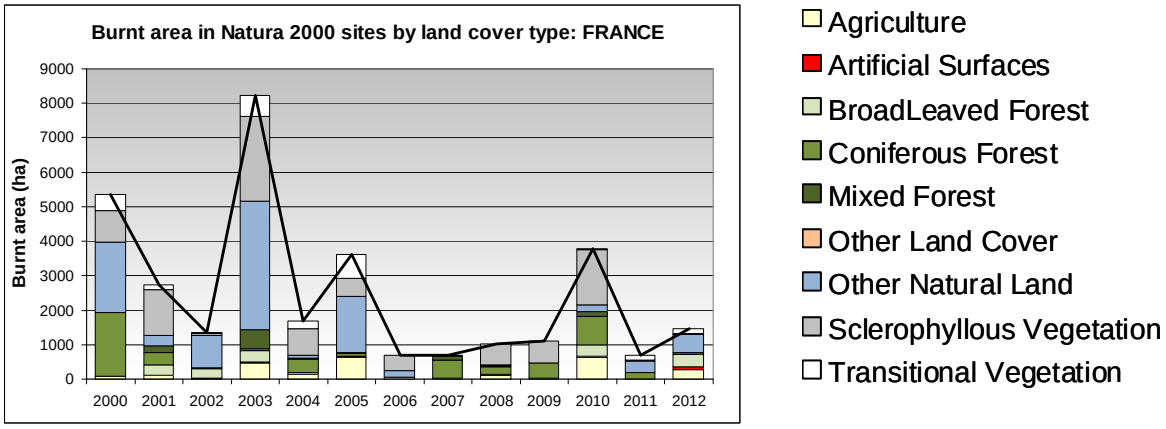

Figure 11. Burnt area in Natura 2000 sites 2000-2012 in France

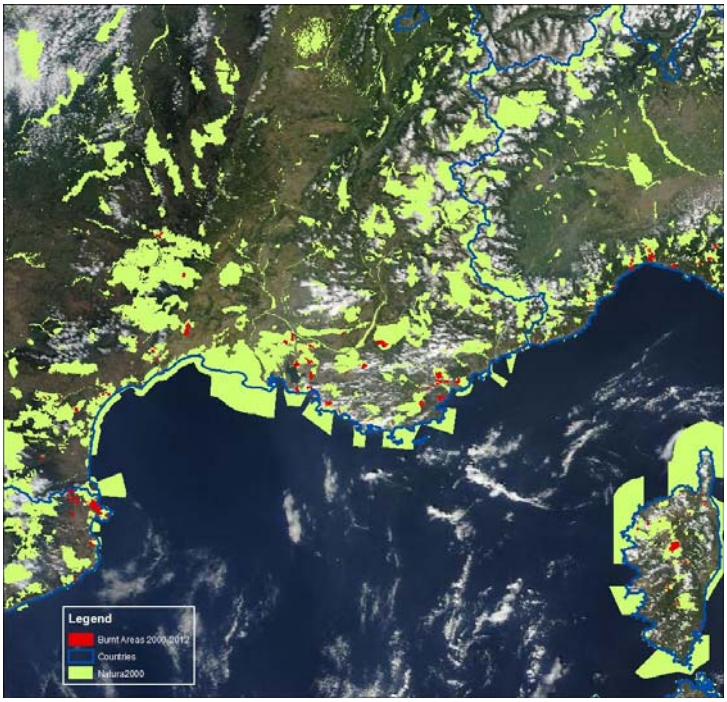

Figure 12. Natura sites affected by fires in France 2000-2012

5.1.4. Italy

In Italy, 321 different Natura 2000 sites were affected by forest fires between 2000 and 2012, burning an average of nearly 12 000 ha per year. The worst year in this period was 2007, although significant damage also occurred in 2012. High temperatures and dry winds in the year 2007 lead to record figures in terms of fire damages in Italy, the Balkan region and Greece The largest fire occurred in Sardinia in 2009, when 4964 ha were burnt. Figure 13 shows the trends of fire damage per year within the Natura 2000 areas. The peaks of fire damage in 2007 and 2012 are noticeable. The most severely affected land type in Italy is Other Natural Land.
Figure 14 shows the distribution of the fires and the impact on Natura 2000 areas in Italy. Noticeable damage is shown in the regions of Sicily and Sardinia.

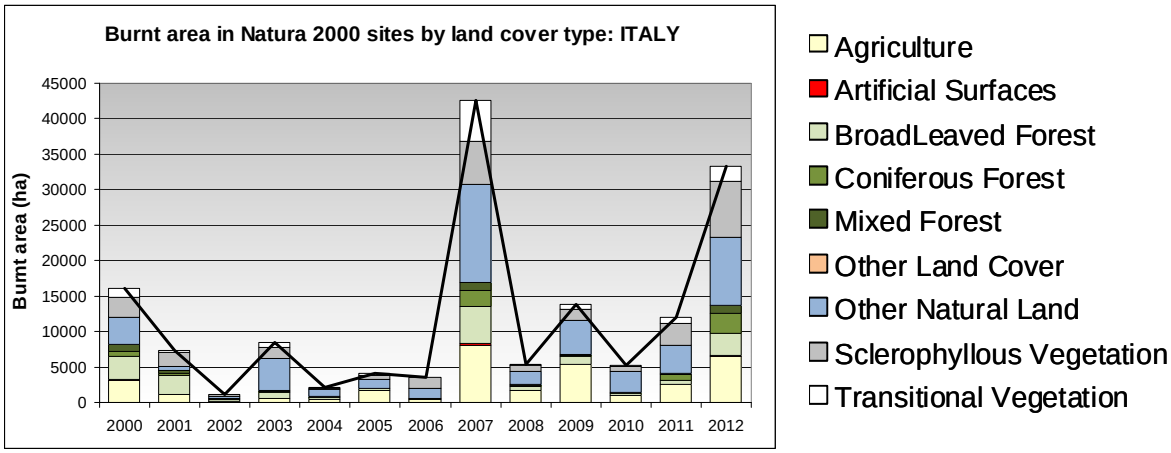

Figure 13. Burnt area in Natura 2000 sites 2000-2012 in Italy

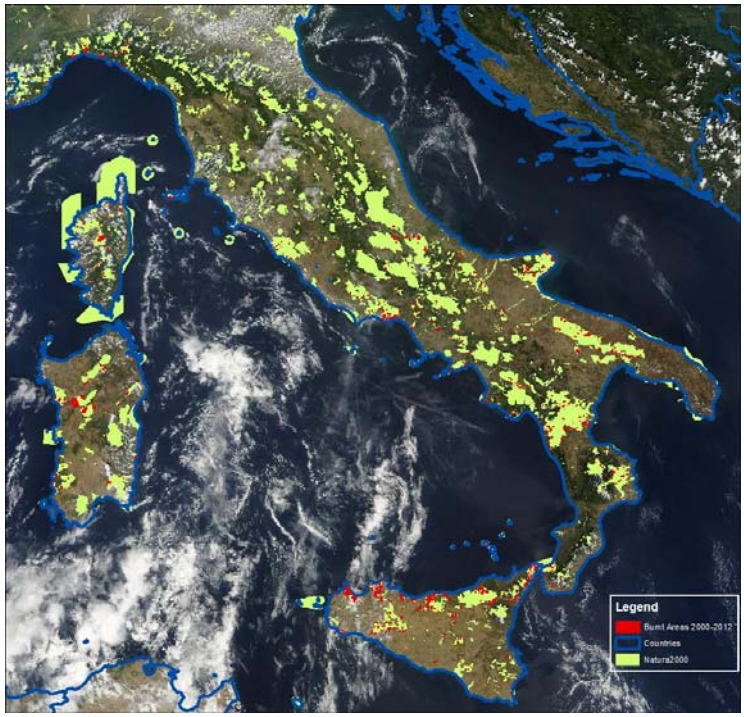

Figure 14. Natura sites affected by fires in Italy 2000-2012

In the case of both France and Italy, the largest fires recorded in Natura 2000 land were on the island territories (Corsica and Sardinia respectively).

5.1.5. Greece

In Greece, 122 Natura 2000 sites were affected by fires of 40 ha or more in the period 2000-2012. The average area burnt each year is over 7 500 ha. By far, the worst year in that period was 2007, when the largest fire also occurred in Oros Taygetos and burnt 8998 ha. In that year the area burnt was more than five times the average. The year 2007 marked a record in terms of fire damages in Greece, with over 300000 ha burnt in the county and high number of human casualties (80 people among civilians and fire fighters). Figure 15 shows that, in addition to the damages in 2007, large fire incidence that affected Natura 2000 sites took place in the years 2000, 2011 and 2012. The most affected land type in Greece is Other Natural Land.
Figure 16 shows the distribution of the large fires on the Natura 2000 areas in Greece.

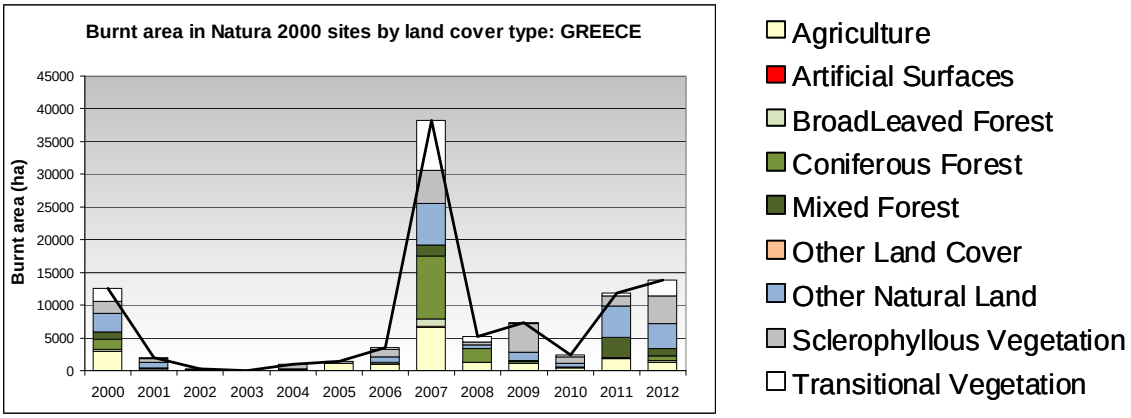

Figure 15. Burnt area in Natura 2000 sites 2000-2012 in Greece

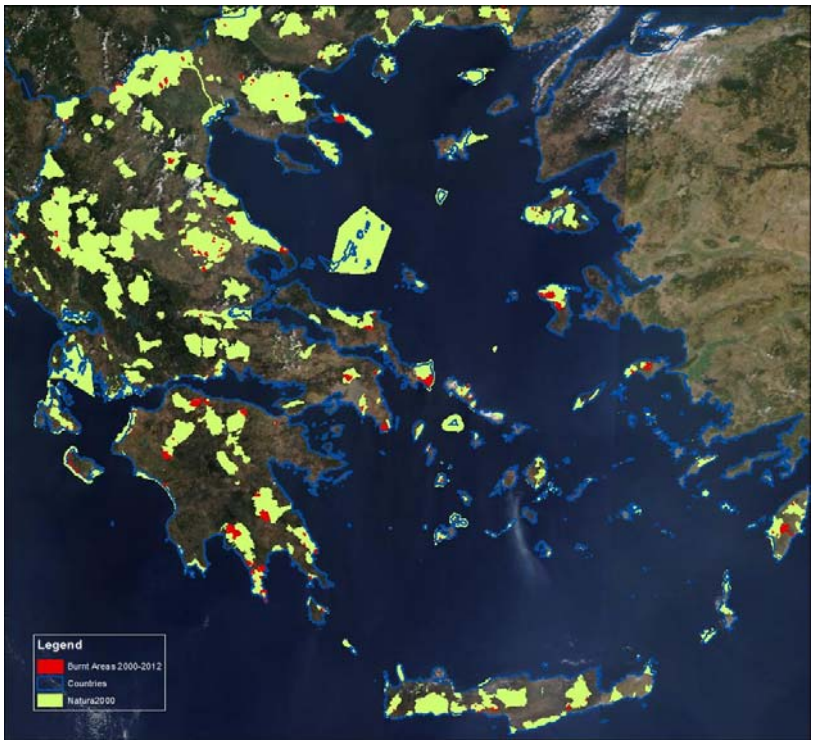

Figure 16. Natura sites affected by fires in Greece 2000-2012

Affected animal species

The Natura 2000 database provides information on species duelling in these protected areas. These species are often of high interest, and in many cases they are endangered species. In the time period 2000-2012 almost 1000 different species may have been affected by the forest fires across Europe; these included 45 amphibians, 448 birds, 60 fish, 79 invertebrates, 43 mammals and 319 plant species.

5.2. Other EU affected countries

Belgium
Fires larger than 40 ha, that is, those mapped in EFFIS are rare in Belgium. However, in 2011, **2144** ha burnt in Natura 2000 sites. 84% of the damage occurred in Other Natural Land (**1791** ha). The largest fire was in the Plateau Des Hautes-Fagnes (Baelen; Jalhay; Malmedy; Waimes) and burnt **1358** ha.

Bulgaria
Of the total burnt area mapped outside the 5 EU-Med countries discussed above, by far the most affected country in terms of burnt areas within the Natura 2000 sites, is Bulgaria, which accounts for over three-quarters of the remaining total burnt area mapped since 2007. In Bulgaria, 64 Natura sites were affected by fires to total **64410** ha burnt in this protected network since 2006. The majority of damage (42218ha) occurred in 2007, which was a critical year for fires in Bulgaria. The most affected land cover type was Agriculture (**28120** ha) and the largest fire occurred in Sakar, near the Greek border, burning **20 637** ha in 2007.

Cyprus
Large fires were mapped in EFFIS in the years 2004, 2006, 2007, 2010, 2011 and 2012. A total of **1016** ha were mapped over the period 2004-2012, with the worst year occurring in 2007 when **453** ha were mapped. The most affected land cover type was Agriculture (**371** ha) and the largest fire occurred in Plateau Gkremoi Chanoutari, burning **283** ha in 2006.

Hungary
Large fires were mappin in EFFIS in 2007 (87 ha) and 2012 (904 ha), making a total of **991** ha mapped over the period 2007-2012. The most affected land cover type was Coniferous Forest (**221** ha), and the largest fire took place in Bócsa-Bugaci Homokpuszta, burning **882** ha in 2012.

Ireland
Large fires are rare in Ireland. However 2011 was an exception; in that year **9630** ha burnt in Natura 2000 sites. Practically the whole burnt area was “Other Natural Land” (**9021** ha). The largest fire was Cloghernagore Bog And Glenveagh National Park and burnt **4061** ha.

Romania
Large fires were mapped in EFFIS in 2011 (333 ha) and 2012 (1524 ha) making a total of **1857** ha over the period 2007-2012. The most affected land cover type was Other Natural Land (**861** ha) and the largest fire occurred in the Delta Dunarii, burning **333** ha in 2011.

Slovenia
Although large fires are not common in Slovenia, some took place in 2003 (265 ha), 2006 (557 ha) and 2012 (257 ha) making a total of **1079** ha burnt over the period 2003-2012. The most affected land cover type was Coniferous Forest, accounting for **267** ha. The largest fire occurred in Kras and burnt **557** ha in 2006.

Sweden
Large fires were mapped in Sweden in 2009 (49 ha) and 2011 (143 ha) making a total of **192** ha over the period 2009-2011. By far the most affected land type was Other Natural Land (**144** ha). The largest fire burnt **143** ha in 2011 in Tönnersjömålet Och Mästocka Skjutfält.

The Netherlands
Generally, there are no large fires in the Netherlands; however, in 2011, **148** ha burnt in Natura 2000 sites. **93** ha of this area was Other Natural Land. The largest fire occurred in Duinen Schoorl and burnt **148** ha.

United Kingdom
Large fires were exceptionally recorded in EFFIS in 2011 when **8536** ha burnt in Natura 2000 sites in the North of the country. The most affected land type was Other Natural Land, accounting for over 90% of the burnt area (**7855** ha). The largest fire was in Slieve Beagh – Mullaghfad – Lisnaskea in Scotland and burnt **2733** ha.

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